Investors' reactions to management forecast forms

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Investors' Reactions to Management Forecast Forms

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Nanyang Business School

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TABLE OF CONTENTS

CHAPTER 1: INTRODUCTION	4
CHAPTER 2: EVIDENCE OF MID FORECASTS	9
CHAPTER 3: BACKGROUND AND HYPOTHESES DEVELOPMENT ...	12
3.1 FORECAST PRECISION AND INVESTORS' CONFIDENCE	12
3.2 EFFECTS OF INVESTORS' KNOWLEDGE ON MANAGEMENT FORECAST FORMS	16
3.3 MULTIPLE REFERENCE POINTS AND INVESTORS' REESTIMATES AFTER THE ACTUAL EARNINGS ANNOUNCEMENT	19
3.4 EFFECTS OF INVESTORS' KNOWLEDGE ON MANAGEMENT FORECAST FORMS	26
CHAPTER 4: METHOD	31
4.1 DESIGN	31
4.2 PARTICIPANTS.....	31
4.3 PROCEDURE	31
CHAPTER 5: RESULTS	35
5.1 MANIPULATION AND OTHER CHECKS	35
5.2 PARTICIPANTS' KNOWLEDGE OF MANAGEMENT FORECAST FORMS	36
5.3 TESTS OF HYPOTHESES	41
5.3.1 <i>Investors' Confidence in Earnings Estimates after the Management Forecast (H1a & H1b).....</i>	41
5.3.2 <i>Investors' Earnings Reestimates after the Actual Earnings Announcement (H2a & H2b)</i>	44
5.4 SUPPLEMENTARY ANALYSIS: PARTICIPANTS' QUALITATIVE EXPLANATIONS OF THEIR EARNINGS REESTIMATES	49
5.5 OTHER PERCEPTIONS OF ZETHA AND ITS MANAGEMENT	52
5.6 WITHIN-SUBJECTS TEST	55
5.6.1 <i>Replicating the Between-Subjects Findings (H2a & H2b) in the Within- Subjects Setting</i>	56
5.6.2 <i>Extending the Findings to the Scenario Where the Actual Earnings Fall in the upper End</i>	58
CHAPTER 6: CONCLUSIONS	62
REFERENCES	68
APPENDIX 1. EXPERIMENT MATERIAL IN THE POINT FORECAST CONDITION	90

LIST OF TABLES

Table 1 Descriptive Statistics of MID Earnings and Revenue Forecasts	744
Table 2 Descriptive Statistics of Firms that Issue MID Forecasts	755
Table 3 Predictions Based on the Multiple-Reference-Points Argument	777
Table 4 Participants' Classifications of the Two MID Forecast Examples	799
Table 5 Investors' Earnings Estimates and Confidence in Estimates after Management Forecast	80
Table 6 Paired Contrast Tests on Participants' Confidence in Estimates after the Management Forecast (One-tailed Significances)	81
Table 7 Investors' Earnings Reestimates and Confidence in Reestimates after the Actual Earnings Announcement	82
Table 8 Paired Contrast Tests on Participants' Earnings Reestimates after the Actual Earnings Announcement (One-tailed Significances)	84
Table 9 Analysis of Qualitative Explanations of the Earnings Reestimates after the Actual Earnings Announcement	85
Table 10 Mean Ratings of Perceptions of Zetha and Its Management	87
Table 11 Within-Subjects Tests	88
Table 12 Summary of Findings in the Between- and Within-Subjects Settings	89

Investors' Reactions to Management Forecast Forms

ABSTRACT

In this study, I investigate investors' reactions to a new form of management forecast that is a hybrid of point and range forecasts (henceforth, MID forecast). A MID forecast takes the form "EPS will be around \$X, plus or minus \$Y." I also examine whether investors' reactions to management forecast forms are moderated by their knowledge. High-knowledge investors are able to appropriately interpret the information of earnings uncertainty conveyed by the forecast form, whereas low-knowledge investors fail to pick up this information. Results suggest that at the moment of management forecast, high-knowledge investors' confidence ratings are similar in the point and MID condition, and both are higher than that in the range condition. Low-knowledge investors' confidence does not differ across forecast forms. Based on multiple-reference-points theory, I predict that for the high-knowledge investors, their earnings perspective after the actual earnings announcement is most positive for a range forecast, followed by a MID forecast, then by a point forecast, when the actual EPS falls below the point forecast and falls within the lower end (i.e., being short of the midpoint and exceeding the lower endpoint of the range). In contrast, the low-knowledge investors focus on the explicit primary benchmark(s) and neglect the implicit secondary benchmark(s). Their earnings perspectives after the actual earnings announcement are similar between the point and MID forecasts, and both are more negative than that for the range forecast. A fourth forecast form, the "range + midpoint" forecast, which does not exist in practice, is also created in the present study in order to disentangle the effects for the predicted precision difference between the MID forecast and the range forecast, as well as to evaluate investors' perceptions of the importance of the midpoint in a range forecast. A "range + midpoint" forecast takes the form "EPS will be around \$X, varying from \$Y to \$Z." Results suggest that explicit mention of the point best estimate in the MID forecast but not in the range forecast is the attribute responsible for the precision difference. The high-knowledge investors regard the midpoint (which is only implicit) in a range forecast as a very important benchmark; whereas the low-knowledge investors fail to do so.

Key words: multiple reference points, forecast form, knowledge, forecast precision

CHAPTER 1: INTRODUCTION

The issuance of management earnings forecasts¹ has become increasingly popular among listed companies, and is an area that has attracted growing research interest (Baginski et al. 1993; Pownall et al. 1993; Baginski and Hassell 1997; Soffer et al. 2000; Healy and Palepu 2001). Academic research shows that management forecasts have information content (Pownall et al. 1993), and that managements issue earnings forecasts in order to mitigate litigation risk (Skinner 1994), to fill in the information gap between insiders and outsiders so as to lower cost of capital (Han and Wild 1991; Healy and Palepu 2001), and/ or to establish reputation among analysts (Skinner 1994; Williams 1996; Libby and Tan 1999). Research also provides evidence that these management forecasts can magnify investors' reactions to positive or negative earnings news (Libby and Tan 1999; Soffer et al. 2000) and that different forecast forms lead to different stock market reactions (Baginski et al. 1993).

Research on management forecasts, thus far, documents five types of management earnings forecasts — point, range, minimum, maximum and qualitative (Baginski et al. 1993; Pownall et al. 1993; Baginski and Hassell 1997; Soffer et al. 2000). Point forecasts refer to those earnings forecasts in which only a best estimate is specified; e.g., "Earnings for the second quarter will be about \$0.11 a share." Range forecasts indicate both the minimum and maximum limits of the

¹ Management earnings forecast literature generally refers to managements' voluntary earnings disclosures issued before the end of the addressing period as "forecasts" (Baginski et al. **1993**), and those issued after the end of the addressing period, but before the formal earnings announcement as "preannouncements" (Soffer et al. **2000**), or "preliminary earnings estimates" (Baginski et al. **1994**). My study does not differentiate these two, and the term "management forecasts" here refers to both; i.e., any managements' voluntary earnings disclosures before the formal earnings announcements.

expected earnings; e.g., "Earnings for the second quarter will be between \$0.08 and \$0.13 a share." Minimum (maximum) forecasts specify the lowest (highest) possible result only. Finally, qualitative forecasts are those in which no numbers are contained, whereas management expresses very general impression of the future earnings; e.g., "Earnings are going to reach a record level." (For more detailed examples of each type of management earnings forecast, please refer to Kross et al. [1994].)

The above five categories of management earnings forecast, however, may not be exhaustive. With the increasing number of firms that engage in the issuance of management forecasts (Baginski et al. 1993; Cotter et al. 2002), the nature and type of management forecasts have become more diversified and complicated. I analyze a small sample of recent management earnings forecasts issued in press releases, and find that some of the forecasts do not clearly fall in any of the above five categories.

Consider the following forecast issued by Echelon Corporation, a company listed on NASDAQ, in its inter-quarter conference call:

"We expect GAAP earnings per share for Q3 2003 to be 8 cents per share, plus or minus 1 cent per share." (FD [FAIR DISCLOSURE] WIRE, 26 August 2003)

The earnings forecast cited above does not clearly belong to any one of the five categories. It jointly specifies both management's best estimate and the possible variations from the best estimate. In this sense, it can be viewed as a hybrid of point and range forecasts (hereafter, I name it MID forecast) in that it

provides both a best estimate (as in a point forecast) and a range (as in a range forecast). The MID forecast takes the form "EPS will be around \$X, plus or minus \$Y," and combines the characteristics of both the point forecast and the range forecast.

I refer to Dow Jones & Reuters database to identify the empirical frequency of MID earnings and revenue forecasts. I document a small but significant number, as well as an increasing trend of MID forecasts in recent years. Further investigation shows that FirstCall database rephrases all the traceable MID earnings forecasts as either point or range forecasts. None of the MID forecasts is recorded in the original form. This phenomenon suggests that the database provider assumes little difference between the MID form and range (as well as point) form.

The purpose of my study is to identify whether and how the investors' reactions to a MID forecast can be different from their reactions to either a point or a range forecast. This issue is important because the frequency of MID forecasts is increasing over time, and it is a recent phenomenon. However, little is known about the properties and effects of the MID forecasts. In my study, I use the point forecast and range forecast as comparison groups because the MID forecast contains attributes of both. Here, I focus on EPS forecast, consistent with the experimental studies in this area (Hirst et al. 1999; Libby and Tan 1999; Tan et al. 2002; Libby et al. 2004).

I also investigate investors' reactions to actual earnings that fall within the lower end of the forecast range, i.e., the actual earnings are higher than the lower endpoint but lower than the midpoint of the range. Both Tan et al. (2002) and

Libby et al. (2004) suggest that investors' earnings reestimates² after the actual earnings announcement are affected by the actual EPS's position relative to management forecast. In the experiment by Libby et al. (2004), actual earnings fall within the wide range (where the range width is 8 cents), but outside of the narrow range (where the range width is 4 cents). Libby et al. (2004) suggest that falling within a range mitigates investors' reactions to a point forecast. However, their results are also consistent with the effect of a wide range rather than the effect of actual earnings falling within a range. In the present study, the range width is held constant at 4 cents, and the actual earnings fall within the range. This allows me to see whether the mitigating effect of falling within the range is applicable to a narrow range as well. I use a laboratory experiment in the present study for several reasons. First, investors' decision-making processes cannot be directly observed and measured by analyzing archival data. A laboratory experiment has the advantage of observing and documenting participants' various judgments and choices. Second, management earnings forecasts are often accompanied with other informative news, e.g., actual earnings announcements, revenue forecasts (Han and Wild 1991), and attributions (Baginski et al. 2000; Baginski et al. 2004). It is difficult to isolate the forecast form effect from other confounding events by analyzing archival data. A laboratory experiment allows control of other extraneous effects and provides a clear test of the forecast form effect. Third, the frequency of MID forecasts is increasing but currently not large enough to enable analysis of

²In the present study, "forecasts" refer to managements' expectations of future earnings; and "estimates" refer to investors' expectations of future earnings. Here, investors' earnings estimates are investors' expectations after the management forecast, and investors' earnings reestimates are their new expectations after the actual earnings announcement.

archival data. Furthermore, I find evidence that these MID forecasts are variously coded either as a point or range forecast in the FirstCall database, a well-accepted management forecast database in archival studies. Thus, existing databases such as FirstCall do not separately code these MID forecasts, appear to assume that these MID forecasts are either point or range forecasts, and also assume that their properties are indistinguishable from point or range forecast. This adds to the difficulties of archival analysis.

The rest of the paper is organized as follows. Chapter two documents empirical evidence of MID forecasts. Chapter three reviews prior literature and develops my research hypotheses. Chapter four describes the experiment method. Chapter five presents data analysis and results. Lastly, chapter six draws conclusions.

CHAPTER 2: EVIDENCE OF MID FORECASTS

To provide some evidence on the trend of issuing MID forecasts, I searched the Dow Jones & Reuters database, and hand-collected a sample of MID forecasts issued from Jan 1,2001 to May 3 1,2004).³

Insert Table 1 here

Panel A of Table 1 shows the sample selection process. The final sample consists of 97 MID earnings forecasts and 115 MID revenue forecasts. The reason I include revenue forecasts is that prior research shows that revenue forecasts, whether issued with or without earnings forecasts, are informative (Han and Wild 1991). I only include the forecasts at the firm level and exclude segmental forecasts. Earnings forecasts are forecasts of EPS, or other earnings-related items, i.e., gross income, operating income, EBITDA or net income.⁴ Revenue forecasts are forecasts of sales or total revenues. I do not include forecasts of other variables, like expenses, investments or cash flows.

Panel B shows the distribution of the MID earnings and revenue forecasts by year. In year 2001, there are only 9 MID forecasts. The number jumps to 80 in year 2002 and remains at the similar level (83) in year 2003. From January to May

³ The search keywords are: (earnings or EPS or income or loss or revenue or EBITDA or sales or result*) same [(anticipate* or believe* or estimate* or expect* or predict* or project* or assume* or forecast* or intend*) and ("plus or minus" or "up or down" or "high* or low*" or "up* or low*")]

⁴ 75 of the 97 earnings forecasts are EPS forecasts.

2004, there are altogether 40 MID forecasts. Panel C shows the distribution of the MID forecasts by forecast horizon. Consistent with other forecast forms, the MID forecasts are more frequently issued for the fourth quarter and the whole financial year than for the first three quarters (Han and Wild 1991; Ajinkya et al. 2003).

Insert Table 2 here

Table 2 shows the distribution of firms that issued MID forecasts. 46 firms issued MID earnings forecasts, and 43 issued MID revenue forecasts. Among the 79 firms that issued MID forecasts, 1 lists on AMEX, 1 on the OTC market, 25 on NYSE, and the remaining 50 on NASDAQ. Panel A of Table 2 shows the firms' distribution by industry (according to their 2-digit SIC codes). The distributions of firms that issued MID earnings forecasts and that issued MID revenues forecasts are quite similar. Overall, the firms are diversified into many industries including mining, manufacturing, transportation & public utilities, retail, finance, and services. The firms cluster in three industries, i.e., manufacturing of industrial machinery & equipment, manufacturing of electronic & other electric equipment, and business service.

Over half the firms (59.5%, or 47/79) issued MID forecast only once. There are several firms that consistently issue MID forecasts (e.g., Surebeam Corp., Pegasystems Inc., OpenWave Systems Inc., and Echelon Corp.).

For the 75 MID EPS forecasts, I refer to CIG database ("Company Issued Guidance" database – a database of management earnings forecasts developed by Firstcall) to check its record. 33 MID EPS forecasts have corresponding records in CIG. 4 are recoded as point forecasts and 29 are recoded as range forecasts. None of the MID EPS forecasts is recorded in its original form.

Overall, the distributions of the MID forecasts (the firms that issued MID forecasts) are quite similar to the distributions of other forecast forms (the firms that issued management forecasts in other forms) documented in previous empirical studies (Waymire 1984; Han and Wild 1991; Ajinkya et al. 2003; Clement et al. 2003). There is no evidence that MID forecasts pertain to certain forecast horizons, or firms in certain industries.

CHAPTER 3: BACKGROUND AND HYPOTHESES **DEVELOPMENT**

3.1 FORECAST PRECISION AND INVESTORS' CONFIDENCE

"Forecast precision" and "forecast specificity" are terms that are interchangeably used in management earnings forecast literature. For example, Baginski et al. (1993) and Baginski and Hassell (1997) use the term "forecast precision," while Bamber and Cheon (1998) and Ajinkya et al. (2003) use the term "forecast specificity." Prior research suggests that management signals earnings uncertainty by varying forecast precision (Hirst et al. 1999). Forecasts come in various forms, and are correspondingly associated with different precision levels. The following forecast forms have descending order of precision—point, range, open-ended (minimum and maximum), and qualitative (Hirst et al. 1999; Ajinkya et al. 2003).

Earlier studies document mixed stock price reactions to forecast precision. Although some empirical-archival studies indicate that the magnitude of stock price reaction is positively related to forecast precision (King et al. 1990; Morse et al. 1991; Baginski et al. 1993), others report results indicating no effect of forecast precision on stock prices (Pownall et al. 1993). Recent experimental studies find that although investors' earnings estimates made after the issuance of management forecasts are not affected by forecast precision, their confidence in these estimates is positively related to precision, which further affects their investment decisions (Hirst et al. 1999; Barber and Odean 2001; Libby et al. 2004).

I argue that similar to a range forecast, the MID forecast should be less precise than an equivalent point forecast.⁵ Both the point and MID forecasts explicitly specify the single best estimate. However, the management additionally expresses its uncertainty on future earnings in the MID forecast, but not in the point forecast.

Analytical models use the standard deviation of the forecast range (or its square) as the proxy for forecast precision (Kim and Verrecchia 1991; Morse et al. 1991). From this perspective, the standard deviation of a MID forecast equals that of an equivalent range forecast. However, from a psychological perspective, a MID forecast could be perceived to be more precise than an equivalent range forecast. First, a single best estimate is provided in a MID forecast, but not in a range forecast. For simplicity, many archival studies on management earnings forecasts use the midpoints of range forecasts as proxies for the range forecasts (Williams 1996; Bamber and Cheon 1998; Soffer et al. 2000; Rogers and Stocken 2003). However, management issuing such a range forecast does not explicitly indicate that the midpoint is the best estimate, nor which point within the range is the most likely outcome (and, therefore, every point within the range is a possible outcome specified by management). In contrast, management specifically mentions the

⁵ In my experiment, I hold constant the point forecast and the midpoints in the MID, range, and "range + midpoint" forecasts. I also hold constant the lower and upper limits (i.e., the widths of the ranges) of the MID, range and "range + midpoint" forecasts. For example, if the MID forecast is "Earnings will be around 2 cents, plus or minus 1 cent," the equivalent point forecast is "Earnings will be around 2 cents;" the equivalent range forecast is "EPS will be between 1 cent and 3 cents;" and the equivalent "range + midpoint" forecast is "Earnings will be around 2 cents, varying from 1 cent to 3 cents."

midpoint as the best estimate in a MID forecast, which implies greater precision and specificity than in a range forecast.

Second, only half of the range width is explicitly described in a MID forecast. For example, in a MID forecast that uses the expression "Earnings are expected to be 30 cents, plus or minus 10 cents," only half the range width (i.e., 10 cents) is numerically emphasized. In contrast, in the equivalent range forecast "Earnings are expected to be between 20 and 40 cents," the entire range width of 20 cents is specified. Thus, the perceived precision is likely to be higher in a MID forecast than in a range forecast, although technically, both the MID and range forecasts in this example have identical range widths.

In summary, investors should perceive a MID forecast to be more precise than a range forecast because (a) a single best estimate appears in the MID forecast but not in the range forecast; and/or (b) only half of the range width is expressed in the MID forecast.

To isolate these two effects, a hypothetical forecast form (hereafter, I name it "range + midpoint" forecast) that does not exist in practice is created in the present study.⁶A "range + midpoint" forecast takes the form "Earnings per share will be around \$X, varying from \$Y to \$Z." A "range + midpoint" forecast mentions the whole range width and the midpoint at the same time. Therefore, if explicit mention of the midpoint is the only reason responsible for the predicted precision difference, investors⁷ confidence should be the same between the MID forecast and the "range + midpoint" forecast (since both of them mention the best

⁶ I find no instance of this forecast form being used in my sample. Of course, it is possible that this form is used, but so infrequently that it is not picked up in my search.

estimate), and both of them should be higher than that in the range forecast (since there is no best estimate in a range forecast). Similarly, if the "half width" effect is the only reason responsible for the difference between the MID and range forecasts, investors' confidence should be the same between the range forecast and the "range + midpoint" forecast (since both mention the whole range width), and both of them should be lower than that of the MID forecast (since only the MID forecast, but not the range or "range + midpoint" forecast, highlights half of the range width). It is also possible that both attributes matter, in which case investors' confidence is highest in the MID forecast condition, followed by the "range + midpoint" condition, and then by the range condition. Any of these effects is possible, and I state my hypothesis assuming that both attributes matter.

Overall, this discussion suggests that forecast precision will be perceived to be highest in a point forecast, followed by a MID forecast, then by a "range + midpoint" forecast, and lastly by a range forecast. In turn, forecast precision will affect investors' confidence in their earnings estimates in that a lower forecast precision implies that investors' earnings estimates are also likely to be subjected to greater uncertainty of occurrence. Consequently, lower forecast precision is associated with lower investors' confidence in their earnings estimates. Consistent with this argument, prior research suggests that forecast precision is positively related to investors' confidence in their estimates (Hirst et al. 1999; Libby et al. 2004).

3.2 EFFECTS OF INVESTORS' KNOWLEDGE ON MANAGEMENT FORECAST FORMS

The effect predicted above is likely contingent on investors' knowledge of various forecast forms. Research on expertise indicates judgment differences between decision makers with high versus low knowledge, and that high-knowledge decision makers are able to perform better than their counterparts with low knowledge [see review articles by Ericsson and Lehmann (1996) in psychology literature; Smith and Kida (1991) in auditing literature; and Alba and Hutchinson (1987) in consumer behavior literature.]. The knowledge considered in the present study is 'task-specific knowledge,' i.e., "the knowledge necessary to perform the judgment task" (Frederick and Libby 1986; p. 270). Since the judgment task in the present study is about management forecast forms, I consider high-knowledge investors to be those who have superior knowledge (relative to low-knowledge investors) on different forecast forms (e.g., point versus range forecast) and their associated market effects.

Both psychology and accounting literature examine the effect of 'domain-specific knowledge' or 'task-specific knowledge' (henceforth, knowledge) on people's judgments and decision-makings. Information integration theory decomposes the J/DM (i.e., judgment and decision-making) process into cue selection, cue evaluation, and cue integration (Anderson 1981). Schwartz and Norman (1989) suggest that situational contexts (e.g., attention, motivation, and knowledge) moderates cue relevance rather than cue importance. High-knowledge

decision-makers are better able to pick up relevant contextual features and take them into considerations than low-knowledge decision-makers (Johnson et al. 1981; Devine and Kozlowski 1995). In the behavioral financial accounting literature, Hopkins (1996) suggests judgment differences between high- and low-knowledge financial analysts. He shows that labeling the same financial instrument as liability, equity or mezzanine affects the stock price judgments of high-knowledge analysts who have knowledge of the stock market effects of different financial instruments, but not those of their low-knowledge counterparts. In the auditing literature, Bonner (1990) demonstrates that high-knowledge auditors pick up more relevant cues than low-knowledge auditors.

Forecast forms are contextual cues which imply different degrees of forecast precision (Hirst et al. 1999). To the extent that high-knowledge investors are more aware that management forecasts can come in different forms, they can more easily infer that different forms are associated with different degrees of forecast precision. That is, because they know that different forecast forms exist, they can more readily compare a given management forecast form with the other forecast forms that exist in their knowledge structures, and therefore, infer the precision of the given management forecast form. In contrast, low-knowledge investors do not have extensive knowledge of the various forecast forms. In fact, they may not even be aware that management forecast can be in different forms. As in the example above, suppose management issues a particular forecast form (e.g., a range forecast). As mentioned earlier, high-knowledge investors can draw from memory their knowledge that forecasts can also be in the form of point estimates

that carry higher precision. Hence, they likely infer that this range forecast form does not have high precision. However, low-knowledge investors are less aware of the existence of other forecast forms, so they are less able to recall alternative forecast forms that serve as comparisons against which to compare the precision of the given management forecast form. Thus, different groups of low-knowledge investors who are given different management forecast forms may not have differential assessments of the precision of the management forecast. My discussion in Section 3.1 depends on investors' being able to assess forecast precision, and because I expect that high-knowledge investors can do so, I anticipate that my prediction in Section 3.1 applies to high-knowledge investors; i.e., confidence in earnings estimates is highest in the point condition, followed by the MID condition, then by the "range + midpoint" condition, lastly by the range condition. For the low-knowledge investors, I anticipate that their confidence in earnings estimates will not vary across forecast forms. My hypotheses are formally stated below,

H1a: High-knowledge investors' confidence in their EPS estimates will be highest in the point condition, followed by the MID condition, then by the "range + midpoint" condition, and lastly by the range condition.

H1b: Low-knowledge investors' confidence in their EPS estimates does not differ across forecast forms.

Also, consistent with recent experimental studies that indicate no effect of forecast forms on investors' earnings estimates (Hirst et al. 1999; Libby et al.

2004), I do not anticipate any effects of forecast forms on investors' earnings estimates.

3.3 MULTIPLE REFERENCE POINTS AND INVESTORS' REESTIMATES AFTER THE ACTUAL EARNINGS ANNOUNCEMENT

Decision making research documents the importance of benchmarks or reference points. For example, decision makers evaluate each attribute or alternative by comparing it with a reference point, and each attribute (alternative) is interpreted as gain or loss relative to the reference point (Kahneman and Tversky 1979, 1984).

Accounting studies have recognized the importance of benchmarks. Zero, prior EPS and consensus analysts' forecast are benchmarks that are the targets of earnings management, and benchmarks against which investors compare current EPS (Degeorge et al. 1999). Bowen et al. (2003) show that in earnings press releases, managers strategically emphasize prior pro forma earnings (GAAP earnings) if prior pro forma earnings are lower (higher) than GAAP earnings. In addition, both Schrand and Walther (2000) and Krische (2005) provide evidence that when announcing current earnings, managers highlight previous one-time gains (so that the previous earnings will be adjusted downward), but not so for previous one-time losses (so that the previous earnings will not be adjusted upward). These studies show that investors are influenced by managers' attempts to influence benchmarks being used to assess the current period's earnings performance.

Several experimental studies examine the relation between management forecast strategy and investors' reactions to the actual earnings announcement. Libby and Tan (1999) indicate that sequential processing of two pieces of information causes the contradicting anecdotal evidence that financial analysts welcome managements' voluntary disclosures of bad earnings news but that the stock market punishes those forecasting firms more compared to non-forecasting firms. Tan et al. (2002) extend the literature by comparing different forecast strategies. Holding constant total earnings surprise,⁷ understatement (overstatement) of good (bad) earnings news at the forecast stage leads to analysts' more positive (less negative) reaction to the actual EPS announcement. Miller (2000) indicates that the split of total earnings surprise between forecast surprise and actual earnings surprise affects investors' qualitative assessments of the actual earnings news, which mediates the effect of management forecast strategy on investors' earnings reestimates after the actual EPS announcements. Libby et al. (2004) compare the effect of the range forecast versus the point forecast, and show that falling within the range forecast mitigates analysts' reactions to a point forecast, and that falling outside of the range forecast magnifies analysts' reactions to a point forecast, both positively and negatively.

There are several important manipulations in my experimental study which are worthy of particular mention. Management earnings forecast is manipulated lower than the latest consensus analysts' forecast. Prior archival studies indicate

⁷ Following Tan et al. (2002), I use "total earnings surprise" to refer to the difference between the actual EPS and the consensus analysts' forecast before management forecast; "forecast surprise" to refer to the difference between management forecast and the consensus analysts' forecast before the management forecast; and "actual earnings surprise" to refer to the difference between the actual EPS and management forecast.

that most management earnings forecasts convey bad news (Pownall et al. 1993; Skinner 1994; Bamber and Cheon 1998; Soffer et al. 2000). In particular, to avoid any confusion, I manipulate both endpoints of the range forecast to fall below the consensus analysts' forecast (Libby et al. 2004).

In my study, I focus on the situation where the actual earnings fall *within* the *lower* end of the range forecast; i.e., the actual earnings fall within the range forecast and are nearer to the lower endpoint. Empirical studies document that, for range forecasts, in many instances, actual EPS falls within the range. For example, in the sample collected by Pownall et al. (1993), 45.2% of the actual earnings fall within the ranges. Similarly, in the sample reported in Hirst et al. (1999), 65% of the actual earnings are within the ranges. In addition, when the actual earnings fall outside of the forecast range, they either exceed or miss all three benchmarks (i.e., the lower endpoint, the midpoint, and the higher endpoint) simultaneously. It is virtually impossible to test the effect of contextual variation of benchmarks in the setting where actual earnings fall outside of the range forecast. Therefore, I decide to focus on the situation where the actual earnings fall within the forecast range.

In particular, I focus on the situation where actual earnings fall in the *lower* end (rather than upper end) of a range forecast. This is because when the actual earnings exceed the midpoint (which equals the point forecast) of the range but fall below the higher endpoint of the range forecast, actual earnings meet (or exceed) expectations for *both* the point and range forecast. In contrast, when the actual earnings fall below the midpoint (which equals the point forecast) of the range but above the lower endpoint of the range forecast, they are in line with the range

forecast but fall short of the point forecast. I anticipate that the differential effects of forecast form is more likely to be magnified in this latter situation where expectations are met for one forecast form (range forecast) but not for the other (point forecast), and I therefore focus on this setting in my study.

Following findings in psychology research, I argue that benchmarks that are explicitly mentioned serve as primary benchmarks, and benchmarks that are not directly available are secondary (Gregory et al. 1993; Boles and Messick 1995; Blount et al. 1996). Psychology research also indicates that although the secondary benchmark is weighted less than the primary one, it also plays a role in affecting one's judgments and decisions. Exceeding (missing) the secondary benchmark exacerbates the positive (negative) reaction to exceeding (missing) the primary benchmark. On the other hand, if an attribute exceeds (misses) the primary but misses (exceeds) the secondary benchmark, the reaction should be less intense, although it is still positive (negative) (Sullivan and Kida 1995).

Primary and secondary benchmarks vary between a MID forecast and a range forecast. In a range forecast, the management explicitly mentions the higher and lower endpoints of the range. The midpoint is only implicit and not directly mentioned. Thus, for a range forecast, the two endpoints serve as primary benchmarks and the midpoint is secondary. In contrast, the management emphasizes the midpoint in a MID forecast. The two endpoints are indirect and inferred. Thus, for a MID forecast, the midpoint serves as a primary benchmark, and the inferred endpoints serve as secondary benchmarks.

From the above analysis, I deduce that when evaluating actual earnings performance, investors will put more weight on the midpoint but less weight on the two endpoints in a MID forecast than in a range forecast. Missing the midpoint will be punished *more* if the earnings forecast is in the MID form than if it is in the range form. This discussion also suggests that, in a situation where actual earnings fall within a range forecast or the implied range of a MID forecast, the mitigating effect of falling within the range is *less* if the earnings forecast is in the MID form than if it is in the range form.

When actual earnings fall short of the point forecast, only one benchmark is missed, and investors' reactions⁸ are likely negative. In comparison, when actual earnings fall within the range but in the lower end (i.e., being short of the midpoint of the range or MID forecast), two benchmarks are missed and one is exceeded, and the net effect is also likely negative. However, because there is a partially offsetting effect of exceeding a benchmark for the range and MID forecasts, the negative effect is likely smaller for these forecasts than for a point forecast. Therefore, investors' earnings reestimates after the actual earnings announcement following a range or a MID forecast are higher than those following a point forecast. For both the range and MID forecasts, actual earnings miss one primary and one secondary benchmarks. Although the same benchmark (i.e., the lower endpoint explicitly mentioned in the range forecast and implied in the MID forecast) is exceeded, it is primary for the range forecast and secondary for the MID forecast.

⁸ Investors' reactions in the present study refer to their economic reactions; specifically, their perspectives of future earnings performance. Following prior research, the reactions are captured by EPS reestimates for the current year and the next year (Libby and Tan 1999; Tan et al. 2002; Libby et al. 2004).

Again, the positive impact of exceeding this benchmark is likely greater for the range forecast than for the MID forecast, so its impact in terms of dampening the overall negative effect of falling within the range is also likely to be greater for the range forecast than for the MID forecast. Investors' reestimates following a range forecast are likely higher than those following a MID forecast. Thus, when the actual earnings are in the lower end, investors' reestimates will be most negative in a point forecast, least negative in a range forecast, with the MID forecast being in between.

As mentioned previously, several archival and experimental studies use the midpoint of a range forecast as empirical proxy for the range forecast. The implicit assumption here is that the midpoint in the range forecast is an important, if not primary, benchmark. Compared to a range forecast, the MID forecast varies the positions of the midpoint and the two endpoints at the same time, whereas the "range + midpoint" forecast only varies the position of the midpoint but not those of the endpoints. The endpoints are primary benchmarks for both range and "range + midpoint" forecasts. The midpoint is primary for the "range + midpoint" forecast but secondary for the range forecast. Therefore, the comparison between the "range + midpoint" condition and the range condition is a clear test of the importance of the midpoint in the range forecast. If the midpoint in a range forecast is assumed to be primary, explicit mention of the midpoint should have little incremental effect on investors' judgments; i.e., investors' reestimates will be similar between the range forecast condition and the "range + midpoint" forecast condition. If, on the other hand, the midpoint is only secondary in a range forecast, mention of the

midpoint in the "range + midpoint" forecast will magnify the positive (negative) reaction to exceeding (missing) the midpoint. Specifically when the actual earnings are in the lower end, investors' earnings reestimates in the "range + midpoint" condition should be lower than those in the range condition. Similar to the MID and range forecasts, in the "range + midpoint" condition, exceeding the lower endpoint has a partial offsetting effect to the negative reaction of missing the midpoint. Therefore, I predict that investors' earnings reestimates in the "range + midpoint" condition will be higher than those in the point condition, and lower than those in the range condition.

In both the MID and "range + midpoint" forecasts, a primary benchmark, i.e., the midpoint, is missed. The lower endpoint that is exceeded is a primary benchmark for the "range + midpoint" forecast but a secondary benchmark for the MID forecast, suggesting a more positive effect on investors' reestimates for the "range + midpoint" forecast. However, the upper endpoint that is missed is also a primary benchmark for the "range + midpoint" forecast but only a secondary benchmark for the MID forecast, suggesting a more negative effect on the reestimates for the "range + midpoint" forecast. These effects are in opposite directions and offsetting. Therefore, I predict that investors' reestimates will be similar between the "range + midpoint" condition and the MID condition.

The discussion above is summarized in Table 3.

Insert Table 3 here

Overall, the multiple-reference-points theory suggests that when the actual earnings fall in the lower end, investors' reestimates are highest in the range forecast condition, followed by the MID forecast and the "range + midpoint" forecast conditions, and then by the point forecast condition.⁹

3.4 EFFECTS OF INVESTORS' KNOWLEDGE ON MANAGEMENT FORECAST FORMS

The moderating effect of knowledge on cue relevance applies to investors' reestimates as well. More specifically, I expect that the effect predicted in Section 3.3 applies to high-knowledge investors. The effect discussed earlier is contingent on investors' awareness and distinction between primary and secondary benchmarks. While primary benchmarks are explicitly stated and should be obvious to both low- and high-knowledge investors, secondary benchmarks are not explicitly stated and have to be inferred. High-knowledge investors likely have, in their knowledge structures, knowledge of the various forecast forms and what the explicit or primary benchmarks are. This facilitates the inference of primary versus secondary benchmarks. For example, a high-knowledge investor who reads a MID forecast can mentally draw comparison between the given MID forecast with his/her knowledge of a range forecast. This investor can infer that in the MID forecast, the endpoints are secondary in that they are not explicitly mentioned

⁹ It is possible that investors infer particular distributions of future EPS from the management forecast. For example, a range forecast may imply a uniform distribution, whereas a MID forecast may imply a normal distribution. It is unclear whether investors would do this. To the extent investors infer these particular distributions for MID and range forecasts (normal versus uniform distribution), predictions would also be similar to the benchmark argument.

unlike the case of a range forecast. In addition, although the endpoints in the MID forecast are not explicitly mentioned, the high-knowledge investor likely also considers them as benchmarks (albeit secondary benchmarks) because of his/her awareness that in other forecast forms (i.e., the range forecast), endpoints also serve as benchmarks. High-knowledge decision makers have been shown to be able to incorporate more information into their judgments, and use more complex decision criteria (Chase and Simon 1973; Fiske et al. 1983; McNamara and McDaniel 2004). Thus, high-knowledge investors likely invoke the use of both primary and secondary benchmarks in evaluating the actual earnings, and my prediction in Section 3.1 applies to high-knowledge investors. Formally stated, my hypothesis is as follows:

H2a: When the actual earnings are in the lower end, high-knowledge investors' earnings reestimates are expected to be highest in the range condition, followed by the MID condition as well as the "range + midpoint" condition, and then by the point condition.

In contrast, the effect of forecast form on earnings reestimates is likely different for low-knowledge investors. Prior research shows that low-knowledge decision makers have a tendency to simplify the task by eliminating certain important attributes or considerations in order to reduce required cognitive effort (Johnson and Russo 1984; Alba and Hutchinson 1987; Ganzach 1994). Low-knowledge investors lack the knowledge that management forecasts can come in different forms. Formation of secondary benchmarks may depend, in part, on the availability of knowledge of comparisons among forecast forms. For example,

given a range forecast, a low-knowledge investor who does not or is unable to retrieve from memory the characteristics of a point forecast may not infer the midpoint (that is present in a point but not a range forecast) as a secondary benchmark. Similarly, given a MID forecast, a low-knowledge investor who does not or is unable to retrieve from memory the characteristics of a range forecast may not infer that the endpoints (explicitly mentioned in a range but not in a MID forecast) can serve as secondary benchmarks.

Furthermore, low-knowledge investors' poorly structured general investment knowledge (Chi et al. 1981; Schoenfeld and Herrmann 1982; Tubbs 1992) may force them to rely on more simplified decision rules. Novices' judgments have been shown to be influenced by the salience of the decision criteria presented in that they focus on the salient criteria and ignore the less salient ones (Bettman and Sujan 1987). In the financial accounting literature, Frederickson and Miller (2004) show that less sophisticated individual investors, but not financial analysts, are affected by the pro forma earnings disclosures explicitly provided in the financial press release, even though these investors could have "undone" the effects of the pro forma disclosures. Their findings are consistent with a proclivity for low-knowledge investors to over-rely on information that is explicitly given. In my study, the primary benchmarks associated with the various forecast forms are explicitly mentioned, and therefore, more salient than the secondary benchmarks. Hence, my prediction is that low-knowledge investors are likely to focus only on the primary benchmark(s) and neglect the secondary benchmark(s).

In the case of a MID forecast, the midpoint is a concrete benchmark that is explicitly stated and salient, and serves as a criterion to evaluate the actual earnings. When the actual earnings fall in the lower end, they miss the primary benchmark (i.e., the midpoint) in the MID forecast, which is equivalent to missing the single benchmark in the point forecast.

In the case of a range forecast, when the earnings fall in the lower end, they miss one primary benchmark (i.e., the higher endpoint) but exceed the other primary benchmark (i.e., the lower endpoint) in the range forecast. Compared to the point and MID forecasts where the single primary benchmark is missed (and no primary benchmark is exceeded), in the case of a range forecast, a primary benchmark is exceeded (which can offset the negative reaction to missing one primary benchmark). This likely leads to a more positive reaction in terms of earnings reestimates in the case of a range forecast compared to either a point or MID forecast. Thus, to the extent that low-knowledge investors are fixated on the salient benchmarks, I predict that their earnings reestimates in the MID condition will be similar to those in the point condition, and both should be lower than reestimates in the range condition.

In the case of a "range + midpoint" forecast, two primary benchmarks are missed and one is exceeded when earnings fall in the lower end. The overall effect is that, net, one primary benchmark is missed, which is similar to the cases in the point and MID forecasts. However, since there is a partial offsetting effect of exceeding one primary benchmark for the "range + midpoint" forecast, I expect that the reestimates in the "range + midpoint" condition are higher than those in the

point and MID conditions. The actual earnings exceed the lower endpoint, which is primary for both the range and the "range + midpoint" forecasts. However, the actual earnings miss two primary benchmarks (i.e., the midpoint and the higher endpoint) in the "range + midpoint" forecast but only one primary benchmark (i.e., the higher endpoint) in the range forecast. Hence I expect that the earnings reestimates in the "range + midpoint" condition are lower than those in the range condition.

In summary, the net benchmark effects are as follows: point forecast (net: -1, one primary benchmark missed), MID forecast (net: -1, one primary benchmark missed), range forecast (net: 0, one primary benchmark missed and one exceeded), and "range + midpoint" forecast (net: -1, two primary benchmarks missed and one exceeded). My prediction is that low-knowledge investors' earnings reestimates are expected to be highest in the range condition, followed by the "range + midpoint" condition, then by the point as well as the MID condition.

My hypothesis is stated as follows,

H2b: When the actual earnings are in the lower end, low-knowledge investors' earnings reestimates are expected to be highest in the range condition, followed by the "range + midpoint" condition, then by the point as well as the MID condition.

CHAPTER 4: METHOD

4.1 DESIGN

The experiment is a 4x2 between-subjects design. Participants are randomly assigned to four forecast form conditions – point, range, MID, and "range + midpoint." Knowledge is a measured variable.

4.2 PARTICIPANTS

Participants are 86 MBA students in one major Singapore university. Three participants did not complete the knowledge test, reducing the effective sample size to 83. The mean (median) years of working experience is 6.9 (6.0). The participants have on average attended 2.4 (2.6) accounting (finance) courses. 73% have experience in investing in stock market. They were each given movie vouchers worth about twenty Singapore dollars for participating in the experiment.

4.3 PROCEDURE

The case materials relate to a semiconductor firm. They were modified from the materials used in Libby and Tan (1999), Tan et al. (2002), and Libby et al. (2004). The background and financial information of Zetha are based on a real semiconductor company listed on the American Stock Exchange.

The experimental materials are separated into 4 sets, with each set, other than set 1 (which was placed on top of the envelopes), placed in a separate envelope. Participants are instructed to answer the questions sequentially, and not to return to the previous envelope(s) after they have opened the next envelope(s). They first read the background information and three-year summary financial statements of Zetha. They then read the quarterly statements of financial year 2001 and 2002, plus the first quarter statement of financial year 2003. These statements are all the same across all conditions.

Participants read the management earnings forecast made by Zetha on May 15, 2003 concerning the second quarter EPS.

The company expects earnings per share for the quarter ending June 30, 2003 to be below expectations due to weaker than expected sales. Earnings per share are estimated to be approximately \$0.16 for the quarter.

The above statement is for the point condition. The forecast is the same across all conditions except for the last sentence which varies as follows: "Earnings per share are estimated to be between \$0.14 and \$0.18 for the quarter" (range condition); "Earnings per share are estimated to be approximately \$0.16, varying from \$0.14 to \$0.18 for the quarter" ("range + midpoint" condition); and "Earnings per share are estimated to be approximately \$0.16, plus or minus 2 cents for the quarter" (MID condition); respectively. Participants are then asked to estimate the EPS for the second quarter of 2003, full-year 2003, and full-year 2004. They are also asked to evaluate their confidence in the estimates, and to write down the basis for their EPS estimates. After that, they complete some demographic questions

before proceeding to Envelope A (which contains Set 2). This simulates the time interval between the release of management earnings forecast and the actual earnings announcement.

In Set 2, participants first read the actual earnings announcement made by Zetha on August 15, 2003.

	<i>Quarter ended June 30, 2003</i>
	\$ '000
<i>Net sales</i>	48,920
<i>Net income</i>	3,519
<i>Earnings per share</i>	\$0.15

Again, this actual earnings announcement is the same across all conditions. Participants are then asked to reestimate the EPS for financial year 2003 and 2004.

After completing the main part of the experiment, participants are instructed to put Set 1 & 2 back into envelope A and proceed to Set 3. Set 3 (in Envelope B) contains perceptions of Zetha and its management, and manipulation check questions. One knowledge question is also in Set 3. Psychological research suggests that decision makers' perceived familiarity with the topic affects their confidence in judgment (Trafimow and Snizek 1994). Therefore, I also include one question to measure the participant's subjective familiarity with the forecast form that he/she encountered in Set 1,

Recall that the management of Zetha made the following earnings forecast on May 15, 2003:

Earnings per share are estimated to be approximately 0.16.¹⁰

Please indicate your familiarity with the manner in which Zetha's management forecasted earnings.

Participants' subjective familiarity ratings are measured by 11-point scales with 1 indicating 'not at all familiar' and 11 indicating 'extremely familiar.'

Finally, Set 4 (in Envelope C) contains other knowledge test and within-subjects test questions. The experiment materials (in the point forecast condition) are attached in Appendix 1.

¹⁰ This sentence varies according to the forecast form condition that the participant was assigned to.

CHAPTER 5: RESULTS

5.1 MANIPULATION AND OTHER CHECKS

Recall that the actual earnings are manipulated to be lower than the point forecast, the midpoints of the range, MID, and "range + midpoint" forecasts. The actual earnings are also higher than the lower endpoints in the latter three conditions, i.e., they are within the lower ends of the forecast ranges. Because of these variations, manipulation check questions also vary across the forecast form conditions. For the point condition, the participants are asked whether the actual earnings are higher than, equivalent to, or lower than the management forecast. For the range, MID, and "range + midpoint" conditions, the participants are asked to indicate whether the actual earnings are within or outside of the management forecast range. For the MID condition, the participants are then asked whether the actual earnings are higher than, equivalent to, or lower than the midpoint of the forecast range. For the range and "range + midpoint" conditions, the participants are then asked whether the actual earnings are nearer to the lower end, right at the middle, or nearer to the higher end of the forecast range.

73% of the participants in the point condition correctly indicate that the actual earnings are lower than the management forecast. 88% of the participants in the range, MID, and "range + midpoint" conditions correctly indicate that the actual earnings fall within the preannouncement range. 90% of the participants in the range, MID, and "range + midpoint" conditions correctly indicate that the actual earnings are not in the upper end of the forecast range. Taken as a whole,

82% of all participants correctly answer the manipulation check questions. Results are unaffected by inclusion or exclusion of those participants who failed the manipulation check questions. Therefore, in the following sections, I report the results based on all participants.

Prediction of the multiple-reference-points effect is based on the assumption that investors recognize the importance of meeting or beating market expectation. To assess whether investors have this institutional knowledge, I ask the participants the following scenario-based question,

Suppose analysts' consensus forecast for Firm A's Quarter 1 (ended March 31) EPS is 20 cents. On April 30, Firm A announces that its quarter 1 EPS is 19 cents. Its stock price just before the announcement is \$8.00. Please predict the stock price after this announcement.

Results show that 94% of the participants predict that stock price will fall or remain unchanged if the actual EPS falls short of the analysts' consensus forecast, with 79% predicting that stock price will fall. Thus, most participants have this institutional knowledge. I reanalyze the data by excluding those participants who incorrectly predict the stock price will rise, and results remain unchanged.

5.2 PARTICIPANTS' KNOWLEDGE OF MANAGEMENT FORECAST FORMS

The knowledge test measures participants' knowledge of management forecast forms.. As I analyzed in Chapter 3, investors' inference of the earnings uncertainty information conveyed by management forecast form, as well as their

recognition of secondary benchmark(s), require them to have the knowledge that management forecasts can come in different forms. The knowledge test consists of 3 questions. Question 1 & 2 are intended to measure whether the participants have knowledge of various management forecast forms. Question 1 provides the participants a scenario, in which the management can reliably estimate the coming EPS under normal, optimistic, and pessimistic conditions. The consensus analysts' forecast right before management forecast is also available. Question 1 asks the participants to act as if he/she were the manager and to issue an earnings forecast, using as many forms as he/she can.

Question 2 contains 8 management earnings forecast examples, and asks the participants to classify each example as point, range, minimum, maximum, qualitative, or others. There are 2 MID forecast examples in the 8 examples. I exclude the two MID examples from the knowledge test because participants' knowledge of the other established forms are used to predict their categorization of the novel MID forecast form. Question 2 lists management forecast examples and serves as a cue to Question 1; therefore, they are put into separate envelopes, and Question 1 is answered before Question 2.

The expertise literature suggests that more causal relationships are developed as knowledge in certain domain increases (Voss et al. 1983). One of the causal relationships associated with management forecast forms relates to market reactions to the actual EPS performance under different management forecast forms. This knowledge is measured by Question 3, which is part of a within-subjects test question. In the within-subjects test, participants are asked to predict

stock price movements when the actual earnings fall in the upper end or lower end of the point, MID, and range forecasts, respectively. The knowledge score is not based on participants' predictions as related to the MID forecast because participants' knowledge of the other forecast forms are used to assess responses to the MID forecast. I coded this question as follows. Given the point forecast, if the participant predicts that stock price will go up or remain unchanged (go down) when the actual EPS is above the point forecast, 1 (0) point is given, and if the participant predicts that stock price will go down (remain unchanged or go up) when the actual EPS falls short of the point forecast, 1 (0) point is given.¹¹ When the actual EPS falls in the upper (lower) end of the range forecast, if the participant predicts that stock price will be higher (lower) under the point forecast than under the range forecast, 1 point is scored and 0 otherwise (Libby et al. 2004). Therefore, for the within-subjects question, the highest possible score is 4 and the lowest possible score is 0.

For Question 1, I count the number of different forecast forms that the participant writes.¹² What I count is the number of different forecast forms, but repetitions of the same forecast form are excluded. For example, if one participant writes two sentences — "Management believes that Company Alpha's quarter 2 EPS will be about \$0.42" and "Management believes that Company Alpha's

¹¹ Research has shown that investors' negative reactions to missing the market expectation are much more intense than the positive reactions to meeting or beating the market expectation. Therefore, I give 0 point for the prediction that stock price will remain unchanged when the actual EPS falls short of the point forecast and 1 point to the same prediction when the actual EPS exceeds the point forecast. I also reperform the analysis where 1 point is given when the participant says the stock price remains unchanged when the actual EPS falls short of (or exceeds) the point forecast. The results remain the same.

¹² A second coder coded this question independently. The inter-coder consistency is 97.7%. Differences are discussed and resolved.

quarter 2 EPS will be about \$0.32," — I consider it to be only 1 form; i.e., the point forecast. If one participant writes — "Management believes that Company Alpha's quarter 2 EPS will be about \$0.42" and "Management believes that Company Alpha's quarter 2 EPS will be at least \$0.32," — I count them as 2 forms; i.e., the point forecast and the minimum forecast.

The results indicate that the mean (median) number of forms written is 2.1 (2). There are only 2 participants who leave this question blank. 63% participants are able to document 2 or more forecast forms. 6 participants write out the MID forecast. The maximum number of forms written is 5 (for 3 participants).

For Question 2, I count the number of examples that the participant correctly classifies (not including the two MID examples). Besides the two MID forecasts, there are 1 point, 1 range, 1 minimum, 1 maximum, and 2 qualitative forecasts in Question 2. On average, the participants correctly classify 5 examples. 74% are able to correctly classify at least 5 examples.

There are two MID forecasts in Question 2. One is "EPS for the second quarter will be about 8 cents, plus or minus 1 cent," and the other one is "EPS for the second quarter will be breakeven, plus or minus 2 cents." For the first MID statement, 80 out of the 83 participants think it is either a point, range, or other forecast.¹³ 21 participants think it is a point forecast, 53 participants think it is a range forecast. The remaining 6 participants do not think it belongs to any of the categories, 5 of whom explicitly point out that the MID forecast is actually a hybrid of point and range forecast. For the second MID example, 61 participants think it is a range forecast, 3 participants think it is a point forecast, and 5 participants think it

¹³ The remaining 3 participants classify the first MID forecast as qualitative forecast.

does not fall in the traditional forecast form categories. 14 participants consider the second MID forecast as a qualitative forecast. I conjecture that the participants who consider the second MID forecast to be a qualitative form may have focused on the word "breakeven;" however, they interpret the word "breakeven" as a qualitative statement rather than as a numerical term "zero." Together, 52% (43) participants think the MID forecasts are both range forecasts. High-knowledge participants are marginally more inclined to classify both MID forecasts as range forecasts than their low-knowledge counterparts (two-tailed significance = 0.10, χ^2 test) This is consistent with the observation that the CIG database recodes more MID forecasts as range forecasts than as point forecasts. Table 4 reports participants' classifications of the two MID examples.

Insert Table 4 here

Based on his/her answers to Question 1 & 2 and the subset of the within-subjects test question, a knowledge score is computed for each participant. The scores on the three questions are standardized and summed. A mean-split based on the total score is taken. 41 participants belong to the high-knowledge group and 42 belong to the low-knowledge group.

5.3 TESTS OF HYPOTHESES

5.3.1 *Investors' Confidence in Earnings Estimates after the Management Forecast (H1a & H1b)*

Insert Table 5 here

Table 5 contains descriptive statistics of the means (standard deviations) of participants' earnings estimates, confidence in these estimates after the management forecast, and the adjusted means for confidence (i.e., with participants' familiarity with the management forecast form as a covariate).

I find that for both low- and high-knowledge participants, earnings estimates after the management forecast are not affected by management forecast form manipulation ($F=0.87$, $p=0.46$)¹⁴. Prior studies have also documented no effect of forecast form on earnings estimates, but an effect on confidence (Hirst et al. 1999; Libby et al. 2004). Surprisingly, and contrary to the prediction of H1a, I also find that high-knowledge participants' confidence is unaffected by the management forecast form manipulation ($F=1.26$, $p=0.30$). Pairwise comparison indicates that the confidence in the point condition is significantly higher than that in the range condition (one-tailed $p=0.03$). All the other pairwise comparisons between any two of the four forecast conditions are insignificant (smallest one-

¹⁴The F-statistic reported here is based on the repeated-measure formed from the participant's estimate of Q2 year 2003, full-year 2003, and full-year 2004.

tailed $p=0.11$). Low-knowledge participants' confidence is also unaffected by the management forecast form manipulation ($F=0.11$, $p=0.95$); none of the pairwise comparisons is significant (smallest one-tailed $p=0.29$).

I re-analyze the confidence results controlling for participants' familiarity in the forecast forms assigned to them. I find that participants' familiarity with their assigned forecast form is significantly associated with participants' confidence rating ($F=9.92$, $p=0.00$). The two-way ANCOVA test suggests a significant main effect of knowledge ($F=7.63$, $p=0.01$). Both the main effect of forecast form ($F=0.94$, $p=0.43$) and the interaction effect ($F=1.18$, $p=0.32$) do not reach the traditional significance level.

As suggested by Buckless and Ravenscroft (1990), the linear contrast test is a refinement of traditional ANOVA test. H1a predicts that high-knowledge investors' confidence is highest in the point condition, followed by the MID condition, then by the "range + midpoint" condition, and lastly by the range condition. The specific contrast test of this prediction is statistically significant, with familiarity as a covariate ($F=5.84$, $p=0.02$).¹⁵ The contrast tests show that high-knowledge participants' confidence ratings in the point, MID, and "range + midpoint" conditions do not differ from each other (Point/MID: $p=0.36$; Point/"Range + midpoint": $p=0.19$; MID/"range + midpoint": $p=0.33$; all p -values are one-tailed), and all of them are significantly or marginally higher than that in the range condition (Point/Range: $p=0.02$; MID/Range: $p=0.05$; "Range + midpoint"/Range: $p=0.08$; all p -values are one-tailed).

¹⁵ The contrast coefficients that I assign to each forecast form are: Point (2), MID (1), "Range + midpoint" (-1), and Range (-2).

Although both the MID and "range + midpoint" forecasts have the same range widths as the range forecast, high-knowledge participants' confidence in these two forecasts are significantly higher than confidence in the range forecast. The only difference between the range forecast and the "range + midpoint" forecast is that the midpoint is mentioned in the "range + midpoint" forecast but not in the range forecast. The higher confidence in the "range + midpoint" condition than in the range condition suggests that explicit mention of the midpoint will significantly increase investors' confidence in their own estimates, even though they are still aware of the range limits as in the range forecast. The only difference between the MID forecast and the "range + midpoint" forecast is that only half range width is mentioned in the former, but that the whole range width is mentioned in the latter. The result shows that there is no difference in investors' confidence between these two conditions. Furthermore, the confidence in both conditions is similar to the confidence in the point condition, in which no range limit is pointed out. The comparable confidence ratings in these three conditions suggest that high-knowledge investors' confidence is mainly affected by the specification of the best estimate in the management forecast, i.e., whether management explicitly points out the best estimate or not. Once a best estimate is explicitly pointed out, their confidence is not affected by whether the range limit is mentioned, or whether half or whole range width is mentioned.

Low-knowledge participants' confidence ratings are not affected by the forecast form manipulation.¹⁶ Paired contrast tests show that there is no significance difference in low-knowledge participants' confidence between any two of the four-forecast forms (smallest one-tailed $p=0.24$). H1b is not rejected.

Table 6 reports the one-tailed significances for the paired contrast tests of the management forecast form effect on investors' confidence for high- versus low-knowledge participants, and for all participants as a whole.

Insert Table 6 here

5.3.2 Investors' Earnings Reestimates after the Actual Earnings Announcement (H2a & H2b)

Insert Table 7 here

The descriptive statistics of participants' earnings reestimates and confidence in the reestimates are provided in Table 7. Table 7 also contains the adjusted marginal means for the reestimates of year 2003 and year 2004 (i.e., with

¹⁶ The specific linear contrast test applying the same contrast coefficients as those for the high-knowledge participants indicates no forecast form effect on low-knowledge investors' confidence ($F=0.18$, $p=0.67$).

earnings estimates made after the management forecast as covariates). The results relating to the full-year 2003 and full-year 2004 EPS reestimates are similar, and I do not separately discuss them. Rather, I combine the two dependent measures, and analyze them as a repeated-measures factor in all analyses and discussions that follow. In order to control for individual differences, participants' earnings estimates for the full-year 2003 and full-year 2004 after the management forecast are included as covariates.

Overall, I find that participants' reestimates are highest in the range condition, followed by the MID condition as well as the "range + midpoint" condition, and then by the point condition (one-tailed paired contrast tests significances – Point/MID: $p=0.02$; Point/Range: $p=0.00$; Point/"Range + midpoint": $p=0.02$; MID/Range: $p=0.02$; MID/"Range + midpoint": $p=0.43$; Range/"Range + midpoint": $p=0.03$).¹⁷ Table 8 reports the results of the contrast tests for high-knowledge participants, low-knowledge participants, and all participants as a whole.

Insert Table 8 here

¹⁷ I conduct a two-way ANCOVA test and find a statistically main effect of forecast form ($p = 0.03$), but no significant main effect of knowledge or interaction between forecast form and knowledge ($p > 0.83$). H2a and H2b together suggest knowledge effects in the comparison between the point and MID conditions, with reestimates in the point condition for high-knowledge participants being lower than those in the MID/high-knowledge, point/low-knowledge, and MID/low-knowledge conditions. Consistent with this prediction, the specific contrast modeling this interaction is marginally significant ($F = 2.83$, $p = 0.05$, one-tailed test). Following H2a and H2b, I also test whether reestimates are higher in the "range + midpoint"/low-knowledge condition compared to those in the "range + midpoint"/high-knowledge, MID/low-knowledge, and MID/high-knowledge conditions. The contrast is not statistically significant ($F=0.00$, $p=0.47$, one-tailed test), consistent with the finding that the MID and "range + midpoint" conditions have similar reestimates for both low-knowledge and high-knowledge participants.

H2a predicts that high-knowledge participants' earnings reestimates are highest in the range condition, followed by the MID condition as well as the "range + midpoint" condition, then by the point condition. The linear specific contrast test of this prediction is statistically significant ($F=9.35$, $p=0.00$).¹⁸ Paired contrast tests show that high-knowledge participants' earnings reestimates in the point condition are significantly lower than the reestimates in all the other three conditions (Point/Range: $p=0.01$; Point/MID: $p=0.05$; Point/"Range + midpoint": $p=0.04$; all p -values are one-tailed). Reestimates in the range condition are significantly higher than those in the MID condition (one-tailed $p=0.09$). Reestimates in the "range + midpoint" condition are similar to those in the MID condition (one-tailed $p=0.35$) and those in the range condition (one-tailed $p=0.23$).

For high-knowledge participants, their earnings reestimates are highest in the range condition, followed by the MID condition, then by the point condition. This pattern suggests that high-knowledge participants can successfully differentiate the primary and secondary benchmarks in these three forecast forms and put appropriate weights on them accordingly. Their reestimates in the "range + midpoint" condition are in between those of the MID condition and the range condition, and do not differ from either of them. The insignificant difference between the "range + midpoint" condition and the range condition suggests that even though the midpoint is only implicit in the range forecast, knowledgeable investors regard it as an important benchmark.

¹⁸The contrast coefficients that I assign to each forecast form (for high-knowledge participants) are: Point (-4), MID (1), "Range + midpoint" (1), and Range (2).

H2b predicts that low-knowledge participants' earnings reestimates are highest in the range condition, followed by the "range + midpoint" condition, then by the point and MID conditions. The linear specific contrast test of this prediction is statistically significant ($F=4.12$, $p=0.05$).¹⁹ The results of the paired contrast tests show that earnings reestimates in the range condition are significantly higher than those in the point condition (one-tailed $p=0.00$), those in the MID condition (one-tailed $p=0.05$), and those in the "range + midpoint" condition (one-tailed $p=0.03$). Reestimates in the point, MID and "range + midpoint" condition do not differ from each other (Point/MID: $p=0.32$; Point/"Range + midpoint": $p=0.43$; MID/"Range + midpoint": $p=0.35$; all p -values are one-tailed).

For low-knowledge investors, the earnings reestimates in the MID condition are similar to those in the point condition, which suggests that they focus on the midpoint (i.e., the primary benchmark in the MID forecast) only and ignore the implicit endpoints. The reestimates in the "range + midpoint" condition are significantly lower than those in the range condition. This suggests that low-knowledge participants put relatively little weight on the midpoint in a range forecast where it is only implicit (and therefore, when the midpoint is explicitly emphasized in the "range + midpoint" condition, the low-knowledge participants put significantly higher weight on it).

One unexpected result is that low-knowledge investors' reestimates in the "range + midpoint" condition are not different from those in the point as well as the MID conditions. My *post hoc* explanation here is that low-knowledge investors

¹⁹ The contrast coefficients that I assign to each forecast form (for low-knowledge participants) are: Point (-2), MID (-2), "Range + midpoint" (1), and Range (3).

may have difficulty in incorporating too many benchmarks in their judgment, even for primary benchmark. In a "range + midpoint" forecast, three benchmarks, i.e., the higher and lower endpoints and the midpoint, are all salient and primary. The low-knowledge participants may further simplify the task by focusing on one primary benchmark (here is the midpoint), rather than processing the three. If low-knowledge investors only weight the midpoint in the "range + midpoint" forecast, their reestimates in this condition will be similar to those in the point and MID conditions.

Participants' confidence in their reestimates after the actual earnings announcement is unaffected by the management forecast form when taken as a whole ($F=0.35$, $p=0.79$), for high-knowledge participants only ($F=0.44$, $p=0.73$), or for low-knowledge participants only ($F=0.70$, $p=0.56$).

In summary, the results suggest that at the time of management earnings forecast, high-knowledge investors' confidence ratings in the point, MID, and "range + midpoint" conditions are similar, and all of them are significantly higher than that in the range condition. In contrast, confidence ratings of low-knowledge investors are unaffected by management forecast form. Only high-knowledge investors recognize the uncertainty information conveyed by the management via the forecast form, but not so for the low-knowledge investors. In addition, high-knowledge investors' confidence is primarily affected by whether there is a single point forecast. Holding constant actual earnings surprise, high-knowledge investors' reestimates are highest in the point condition, followed by the MID condition, then by the point condition. In contrast, low-knowledge investors'

reestimates are similar between the point and MID conditions, and both are significantly lower than those in the range condition. This pattern is consistent with my argument that high-knowledge investors appropriately weigh and incorporate both the primary and secondary benchmarks, but that low-knowledge investors over-rely on the primary benchmark(s) and ignore the secondary benchmark(s). High-knowledge investors recognize the importance of the midpoint in a range forecast; therefore their reestimates in the range condition and the "range + midpoint" condition are comparable. Low-knowledge investors place significantly more weight on the midpoint for the "range + midpoint" condition (where it is explicitly mentioned) than for the range condition (where it is implicit), which suggest that they do not regard the midpoint as an important benchmark in a range forecast.

5.4 SUPPLEMENTARY ANALYSIS: PARTICIPANTS' QUALITATIVE EXPLANATIONS OF THEIR EARNINGS REESTIMATES

To provide further evidence on participants' usage of benchmarks to which they compare actual EPS, their qualitative explanations accompanying with the EPS reestimates are analyzed. I, along with a PhD student in the finance division who is blind to the hypotheses, coded these qualitative explanations independently. The inter-coder consistency rate is 87%. Differences are resolved through discussions. The analysis is documented in Table 9.

Insert Table 9 here

Out of the total 83 participants, 13 (15.7%) do not provide a basis for their reestimates. 43 participants (51.8%) focus on EPS only. 17 participants (20.5%) base their reestimates on other factors except EPS. 10 participants (12.0%) use EPS and other factors. The other factors presented include sales, industry, seasonality, general economic environment and so on.

For the 53 participants who mention EPS (with or without other factors), I analyze the benchmark with which the participants use to compare the actual EPS. 28 participants (52.8%) compare the actual EPS with the management forecast; 8 participants (15.1%) compare it with historical EPS; 3 participants (5.7%) compare it with the consensus analysts' forecast; 4 participants (7.5%) compare the actual EPS with their own EPS estimates right after management forecast; and the remaining 10 participants do not state explicitly the benchmark used or they just list the EPS performance as one factor without any comments.

For the 28 participants who explicitly compare the actual EPS with management forecast, I code the qualitative statements into two categories. One category relates to those participants who think that the actual EPS is lower than the forecast. The other one relates to those participants who think that the actual EPS is 'in line with' or 'acceptable' compared to the forecast. The descriptive statistics are reported in Panel C of Table 9.

In the point condition, 5 participants state that the actual EPS is lower than the forecast and only 1 participant says that the actual EPS is 'close to' the forecast. Similarly, 4 participants in the MID condition state that the actual EPS is lower than expected, and only 1 states that the actual EPS is acceptable. In the range condition, in contrast, 7 participants state that the actual EPS is "in line with," "stable," or "satisfying," and only 1 participant suggests that falling into the lower end is not acceptable. Finally, for the "range + midpoint" condition, roughly the same number of participants (5 versus 4) comment that the actual EPS is lower than the forecast or that it is in line with the forecast.

10 participants do not state explicitly state the benchmark used or do not comment on the actual EPS performance. I combine these participants with the 28 participants analyzed above and do a joint analysis, since this represents the maximum limit of participants who use the management forecast as a benchmark. The results are reported in Panel D of Table 9. The basic pattern remains unchanged.

I perform χ^2 tests to assess whether participants' comments on the actual EPS performance vary by the forecast form conditions they are in for the 28 participants who explicitly compare the actual EPS with management forecast.²⁰ Generally, participants in the point condition think the actual EPS performance is not good. In contrast, participants in the range condition think it is satisfactory ($p=0.02$). This difference suggests that participants in the range condition mainly compare the actual EPS with the endpoints rather than the midpoint. Participants in

²⁰ P-values in this and the next paragraphs are all two-tailed.

the MID condition do not differ from those in the point condition with respect to their views on the actual EPS performance ($p=0.73$), but they have a greater tendency to indicate that the actual EPS performance is poor compared to those in the range condition ($p=0.03$). This pattern is consistent with the argument that in a MID forecast the midpoint is the primary benchmark and the endpoints are only secondary.

Participants' comments on the actual EPS performance in the "range + midpoint" condition do not differ from those in the point condition ($p=0.29$) and those in the MID condition ($p=0.38$). Participants' comments in the "range + midpoint" condition are marginally more negative than those in the range condition ($p=0.09$). This suggests that explicit mention of the midpoint in the "range + midpoint" condition marginally magnifies the negative effect of missing the midpoint.

In summary, the analysis of participants' qualitative explanations of their earnings reestimates provides further evidence of the multiple-reference-points frame. Variation of benchmark importance across forecast forms affects investors' qualitative comments on the actual EPS performance, which further affects their earnings reestimates (Miller 2000).

5.5 OTHER PERCEPTIONS OF ZETHA AND ITS MANAGEMENT

Insert Table 10 here

Set 3 contains questions related to perceptions of Zetha and its management. These questions ask the participants to assess the following: *volatility* of Zetha's earnings (1: extremely stable; 11: extremely volatile); *riskiness* of Zetha as a stock investment (1: not at all risky; 11: extremely risky); *quality* of Zetha's financial disclosures (1: extremely low disclosure quality; 11: extremely high disclosure quality); *accuracy* of the management forecast (1: extremely inaccurate; 11: extremely accurate); how *forthcoming* the management forecast was (1: not at all forthcoming; 11: Extremely forthcoming); the extent to which the participant was *surprised* by the magnitude of the actual earnings (1: not at all surprised; 11: extremely surprised); *future earnings growth potentiality* (-5: extremely negative; 5: extremely positive); the *likelihood* that Zetha's management was intentionally *misguiding* the market in its forecast (0: extremely unlikely; 1.00: extremely likely); *management's competence* (1: extremely low competence; 11: extremely high competence); and *management's integrity* (1: extremely low integrity; 11: extremely high integrity). All questions are based on 11-point scales. (The p-values reported in this section are all two-tailed.)

The Principal Component Analysis (PCA) with varimax rotation suggests that the 10 questions load on **3** factors. The first perspective is "disclosure characteristic" (Tan et al. 2002). It includes four questions, i.e., accuracy of the management forecast, how forthcoming the management forecast was, the extent to which the participant was surprised by the magnitude of the actual earnings, and quality of Zetha's financial disclosures. Participants' perceptions do not differ across the forecast form conditions except that the participants in the point and

MID conditions are less surprised by the actual earnings announcement than the participants in the range and "range + midpoint" conditions ($p=0.02$).

The second perspective is "management characteristic." It includes three questions related to participants' assessments of management competency, integrity, and the likelihood that management was intentionally misguiding investors in its forecast. The perceived management integrity in the point, MID, and "range + midpoint" conditions are significantly lower than that in the range condition ($p=0.06$). The likelihood of Zetha's management intentionally misguiding the market in its forecast is also judged to be lower in the range condition than in the other three conditions ($p=0.03$). Note that the point, MID, and "range + midpoint" forecasts all include an explicit best estimate which was missed by the actual EPS in my experiment, but not the range forecast. Thus, the results suggest that management should be cautious in providing a point best estimate. Once the point estimate is missed, investors may suspect management's incentive for doing so.

The perceived management competency is lower in the MID and "range + midpoint" conditions than it is in the point and range conditions ($p=0.05$). This suggests that supplying a less popular forecast form may hurt the perceived competency of management.

The last perspective, "earnings prospect," consists of three questions: participants' evaluations of earnings volatility, earnings growth potentiality, and riskiness of Zetha as an investment option. None of the perceptions differs across the forecast form conditions (smallest $p=0.71$).

I also analyze the effect of knowledge on these perceptions. All the other perceptions are unaffected by the knowledge variable except for the extent to which the participant was surprised by the magnitude of the actual earnings. For this question, the two-way interaction effect of forecast form and knowledge is significant ($F=3.69$, $p=0.06$). The high-knowledge participants are much less surprised by the actual EPS (mean = 3.44) than the low-knowledge participants are (mean = 6.08; two-tailed $p=0.01$) for the MID forecast. Besides, the mean earnings growth potentiality for the high-knowledge participants (mean = 1.19) is marginally higher than that for the low-knowledge participants (mean = 0.46; two-tailed $p=0.06$).

5.6 WITHIN-SUBJECTS TEST

After completing the main experiment, participants are asked to compare three management forecast forms, i.e., the point, MID, and range forecasts, in a within-subjects setting. Participants are told that Company Beta is about to issue quarter 3 earnings forecast. There are three options available to Beta's management — to issue the earnings forecast in point, MID, or range form. Then, participants are asked to answer two scenario-based questions; i.e., when the actual earnings fall in the upper- and lower-end of the range (or MID) forecast and above (below) the point forecast. Participants are asked to judge whether stock price is going to fall, remain unchanged, or rise under each forecast form. They are also asked to

predict under which forecast form the absolute magnitude of stock price variation will be largest and smallest. The orders of the two scenarios are counter-balanced.

Insert Table 11 here

Table 11 reports the results of the within-subjects tests based on participants' answers to whether stock price will go up, remain unchanged, or go down when the actual EPS falls in the upper or the lower end.²¹ When the actual EPS falls in the upper end, the percentages in Panel A of Table 11 refer to those participants who think stock price will go up (versus remain unchanged or go down). Similarly, when the actual EPS falls in the lower end, the percentages in Panel A of Table 11 refer to those participants who think stock price will go down (versus remain unchanged or go up). Panel B presents the significances of the Friedman tests on whether the percentages differ between any two of the forecast forms. All p-values reported in this section are one-tailed.

5.6.1 Replicating the Between-Subjects Findings (H2a & H2b) in the Within-Subjects Setting

²¹ Participants are asked to predict the magnitude of stock price change as well. 5 participants left the magnitude questions unanswered. The interpretation of the magnitude answer is also questionable. For example, some participants predict that stock price will remain unchanged when the actual EPS falls in the upper ends of the range and MID forecasts. When they are then asked to choose under which form the magnitude of stock price change is smallest, they have no preference with regards to the two forecast forms. Therefore I only use participants' predictions of stock-price-change directions.

A within-subjects test gives participants an opportunity to correct their unintentional judgment bias and let them think thoroughly (Tan et al. 2002; Kahneman 2003). It can show whether the findings in the between-subjects setting are due to participants' autonomous judgment bias or systematic information processing. In addition, the within-subjects questions ask participants to directly assess the effect of forecast form on stock prices instead of EPS expectations. Therefore, I can detect whether the effect on investors' EPS estimates can be generalized to stock prices as well.

When the actual EPS falls in the lower end, 59.5%/21.7%/33.7% of all the participants predict stock price will fall (versus remain unchanged or rise) for the point/range/MID forecast. The percentage is largest in the point condition, followed by the MID condition, and then by the range condition (largest $p=0.01$).

When the actual earnings fall in the lower end, the between-subjects findings show that for the high-knowledge investors, the earnings reestimates are highest in the range condition, followed by the MID condition, then by the point condition. In contrast, for the low-knowledge investors, the earnings reestimates in the MID condition are similar to those in the point condition, and both are significantly lower than those in the range condition.

In the within-subjects setting, when the actual EPS falls in the lower end, 75.6%/22.0%/31.7% of the high-knowledge participants predict stock price will fall (versus remain unchanged or rise) for the point/range/MID forecast. The Friedman tests in Table 11 Panel B show that the percentage in the point condition is significantly larger than that in the range or MID condition (both $p=0.00$), and

the percentage in the MID condition is marginally larger than that in the range condition ($p=0.10$). When the actual earnings fall in the lower end, the high-knowledge participants predict that stock price is highest in the range condition, followed by the MID condition, then by the point condition.

42.9%/21.4%/38.1% of the low-knowledge participants predict stock price will fall (versus remain unchanged or rise) for the point/range/MID forecast. The percentages for the point and the MID forecasts are both significantly larger than that for the range forecast (both $p=0.02$), but the percentage for the point forecast is not different from that for the MID forecast ($p=0.30$). When the actual earnings fall in the lower end, the low-knowledge participants tend to focus on the explicit midpoint in the MID forecast, and, therefore, punish the firm more severely (than the high-knowledge participants), both in the between-subjects and within-subjects settings.

The within-subjects test replicates the between-subjects findings for both high- and low-knowledge participants, and for all participants as a whole.

5.6.2 Extending the Findings to the Scenario Where the Actual Earnings Fall in the upper End

The between-subjects test is restricted to the setting where the actual earnings fall in the lower end. In the within-subjects setting, I test whether the results of management forecast forms can be generalized to where the actual earnings fall in the upper end of the range forecast (or the implied range of the MID forecast) or is above the point forecast.

When the actual earnings are higher than the point estimate, they exceed the only benchmark in the point forecast. In contrast, for both the range and MID forecasts, some benchmarks are exceeded but some benchmarks are also missed—this likely leads to more subdued effects on investors' reestimates for the range and MID forecasts compared to the case of the point forecast where only one benchmark is exceeded and none is missed. Comparing the range and MID forecasts when actual earnings fall above the midpoints of these forecasts (i.e., when actual earnings fall within the upper end), both forecast types involve having two benchmarks (one primary and one secondary) exceeded and one benchmark missed. However, the benchmark missed (i.e., the higher endpoint that is explicitly mentioned in the range forecast and implied in the MID forecast) is primary for the range forecast and secondary for the MID forecast. Therefore, the negative impact of missing this benchmark is likely to be greater for the range forecast than for the MID forecast. As a result, although the net impact of having actual earnings fall in the upper end is positive (since the number of benchmarks exceeded is greater than the number missed), this net positive impact is dampened more in the case of a range forecast than in a MID forecast. Together, this discussion suggests that when the actual earnings fall within the upper end, investors' stock price expectations will be highest for a point forecast, followed by a MID forecast, then by a range forecast (See Table 3, Panel C).

When the actual earnings fall in the upper end, 85.4%/34.1%/43.9% of the high-knowledge participants predict stock price will rise (versus remain unchanged or fall) for the point/range/MID forecast. The percentage is highest in the point

condition, followed by the MID condition, then by the range condition (largest $p=0.08$).

The percentage of the low-knowledge participants who predict stock price will rise for the point forecast (76.2%) is significantly higher than that for the range forecast (45.2%, $p=0.00$) and that for the MID forecast (45.2%, $p=0.00$). However, the percentage for the MID forecast is similar to that for the range forecast ($p=0.50$). The low-knowledge participants behave inconsistently in the sense that when the actual earnings fall in the lower end, they focus on the midpoint in the MID forecast and do not differentiate it from the point forecast (but differentiate it from the range forecast). In contrast, when the actual earnings fall in the upper end, they put more weight on the implied endpoints in the MID forecast and therefore do not differentiate it from the range forecast (but differentiate it from the point forecast).

Overall, when the actual EPS falls in the upper end, the percentage of the participants that predict stock price will rise (vs. remain unchanged and fall) for the point forecast (80.0%) is significantly larger than the percentage for the MID forecast (44.0%, $p=0.00$) and the range forecast (39.3%, $p=0.00$). However, the percentages for the range forecast and the MID forecast do not differ from each other ($p=0.29$).

In the within-subjects setting, when the actual earnings fall in the upper end, although the high-knowledge participants continue to differentiate the MID forecast from both the point forecast and the range forecast, the low-knowledge participants (as well as the overall effect) do not differentiate the MID forecast

from the range forecast. Here I offer an *ex post* explanation for the asymmetry of low-knowledge participants' predictions between the upper-end and lower-end scenarios. Investors are more sensitive to missing the benchmark than meeting or exceeding the benchmark. In other words, investors are generally loss-averse. Missing the midpoint of the MID forecast will lead to more intense reactions than exceeding the midpoint, especially here in the present study, where the distance between the actual EPS and the forecast midpoint is only one cent. Therefore, the negative reaction to missing the MID forecast is likely much more intense than the positive reaction to exceeding the midpoint by 1 cent, which can make the difference between the MID and the range forecasts more obvious when the actual EPS falls below the midpoint than it is above the midpoint.

In summary, high-knowledge participants apply the same decision rule (which is, as I suggested above, the multiple-reference-points rule) both in the between-subjects and within-subjects settings, both when the actual earnings fall in the upper end and in the lower end. The low-knowledge participants place more weight on the midpoint in the MID forecast only when the actual EPS falls in the lower end, but not so when the actual EPS falls in the upper end.

Table 12 summarizes the findings across the between- and within-subjects settings.

Insert Table 12 here

CHAPTER 6: CONCLUSIONS

In this study, I identify a new form of management guidance that is a hybrid of the point and range forecasts, i.e., the MID forecast. MID forecasts are recoded as either point or range forecasts in the CIG, which is a popular management earnings forecast database for both academic researchers and practitioners. However, the present experiment shows that the effect of the MID forecast is different from those of the point and range forecasts, both at the time of management announcing earnings forecast, and at the time of actual earnings announcement.

Two attributes distinguish a MID forecast from a range forecast — one is the explicit mention of the best estimate in the MID forecast; and the other one is that only half the range limit is mentioned in the MID forecast. To isolate the effects of these two attributes, a forecast form not used in practice, the "range + midpoint" forecast, is used in the experiment.

My results show that at the point of management earnings forecast, high-knowledge investors' confidence (adjusted for their familiarity in forecast form) does not differ across the point, MID, and "range + midpoint" conditions, and all of them are higher than that in the range condition. This result suggests that holding the range width constant, high-knowledge investors' confidence is only affected by the specificity of forecast, i.e., whether a single best estimate is mentioned or not. Once a best estimate is explicitly mentioned, their confidence is not affected by whether the range limit is mentioned, and whether half or whole range limit is mentioned.

Compared with a point forecast, a MID forecast provides two implied endpoints that serve as secondary benchmarks in the evaluation of actual earnings. Compared with a range forecast, a MID forecast changes the relative positions of the midpoint and the endpoints — the midpoint becomes primary in a MID forecast but secondary in a range forecast, and the endpoints become secondary in a MID forecast but primary in a range forecast. The between-subjects test is limited to the setting where the actual earnings fall in the lower end of the forecast range. The results are as predicted that high-knowledge participants' earnings reestimates are highest in the range condition, followed by the MID condition, and then by the point condition. The within-subjects findings corroborate the between-subjects findings.

High-knowledge investors have the knowledge of various management forecast forms. They are able to infer the precision information conveyed by the forecast form chosen. They also have well-developed decision rules and can appropriately evaluate primary and secondary benchmarks. However, low-knowledge investors are less able to do so. Their confidence in their own estimates is unaffected by management forecast forms. Their earnings reestimates are the same between the point and the MID conditions, and both are lower than those in the range condition, which suggests that they focus solely on the primary benchmark(s) and ignore the secondary benchmark(s). In addition, high-knowledge investors are able to infer the midpoint in a range forecast as an important benchmark, whereas low-knowledge investors fail to do so.

Hirst et al. (1999) suggest that management forecast form (point versus range) affects investors' confidence when the firm's past forecast record is of high accuracy, but not when its past forecasts are of low accuracy. This study suggests another moderating variable – the investors' knowledge. Forecast form only affects the confidence of those participants who are knowledgeable about management forecast forms, but not those who are less knowledgeable.

Libby et al. (2004) suggest that forecast precision and benchmark jointly affect investors' decision making process. The present study provides further evidence on this viewpoint. Investors are particularly sensitive to the best estimate provided by management. Even though the range limit is the same, providing a best estimate can significantly increase investors' confidence in the forecast. But once the best estimate is missed, investors punish the firm more severely.

In Libby et al. (2004), the range width is 8 cents (a relatively wide range) when the actual EPS falls within the range forecast. In my study, the range width is 4 cents (a relatively narrow range) and the actual EPS falls within the range. Consistent with Libby et al. (2004), falling within the range dampens investors' reaction to a point forecast. My results, combined with Libby et al. (2004), suggest that the dampening effect of falling within the range is applicable to both a wide range and a narrow range.

My results suggest that investors' familiarity with the forecast form is positively associated with their confidence in estimates. Investors' confidence in the MID forecast may be impaired by their lower familiarity with the MID form. This potential detrimental effect of using a novel forecast form is also evidenced by

participants' lower ratings of management competency in both the MID and the "range + midpoint" conditions than in the point and the range conditions. However, this concern should be mitigated over time with the increasing number of MID forecasts.

In summary, at the surface, the MID and range forecasts are similar and differ only in the phrasing. However, investors' reactions both at the moment of management forecast and the actual earnings announcement are affected by the forecast form chosen. Thus, managements should be careful in how they phrase their forecasts. This study, combined with prior studies (Libby and Tan 1999; Soffer et al. 2000; Tan et al. 2002), suggests that managements should be careful in choosing their forecast strategies.

The general limitations of laboratory experiments apply to the present study. The primary concern is whether the results can be generalized to the aggregate market level. However, that concern is mitigated by increasing evidence suggesting market inefficiency (Libby et al. 2002; Kothari 2003).

The second concern relates to using MBA students as participants. MBA students represent relatively informed individual investors, and individual investors are also important market players (Maines and McDaniel 2000). The present study uses the point and range forecasts as comparison groups, and the results concerning the comparisons in high-knowledge participants between the point versus range forecast replicate prior research in which participants are professional analysts. For example, as in Libby et al. (2004), high-knowledge participants' confidence in their own estimates after the management forecast in the point condition is significantly

higher than that in the range condition. Libby et al. (2004) suggest that falling within the forecast range will dampen investors' reactions to the point forecast. Consistent with their prediction, in the present study participants' reestimates after the actual earnings announcement are higher in the range condition than in the point condition. The within-subjects comparisons between the point and the range condition are of the same pattern as the between-subjects findings, which were also found for the financial analysts participants in Libby et al. (2004).

However, given the findings of Frederickson and Miller (2004) that professional analysts and individual investors react differentially to pro forma earnings announcement, it is still an unanswered question whether the high-knowledge participants in the present study, who are also MBA students, behave in exactly the same way as analysts. Future research can directly address this concern.

Given the fact that all participants in my study are from the same subject pool (i.e., MBA students), it is possible that the knowledge differences between the high- and low-knowledge groups documented in my study is smaller than the gap between sophisticated and novice investors in a real financial market. But the documented systematic differences in J/DM between high- and low-knowledge participants reflects the importance of further investigation of investors' knowledge in the setting of financial reporting.

I restrict the between-subjects test to a situation where the actual earnings fall in the lower end of the forecast range, and use a within-subjects test to assess the effect where the actual earnings fall in the upper end. The within-subjects test suggests that when the actual earnings fall in the upper end, overall, investors do

not differentiate the MID forecast from the range forecast. My within-subjects test is a rough test because it is based on participants' predictions of the direction of stock price variation, not the absolute value. Future studies can test whether the results hold in a between-subjects setting. It is particularly interesting to identify the reasons behind this asymmetry between the situations where the actual earnings fall in the upper end and in the lower end.

My study holds constant the forecast surprise and actual earnings surprise. The forecast range here is manipulated as a narrow range. Given the findings of Miller (2000) that the magnitude of forecast surprise and actual earnings surprise affects investors' reestimates, future study can investigate whether my results hold in a wide-range setting, and whether the position of actual EPS relative to the endpoints (or the midpoint) of the range forecast affects investors' reestimates.

Libby et al. (2004) suggest that falling outside of the range forecast magnifies investors' reactions to a point forecast. Since the endpoints are attenuated in a MID forecast, this exacerbating effect should be smaller for a MID forecast than for an equivalent range forecast. Future research can also test whether the results are applicable to a setting where actual earnings fall outside of the range forecast. Libby and Tan (1999) suggest that investors behave differently across positive and negative domains. Future research could also examine whether the results can be generalized to negative earnings domain. Finally, with the increasing frequency of MID forecasts, their effects may be testable by using archival data.

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Table 1 Descriptive Statistics of MID Earnings and Revenue Forecasts
(Jan 1, 2001 to May 31, 2004)

Panel A: Sample selection process

	Earnings forecast	Revenue forecast	Total
Initial sample from Dow Jones & Reuters	102	125	227
Less: Common stocks not traded on the NYSE, NASDAQ, AMEX, or OTC	(5)	(10)	(15)
Final Sample	97	115	212

Panel B: Distribution of the MID forecasts by type and calendar year

Year	Earnings forecast		Revenue forecast		Total	
	Number	Percentage	Number	Percentage	Number	Percentage
2001	5	5	4	3.5	9	4.3
2002	32	33	48	41.7	80	37.7
2003	40	41	43	37.4	83	39.2
2004 (January to May)	<u>20</u>	<u>21</u>	<u>20</u>	<u>17.4</u>	<u>40</u>	<u>18.8</u>
Total	97	100	115	100	212	100

Panel C: Distribution of the MID forecasts by type and forecast horizon (fiscal calendar)

	Q1	Q2	Q3	Q4	Year	Total
Earnings forecast	9	14	17	22	35	97
Revenue forecast	<u>22</u>	<u>23</u>	<u>17</u>	<u>22</u>	<u>31</u>	<u>115</u>
Total	31	37	34	44	66	212

Table 2 Descriptive Statistics of Firms that Issue MID Forecasts

<i>Panel A: Distribution of MID forecast firms by industry</i>				
Two-digit SIC code	Industry Classification	Earnings forecast	Revenue forecast	Total
<i>Mining</i>				
13	Oil & gas Extraction	3	1	3
<i>Manufacturing</i>				
20	Food & Kindred Products	1		1
28	Chemical & Allied Products	3	--	3
30	Rubber & Miscellaneous Plastics Products	1	1	2
33	Primary Metal Industries	2	--	2
35	Industrial Machinery & Equipment	4	10	11
36	Electronic & Other Electric Equipment	6	15	19
38	Instruments & Related Products	4	2	5
39	Miscellaneous Manufacturing Industries	2		2
<i>Transportation & Public Utilities</i>				
40	Railroad Transportation			1
42	Trucking & Warehousing	2		2
48	Communications	1	--	1
49	Electric, Gas, & Sanitary Services	2	1	3
<i>Retail Trade</i>				
53	General Merchandise Stores	1	1	1
59	Miscellaneous Retail	1	--	1
<i>Finance, Insurance, & Real Estate</i>				
64	Insurance Agents, Brokers, & Service	--	1	1
67	Holding & Other Investment Offices	1	1	2
<i>Services</i>				
73	Business Services	10	10	17
80	Health Services	2	--	2
Total		46	43	79

Panel B: Distribution by number of MID forecasts per firm

Number of Forecasts per firm	Earnings forecast	Revenue forecast	Total
1	28	28	47
2	5	7	11
3	4	0	8
4	4	2	3
5	2	1	2
6	1	2	1
7	1	1	2
8 or more	<u>1</u>	<u>2</u>	<u>5</u>
Total	46	43	79

Table 3 Predictions Based on the Multiple-Reference-Points Argument**Panel A. Importance of benchmarks in different forecast forms**

Forecast Form	Higher & lower endpoints	Midpoint
Point	Not Available	Primary
Range	Primary	Secondary
MID	Secondary	Primary
"Range + midpoint"	Primary	Primary

Panel B. Benchmark effect on investors' earnings reestimates and stock price predictions when the actual earnings fall in the lower end'

Forecast Form	No. of benchmark(s) missed	Importance of benchmark(s) missed	No. of benchmark(s) exceeded	Importance of benchmark(s) exceeded	Investors' Reactions
Point	1	Primary	0	--	Lowest
Range	2	One primary, one secondary	1	Primary	Highest
MID	2	One primary, one secondary	1	Secondary	In between
"Range + midpoint"	2	Both primary	1	Primary	In between

Panel C. Benchmark effect on investors' stock price predictions when the actual earnings fall in the upper end'

Forecast Form	No. of benchmark(s) exceeded	Importance of benchmark(s) exceeded	No. of benchmark(s) missed	Importance of benchmark(s) missed	Investors' Reactions
Point	1	Primary	0	--	Highest
Range	2	One primary, one secondary	1	Primary	Lowest
MID	2	One primary, one secondary	1	Secondary	In between

1. When the actual earnings fall in the lower end, the benchmark effect on investors' earnings reestimates is tested in a between-subjects setting where four forecast forms, i.e., point, range, MID, and "range + midpoint," are compared. The benchmark effect on investors' stock price predictions is tested in a within-subjects setting where three forecast forms, i.e., point, range, and MID, are compared.

2. When the actual earnings fall in the upper end, the benchmark effect on investors' stock price predictions is tested in a within-subjects setting where three forecast forms, i.e., point, range, and MID, are compared.

Table 4 Participants' Classifications of the Two MID Forecast Examples

Range	53	61
Point	21	3
Point + Range	5	--
Qualitative	3	14
Others	1	5
Total	83	83

¹ The first MID example is, "EPS for the second quarter will be about 8 cents, plus or minus 1 cent."

² The second MID example is, "EPS for the second quarter will be breakeven, plus or minus 2 cents."

Table 5 Investors' Earnings Estimates and Confidence in Estimates after Management Forecast

<i>Panel A. Sample size</i>					
	Point	MID	Range	Range + Midpoint	Total
High-knowledge	11	9	12	9	41
Low-knowledge	9	13	8	12	42
Overall	20	22	20	21	83
<i>Panel B. Overall participants: mean earnings estimates, confidence in estimates after management forecast and adjusted marginal means of confidence when familiarity with forecast form is included as covariate (standard deviations in brackets).</i>					
	Point	MID	Range	Range + Midpoint	Total
Quarter 2 of year 2003	.17 (.02)	.18 (.02)	.17 (.03)	.17 (.03)	.17 (.02)
Full-year 2003	.67 (.10)	.71 (.09)	.68 (.08)	.72 (.10)	.69 (.09)
Full-year 2003	.73 (.09)	.75 (.10)	.74 (.07)	.76 (.11)	.75 (.09)
Confidence	.51 (.16)	.54 (.14)	.54 (.21)	.55 (.16)	.53 (.19)
Confidence (adjusted marginal means)	.54 (.04)	.55 (.04)	.46 (.04)	.56 (.04)	.53 (.02)
<i>Panel C. High-knowledge participants: mean earnings estimates, confidence in estimates after management forecast and adjusted marginal means of confidence when familiarity with forecast form is included as covariate (standard deviations in brackets).</i>					
	Point	MID	Range	Range + Midpoint	Total
Quarter 2 of year 2003	.18 (.02)	.17 (.01)	.17 (.03)	.17 (.03)	.17 (.02)
Full-year 2003	.68 (.11)	.68 (.08)	.68 (.08)	.71 (.13)	.68 (.10)
Full-year 2003	.73 (.09)	.73 (.09)	.74 (.08)	.76 (.14)	.74 (.10)
Confidence	.51 (.14)	.50 (.18)	.44 (.17)	.47 (.13)	.48 (.18)
Confidence (adjusted marginal means)	.54 (.05)	.52 (.05)	.36 (.05)	.49 (.05)	.48 (.03)

<i>Panel D. Low-knowledge participants: mean earnings estimates, confidence in estimates after management forecast and adjusted marginal means of confidence when familiarity with forecast form is included as covariate ((standard deviations in brackets)).</i>					
	Point	MID	Range	Range + Midpoint	Total
Quarter 2 of year 2003	.16 (.01)	.18 (.02)	.17 (.02)	.18 (.03)	.18 (.02)
Full-year 2003	.65 (.07)	.73 (.09)	.69 (.10)	.72 (.08)	.70 (.09)
Full-year 2003	.72 (.11)	.77 (.10)	.74 (.07)	.76 (.07)	.76
Confidence	.52 (.19)	.57 (.09)	.67 (.18)	.61	.58
Confidence (adjusted marginal means)	.55 (.06)	.58 (.05)	.58 (.07)	.61 (.05)	.58 (.03)

1. The point forecast is "Earnings per share are estimated to be approximately \$0.16 for the quarter." The range forecast is "Earnings per share are estimated to be between \$0.14 and \$0.18 for the quarter." The "range + midpoint" forecast is "Earnings per share are estimated to be approximately \$0.16, varying from \$0.14 to \$0.18 for the quarter." The MID forecast is "Earnings per share are estimated to be approximately \$0.16, plus or minus 2 cents for the quarter." For all conditions, the actual EPS is 15 cents.
2. After the management forecast of the coming EPS for second quarter of year 2003, participants are asked to provide their own estimates of EPS for second quarter of year 2003, full-year 2003, and full-year 2004. They are also asked to provide their confidence in these estimates.
3. After completing the main experiment, participants are asked to self-evaluate his/her familiarity with the management forecast form that (s)he has encountered before. The adjusted marginal means of confidence reported in this table are after including the familiarity rating as a covariate.

Table 6 Paired Contrast Tests on Participants' Confidence in Estimates after the Management Forecast (One-tailed Significances)

	High-knowledge participants	Low-knowledge participants	All participants
Point > MID	.36	.28	.38
MID > Range	.05	.42	.09
Point > Range	.02	.43	.07
Point > "Range + midpoint"	.19	.24	.43
MID > "Range + midpoint"	.33	.33	.49
"Range + midpoint" > Range	.08	.39	.09

1. The effects are after inclusion of participants' familiarity rating with the given management forecast form as a covariate.
2. For high-knowledge participants, the specific linear contrast test (the coefficients – Point: 2, MID: 1, "Range + midpoint": -1, Range: -2) is significant ($F=5.84$, $p=0.02$).
3. For low-knowledge participants, the specific linear contrast test (the coefficients – Point: 2, MID: 1, "Range + midpoint": -1, Range: -2) is insignificant ($F=0.18$, $p=0.67$).
4. For all participants as a whole, the specific linear contrast test (the coefficients – Point: 2, MID: 1, "Range + midpoint": -1, Range: -2) is insignificant ($F=1.73$, $p=0.19$).

Table 7 Investors' Earnings Reestimates and Confidence in Reestimates after the Actual Earnings Announcement

<i>Panel A. Overall participants: mean earnings reestimates, adjusted marginal means of earnings reestimates after including earnings estimates after the management forecast as covariate, confidence in reestimates after actual earnings announcement (standard deviations in brackets).</i>					
	Point	MID	Range	Range + Midpoint	Total
Full-year 2003	.60 (.09)	.68 (.09)	.69 (.05)	.67 (.09)	.66 (.09)
Full-year 2003 (adjusted marginal means)	.62 (.02)	.67 (.01)	.70 (.01)	.66 (.01)	.66 (.01)
Full-year 2004	.66 (.12)	.73 (.10)	.75 (.05)	.74 (.09)	.73 (.10)
Full-year 2004 (adjusted marginal means)	.69 (.02)	.73 (.02)	.76 (.02)	.73 (.02)	.73 (.01)
Confidence	.51 (.17)	.56 (.17)	.55 (.19)	.56 (.15)	.55 (.16)
<i>Panel B. High-knowledge participants: mean earnings reestimates, adjusted marginal means of earnings reestimates after including earnings estimates after the management forecast as covariate, confidence in reestimates after actual earnings announcement (standard deviations in brackets).</i>					
	Point	MID	Range	Range + Midpoint	Total
Full-year 2003	.60 (.10)	.66 (.08)	.68 (.06)	.69 (.10)	.66 (.09)
Full-year 2003 (adjusted marginal means)	.61 (.02)	.66 (.02)	.69 (.02)	.67 (.02)	.66 (.01)
Full-year 2004	.65 (.14)	.71 (.09)	.76 (.05)	.75 (.10)	.72 (.10)
Full-year 2004 (adjusted marginal means)	.67 (.02)	.72 (.03)	.76 (.02)	.73 (.03)	.72 (.01)
Confidence	.49 (.18)	.54 (.19)	.48 (.18)	.46 (.10)	.49 (.16)
<i>Panel C. Low-knowledge participants: mean earnings reestimates, adjusted marginal means of earnings reestimates after including earnings estimates after the management forecast as covariate, confidence in reestimates after actual earnings announcement (standard deviations in brackets).</i>					
	Point	MID	Range	Range + Midpoint	Total
Full-year 2003	.60 (.06)	.70 (.11)	.71 (.05)	.67 (.09)	.67 (.09)
Full-year 2003 (adjusted marginal means)	.65 (.02)	.68 (.02)	.70 (.02)	.66 (.02)	.67 (.01)
Full-year 2004	.68 (.1)	.75 (.1)	.75 (.05)	.73 (.07)	.74 (.09)
Full-year 2004 (adjusted marginal means)	.72 (.02)	.73 (.02)	.76 (.02)	.73 (.02)	.74 (.01)
Confidence	.55 (.18)	.58 (.15)	.66 (.16)	.64 (.14)	.61 (.15)

1. The point forecast is "Earnings per share are estimated to be approximately **\$0.16** for the quarter." The range forecast is "Earnings per share are estimated to be between \$0.14 and \$0.18 for the quarter." The "range + midpoint" forecast is "Earnings per share are estimated to be approximately \$0.16, varying from \$0.14 to \$0.18 for the quarter." The MID forecast is "Earnings per share are estimated to be approximately \$0.16, plus or minus 2 cents for the quarter." For all conditions, the actual EPS is 15 cents.
2. After the actual earnings announcement for **Q2** of year 2003, participants are asked to reestimate the EPS for full-year 2003 and full-year 2004.
3. The adjusted marginal means of earnings reestimates for full-year 2003 are after including the earnings estimates for full-year 2003 after the management forecast as a covariate.
4. The adjusted marginal means of earnings reestimates for full-year 2004 are after including the earnings estimates for full-year 2004 after the management forecast as a covariate.

Table 8 Paired Contrast Tests on Participants' Earnings Reestimates after the Actual Earnings Announcement (One-tailed Significances)

	High-knowledge participants	Low-knowledge participants	All participants
Point < MID	.05	.32	.02
MID < Range	.09	.05	.02
Point < Range	.01	.00	.00
Point < "Range + midpoint"	.04	.43	.02
MID < "Range + midpoint"	.35	.35	.43
"Range + midpoint" < Range	.23	.03	.03

1. The tests are based on the repeated-measure which is formed of participants' earnings reestimates for full-year 2003 and full-year 2004.
2. The effects are after inclusion of participants' earnings estimates for full-year 2003 and full-year 2004 as covariates.
3. For high-knowledge participants, the specific linear contrast test (the coefficients – Point: -4, MID: 1, "Range + midpoint": 1, Range: 2) is significant ($F=9.35$, $p=0.00$).
4. For low-knowledge participants, the specific linear contrast test (the coefficients – Point: -2, MID: -2, "Range + midpoint": 1, Range: 3) is significant ($F=4.12$, $p=0.05$).
5. For all participants as a whole, the specific linear contrast test (the coefficients – Point: -4, MID: 1, "Range + midpoint": 1, Range: 2) is significant ($F=14.92$, $p=0.00$).

Table 9 Analysis of Qualitative Explanations of the Earnings Reestimates after the Actual Earnings Announcement

Panel A. Factors presented in the qualitative explanations					
			Number	Percentage	
No explanation			13	15.7	
Other factors'			17	20.5	
EPS only			43	51.8	
EPS & Others			<u>10</u>	<u>12.0</u>	
Total			83	100	
Panel B. Benchmark to which the actual EPS is compared					
			Number	Percentage	
Management forecast			28	52.8	
Historical EPS			8	15.1	
Consensus analysts' forecast			3	5.7	
The participant's own EPS estimate			4	7.5	
Unclear			<u>10</u>	<u>18.9</u>	
Total			53	100	
Panel C. Participants' comments on the actual EPS performance by forecast form manipulation (For those who explicitly compared the actual EPS with the management forecast)					
	Point	Range	MID	Range + midpoint	Total
Actual EPS is in line with management forecast	1	7	1	4	13
Actual EPS falls short of management forecast	<u>5</u>	<u>1</u>	<u>4</u>	<u>5</u>	<u>15</u>
Total	<u>6</u>	8	5	9	28

Panel D. Participants' comments on the actual EPS performance by forecast form manipulation (For those who explicitly compared the actual EPS with management forecast and those do not indicate the benchmark used)

	Point	Range	MID	Range + midpoint	Total
Actual EPS is inline with management forecast or no comment	3	8	1	7	19
Actual EPS is lower	6	2	6	5	19
Total	9	10	7	12	38

¹ Other factors include sales (13186, or 15.12%), industry (10186, or 11.63%), seasonality (8186, or 9.30%), cost & expenses (8186, or 9.30%), general economic environment (4186, or 4.65%) and others (8186, or 9.30%).

Table 10 Mean Ratings of Perceptions of Zetha and Its Management
(Standard Deviations in Brackets)

	Point	Range	MID	Range + Midpoint	Total	F- statistic	P- value
Earnings Volatility	6.41 (1.94)	6.62 (1.75)	6.73 (1.86)	6.71 (2.41)	6.62 (1.97)	0.12	0.95
Investment Riskiness	6.00 (1.95)	6.00 (1.92)	6.23 (1.90)	6.52 (2.52)	6.19 (2.06)	0.30	0.83
Financial Disclosure Quality	5.23 (1.38)	5.48 (2.29)	5.59 (2.06)	5.90 (2.14)	5.55 (1.97)	0.43	0.74
Management Forecast Accuracy	6.86 (1.81)	7.43 (2.11)	7.27 (2.47)	6.33 (2.54)	6.98 (2.25)	1.00	0.40
Forthcoming of Management Forecast	6.82 (1.84)	6.81 (1.69)	6.77 (2.35)	7.05 (2.11)	6.86 (1.98)	0.08	0.97
Actual EPS as Surprise	4.50 (2.09)	5.62 (2.09)	5.00 (2.31)	6.19 (2.54)	5.31 (2.31)	2.27	0.09*
Earnings Growth Potentiality	0.59 (1.71)	1.05 (1.43)	1.05 (1.73)	0.62 (2.09)	0.83 (1.74)	0.46	0.71
Likelihood of Intentionally Misguiding Market	0.43 (0.22)	0.34 (0.16)	0.45 (0.20)	0.46 (0.20)	0.42 (0.20)	1.66	0.18
Management Competency	6.64 (1.36)	6.80 (1.06)	6.09 (1.48)	5.62 (1.99)	6.28 (1.56)	2.65	0.05*
Management Integrity	6.32 (1.25)	7.15 (1.35)	6.41 (1.87)	6.33 (2.01)	6.54 (1.66)	1.20	0.32

1. All the ratings are based on 11-point scales with the smallest number indicating the least and the largest number indicating the most. For the earnings growth potentiality, the scales are from -5 to 5. For the likelihood of intentionally misguiding the market, the scales are from 0.00 to 1.00. For the rest the scales are from 1 to 11.

Table 11 Within-Subjects Tests

<i>Panel A. Percentages of the participants who think stockprice will rise (versus who thinkstock price will remain unchanged or fall) when the actual earnings fall in the upper end and percentages of the participants who think stock price will fall (versus. who think stock price will remain unchanged or rise) when the actual earnings fall in the lower end</i>						
	Upper-end			Lower-end		
	Point	Range	MID	Point	Range	MID
All	80.0%	39.3%	44.0%	59.5%	21.7%	33.7%
High-knowledge	85.4%	34.1%	43.9%	75.6%	22.0%	31.7%
Low-knowledge	76.2%	45.2%	45.2%	42.9%	21.4%	38.1%
<i>Panel B. Friedman tests for the differences between any two of the forecast forms (one-tailed p-values in cells)</i>						
	Upper-end			Lower-end		
	Point vs. Range	Point vs. MID	MID vs. Range	Point vs. Range	Point vs. MID	MID vs. Range
All	.00	.00	.29	.00	.00	.01
High-knowledge	.00	.00	.08	.00	.00	.10
Low-knowledge	.00	.00	.50	.02	.30	.02

Table 12 Summary of Findings in the Between- and Within-Subjects Settings

<i>Panel A. All participants</i>		
Actual earnings' position	Between-subjects setting ¹	Within-subjects setting ²
Lower end	Point < MID < Range	Point < MID < Range
Upper end	--	Point > MID = Range
<i>Panel B. High-knowledge participants</i>		
Lower end	Point < MID < Range	Point < MID < Range
Upper end	--	Point > MID > Range
<i>Panel C. Low-knowledge participants</i>		
Lower end	Point = MID < Range	Point = MID < Range
Upper end	--	Point > MID = Range

1. The dependent variables in the between-subjects test are participants' earnings reestimates after the actual earnings announcement.
2. The dependent variable in the within-subjects test is participants' stock price prediction.

Appendix 1 Experiment Material in the Point Forecast Condition

Thank you for participating in this study.

In this exercise, we would like you to analyze the enclosed case as an investor. The case relates to a listed company. In order to avoid having the name of the company influence your decisions, we have changed the name and called it Zetha Inc. While not all the information that you would normally desire will be made available to you due to time constraints, it is important that you perform your analysis to the best of your abilities given the limited information set.

Please open the envelopes in the given sequence (i.e., beginning with Envelope A), and answer the questions in each envelope sequentially. Please do not skip questions or move ahead to other pages before completing the earlier pages. Once you have answered a question, please do not go back and change your responses to previous questions.

Your answers will be kept strictly confidential and anonymous, and will be analyzed after being aggregated with responses from other respondents. Under no circumstance will any firm or individual information be identified with the results.

As a small token of appreciation for your participation, we will be providing you with two movie ticket passes. Please write down your name for our record purposes in connection with the issuance of these movie passes.

Name: _____

Thank you once again for your cooperation. Your assistance is very much appreciated.

Sincerely,

Han Jun
Tan Hun Tong (Head, Division of Accounting)

ZETHA INC. BACKGROUND INFORMATION

BUSINESS

The Company's principal products are Monolithic and Discrete Semiconductor Devices and Components, Ceramic Devices and components, and wireless communication devices.

The principal customers for these products are equipment manufacturers for commercial and defense microwave systems such as cellular telephones, commercial telecommunications, direct broadcast satellites, automotive collision avoidance applications and military applications.

MARKETS AND DISTRIBUTION

The major market for Zetha's products is to manufacturers of commercial products, primarily in the wireless communications markets and includes components for products such as wireless telephones and base stations in addition to motion detectors and sensors.

RESEARCH AND DEVELOPMENT

The Company has maintained a high level of R&D activities to remain competitive in certain areas and to be an industry leader in other areas.

RAW MATERIALS

Raw materials for the Company's products and manufacturing processes are generally available from several sources. It is the Company's policy not to depend on a sole source of supply.

CONTRACTS

During fiscal year 2002, no one customer accounted for 10% or more of the Company's total sales.

COMPETITIVE CONDITIONS

The principal competitive factors affecting the Company's business are product performance, price, applications support and adherence to delivery schedules. The Company faces competition from divisions of larger, more diversified organizations in the electronics industry with substantially greater assets and access to larger financial resources, as well as from many smaller specialized companies.

PATENT AND TRADEMARKS

Zetha owns a small number of patents and has other patent applications under preparation or pending.

PROPERTIES

The company owns a number of plants and facilities in various countries.

SELECTED FINANCIAL DATA PERTAINING TO ZETHA, INC.

(Note that the fiscal year end of Zetha is December 31st)

THREE-YEAR FINANCIAL SUMMARY

(In thousands, except per share amounts and financial ratios)

FISCAL YEAR

	2000	2002	2001
RESULTS OF OPERATION			
Sales		\$158,005	\$123,739
\$116,881			
Net income (loss)		17,301	15,931
10,302			
Per share data			
Net income (loss) diluted		\$ 0.81	\$ 0.75
\$ 0.52			
Weighted average common			
Shares		21,218	21,037
20,024			
FINANCIAL POSITION			
Working capital		\$ 63,436	\$ 42,687
\$ 26,061			
Additions to property, plant			
and equipment		34,584	17,730
11,039			
Total assets		127,104	106,681
76,929			
Long-term debt		345	713
1,625			
Stockholders' equity		90,354	71,814
55,822			
OTHER STATISTICS			
New orders			
(net of cancellations)		123,500	126,500
121,100			
Backlog at year end		\$ 36,700	\$ 36,900
\$ 36,800			

FISCAL YEAR 2003

Quarterly FINANCIAL DATA

(In thousands, except per share amounts and financial ratios)

	First Quarter	Second Quarter	Third Quarter	Fourth Quarter	Year
FISCAL 2003					
Sales	\$39,995				
Gross profit	17,605				
Net income	4,129				
Earnings per share	.19				
FISCAL 2002					
Sales	\$ 38,605	\$41,769	\$38,463	\$ 39,168	\$ 158,005
Gross profit	17,105	18,413	16,979	17,003	69,500
Net income	4,389	5,384	3,650	3,878	17,301
Earnings per share	.21	.25	.17	.18	.81
FISCAL 2001					
Sales	\$29,955	\$28,206	\$31,489	\$ 34,269	\$123,739
Gross profit	12,823	10,863	13,338	15,184	52,208
Net income	3,974	2,535	4,072	5,250	15,931
Earnings per share	.19	.12	.19	.25	.75
Consensus Second Quarter Forecast for FY 2003					\$0.23
Consensus 12-month EPS Forecast for FY 2003					\$0.77
Consensus 12-month EPS Forecast for FY 2004					\$0.80

Set 1

On May 15, 2003, the management of Zetha issued the following statement:

The company expects earnings per share for the quarter ending June 30, 2003 to be below expectations due to weaker than expected sales. Earnings per share are estimated to be approximately \$0.16 for the quarter.

Question 1

Recall that, *before the company provided its estimate on May 15, 2003*, the consensus EPS forecasts are:

Consensus Second Quarter Forecast for FY 2003	\$0.23
Consensus 12-month EPS Forecast for FY 2003	\$0.77
Consensus 12-month EPS Forecast for FY 2004	\$0.80

Given the company's May 15, 2003 earnings estimate, what is your EPS forecast (*fill in each blank*):

- a) for the *second quarter (3 months)* ending *June 30, 2003*: \$. _____
- b) for the *full-year (12 months)* ending *December 31, 2003*: \$. _____
- c) for the *full-year (12 months)* ending *December 31, 2004*: \$. _____

Question 2

How confident are you of the accuracy of the above forecasts? (*circle one number*)

0	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00
Not at all										Extremely
confident										confident

Question 3

Please explain how you decided on your forecasts provided above. Please document everything that comes across your mind during your decision making process.

Background questions

Please answer the following questions.

- How many years of working experience do you have? (*fill* in the blanks)

_____ years and _____ months

- Have you ever invested in the stock market (circle one)? YES / NO

If your answer is "yes", how many times have you done that? _____ times

- Have you ever invested in mutual funds that invest in a portfolio of stocks (circle one)? YES / NO

If your answer is "yes", how many times have you done that? _____ times

- In the space below, indicate the number of courses (undergraduate and graduate) you have taken or are currently enrolled in:

Accounting: _____ courses

Finance: _____ courses

- Please indicate your age group by ticking against the appropriate response.

___ 20-30 years old ___ 30-40 years old ___ 40-50 years old ___ 50-60 or above

Now you have finished question set 1, open the envelope marked 'A'.

Set 2

On August 15, 2003, Zetha made the following interim earnings announcement:

	<i>Quarter ended June 30, 2003 \$'000</i>
<i>Net sales</i>	<i>48,920</i>
<i>Net income</i>	<i>3,519</i>
<i>Earnings per share</i>	<i>\$ 0.15</i>

Question 1

Recall that on May 15, 2003, Zetha's EPS estimate for the quarter ending June 30, 2003 was \$0.16. Given the company's May 15, 2003 earnings estimate *and* its August 15, 2003 earnings announcement, what is your EPS forecast (*fill in each blank*):

(a) for the *full-year (12 months)* ending *December 31, 2003*: \$.

(b) for the *full-year (12 months)* ending *December 31, 2004*: \$.

Question 2

How confident are you of the accuracy of the above forecasts? (*circle one number*)

0	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00
									Extremely	
Not at all										confident
confident										

Question 3

Please explain how you decided on your forecasts provided in the answer to Question 1?

Now you have finished question set 2, please put both Sets Set 1 & 2 back into the envelope marked 'A'. After that, please open the envelope marked 'B'.

Set 3

Question 1

Please assess the *volatility* of Zetha's earnings. (*circle one number*)

1	2	3	4	5	6	7	8	9	10	11
Extremely Stable			Neutral				Extremely volatile			

Question 2

Please assess the *riskiness* of Zetha as a stock investment. (*circle one number*)

1	2	3	4	5	6	7	8	9	10	11
Not at all Risky			Neutral				Extremely risky			

Question 3

Please assess the quality of Zetha's financial disclosures. (*circle one number*)

1	2	3	4	5	6	7	8	9	10	11
Extremely low disclosure quality					Neutral			Extremely high disclosure quality		

Question 4

How accurate was Zetha's management forecast on May 15, 2003? (*circle one number*)

1	2	3	4	5	6	7	8	9	10	11
Extremely inaccurate				Neutral			Extremely accurate			

Question 5

How forthcoming was the management of Zetha in providing its earnings estimates on May 15, 2003? (*circle one number*)

1	2	3	4	5	6	7	8	9	10	11
Not at all forthcoming				Neutral			Extremely forthcoming			

Question 6

To what extent were you surprised by the magnitude of the actual earnings reported by management (in their announcement on August 15, 2003) for the quarter ending June 30, 2003? (*circle one number*)

1 2 3 4 5 6 7 8 9 10 11
 Not at all Neutral Extremely
 surprised

Question 7

What is your assessment of Zetha's potential for future earnings growth? (*circle one number*)

-5 -4 -3 -2 -1 0 1 2 3 4 5
 Extremely Neutral Extremely
 negative positive

Question 8

What is the likelihood that Zetha's management was intentionally misguiding the market in its forecast on May 15, 2003? (*circle one number*)

0 0.10 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
 Extremely Extremely
 unlikely likely

Question 9

What do you think of the competence of Zetha's management? (*circle one number*)

1 2 3 4 5 6 7 8 9 10 11
 Extremely low Neutral Extremely high
 competence competence

Question 10

What do you think of the integrity of Zetha's management? (*circle one number*)

1 2 3 4 5 6 7 8 9 10 11
 Extremely low Neutral Extremely high
 integrity integrity

Question 11

Recall that the management of Zetha made the following earnings forecast on May 15, 2003:

Earnings per share are estimated to be approximately \$0.16 for the quarter.

Please indicate your familiarity with the manner in which Zetha's management forecasted earnings. (*circle one number*)

1 2 3 4 5 6 7 8 9 10 11
 Not at all Neutral Extremely
 familiar familiar

Question 12

Zetha's second-quarter *actual* earnings announced on August 15, 2003 is _____ (higher than/ equivalent to/ lower than) the earnings estimate provided by management on May 15, 2003. (*circle the appropriate answer*)

Please answer the rest of the questions based on your common understanding of management earnings forecast. In other words, these questions are not related to Zetha. Please answer the questions sequentially.

Question 13

Suppose it is now May 30, 2003. The current consensus analyst forecast for Company Alpha's Quarter 2 EPS (for the period from April 1 to June 30) is \$0.40. The management of Company Alpha is looking at its own internal forecasts for its Quarter 2 EPS.

Management thinks that it can, based on its best estimates, achieve \$0.42. EPS estimates under pessimistic and optimistic conditions are \$0.32 and \$0.52, respectively.

Management intends to issue a one-line announcement to guide the market and analysts on its Q2 EPS, and the guidance begins with the line "Management believes that Company Alpha's quarter 2 EPS will _____"
In actual practice, there are distinct and different forms that issuing such guidance can take. In the space below, write down as many as these different forms as you are aware of by completing the one-line announcement.

- Management believes that Company Alpha's quarter 2 EPS will _____
- Management believes that Company Alpha's quarter 2 EPS will _____
- Management believes that Company Alpha's quarter 2 EPS will _____
- Management believes that Company Alpha's quarter 2 EPS will _____
- Management believes that Company Alpha's quarter 2 EPS will _____

Now you have finished question set 3, please put them back into the envelope marked 'B' and put it aside. After that, please open the envelope marked 'C'.

Set 4

Question 1

Below are some examples of real management earnings forecasts. In general, such forecasts can be classified as:

- Qualitative forecasts (Q)
- Range forecasts (R)
- Point estimate forecasts (P)
- Minimum forecasts (Min)
- Maximum forecasts (Max)
- Others (O, please elaborate if you choose this option)

Classify each of the following earnings forecasts below by writing down the alphabet associated with each category (Q, R, P, Min, Max, or O) in the spaces after each statement

'EPS for the second quarter will be between 2 cents and 5 cents.' _____

'EPS for the second quarter will be comparable to last year.' _____

'EPS for the second quarter will be less than 25 cents.' _____

'EPS for the second quarter will be breakeven, plus or minus 2 cents.' _____

'EPS for the second quarter will be about 8 cents, plus or minus 1 cent.' _____

'EPS for the second quarter will be no less than 12 cents.' _____

'EPS for the second quarter will be not as good as it is expected to be.' _____

'EPS for the second quarter will be minus 5 cents.' _____

Question 2

Suppose analysts' consensus forecast for Firm A's Quarter 1 (ended March 31) EPS is 20 cents. On April 30, Firm A announces that its Quarter 1 EPS is 19 cents. Its stock price just before the announcement is \$8.00. Please predict the stock price right after this announcement.

Answer: \$ ____ . ____ per share

Question 3

Suppose analysts' consensus forecast for Company Beta's quarter 3 (for the three-month period ending September 30) results is \$0.50. Consider the following three scenarios where, on August 15, Beta issues a forecast for its Quarter 3 results:

Scenario A: We anticipate that our Quarter 3 EPS will be about \$0.55.

Scenario B: We anticipate that our Quarter 3 EPS will be between \$0.53 and \$0.57.

Scenario C: We anticipate that our Quarter 3 EPS will be around \$0.55, plus or minus \$0.02.

Case I

On October 15, Company Beta announced that actual Q3 earnings of \$0.56. Answer the following questions (*circle the appropriate responses*):

(a): In Scenario A above, after the actual earnings announcement on October 15, Beta's stock price will _____ (rise/ remain unchanged/ fall).

In Scenario B above, after the actual earnings announcement on October 15, Beta's stock price will _____ (rise/ remain unchanged/ fall).

In Scenario C above, after the actual earnings announcement on October 15, Beta's stock price will _____ (rise/ remain unchanged/ fall).

(b) Which scenario will have the largest stock price reaction in terms of its absolute magnitude?

Scenario A

Scenario B

Scenario C

(c) Which scenario will have the smallest stock price reaction in terms of its absolute magnitude?

Scenario A

Scenario B

Scenario C

Case II

On October 15, Company Beta announced that actual Q3 earnings of \$0.54. Answer the following questions (*circle the appropriate responses*):

(a) In Scenario A above, after the actual earnings announcement on October 15, Beta's stock price will _____ (rise/ remain unchanged/ fall).

In Scenario B above, after the actual earnings announcement on October 15, Beta's stock price will _____ (rise/ remain unchanged/ fall).

In Scenario C above, after the actual earnings announcement on October 15, Beta's stock price will _____ (rise/ remain unchanged/ fall).

(b) Which scenario will have the largest stock price reaction in terms of its absolute magnitude?

Scenario A

Scenario B

Scenario C

(c) Which scenario will have the smallest stock price reaction in terms of its absolute magnitude?

Scenario A

Scenario B

Scenario C

That's the end of the exercise. Please put set 4 back into the envelope marked 'C'. Thank you very much again for your cooperation and assistance!