Probability of Meeting/Beating Analysts' Forecasts and Market Reaction to Earnings Announcements

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Abstract

In this paper, I hypothesize that market reaction to meeting/beating (missing) earnings expectations depends on its unexpected component, which is related to the *ex ante* probability that a firm will meet/beat expectations (MBE probability). I first empirically model the *ex ante* MBE probability using a vector of variables that is available to the market prior to earnings announcements. I then generate out-of-sample estimates of the MBE probability, which I use to explain cross-sectional variation in market reaction to earnings announcements. As predicted, I find that when firms with high MBE probabilities miss (meet/beat) analysts' consensus forecasts, their three-day abnormal returns around earnings announcements are significantly more negative (less positive) than those with low MBE probabilities. These results are robust to controlling for unexpected earnings and other determinants of stock returns around earnings announcements. Overall, I contribute to the literature on meeting/beating expectations by providing a rational explanation for cross-sectional variation in market reaction to meeting/beating or missing earnings expectations.

Keywords: probability of meeting/beating analysts' forecasts; market reaction; earnings torpedoes.

Data Availability: Data are commercially available from the sources identified in the text.

1. Introduction

The financial press is replete with anecdotal evidence of 'earnings torpedoes', where a firm loses a significant proportion of its market value after announcing earnings that fall below market expectations. For example, in February 2001 Cisco lost 13% of its market value over the two days after it announced earnings that fell one cent short of expectations. Although there is much anecdotal evidence of such earnings torpedoes, the average stock price decrease after a firm misses expectations is fairly modest. For example, Lopez and Rees (2002) report that the average three-day return for firms announcing earnings that miss consensus analysts' forecasts, after controlling for earnings surprise, is just 1.9% lower than the return for firms that beat forecasts.[1]

The modest average market reaction to missing expectations in light of much anecdotal evidence of earnings torpedoes suggests that there is considerable cross-sectional variation in market reaction to missing expectations even after controlling for the magnitude of earnings surprise. This implication calls for research that explains cross-sectional variation in market reaction to missing (or alternatively to meeting/beating) earnings expectations, with particular emphasis on whether earnings torpedoes can be identified *ex ante*. To date, the only research examining this issue is Skinner and Sloan (2002), who conjecture that earnings torpedoes occur when investors' overly-optimistic (i.e., irrational) earnings expectations regarding growth stocks are revised downward when earnings expectations are missed. They predict that the penalty for missing expectations will be much larger for growth than for value stocks. Skinner and Sloan report an approximately 4% difference in returns over a one-quarter holding period between growth and value stocks that miss expectations, although they find little difference for firms that meet/beat expectations. However, Skinner and Sloan find no significant return differences

[1] In my sample, the mean (median) cumulative 3-day abnormal return for firms missing quarterly analysts' forecasts is –1.66% (–0.99%).

between growth and value stocks for firms missing (meeting/beating) expectation over the short window around earnings announcements.[2]

In this paper, I conjecture that market reaction—after controlling for earnings surprise—to meeting/beating earnings expectations (henceforth MBE), or alternatively to missing earnings expectations (henceforth MISS), is a function of the market's *ex ante* probability that a firm will meet or beat analysts' earnings forecasts (henceforth MBE probability). Specifically, a firm with a high MBE probability—for example, because it has met expectations for many consecutive quarters—should more adversely surprise the market when it misses expectations than a firm with a low MBE probability. Conversely, a firm with a high MBE probability should surprise the market less if it meets/beats expectations than a firm with a low MBE probability.

The MBE probability hypothesis for explaining cross-sectional variation in market reaction to meeting/beating (or missing) expectations has the following desirable features. First, unlike Skinner and Sloan's irrational-investor-optimism hypothesis (hereafter, investor-optimism hypothesis), the MBE probability hypothesis provides a rational explanation for cross-sectional return variation relating to meeting/beating or missing expectations, including earnings torpedoes.[3] Second, unlike the investor-optimism hypothesis proposed by Skinner and Sloan that explains market reaction only to missing expectations, the MBE probability hypothesis explains cross-sectional variation in market reaction to both missing and meeting/beating expectations. Third, the MBE probability hypothesis is a natural extension of the concept of unexpected earnings. That is, just as market reaction to earnings announcements depends on the unexpected component of reported earnings, market reaction to meeting/beating (or missing) expectations

[2] In addition, Payne and Thomas (2003) show that the Sloan and Skinner results are sensitive to split-adjustment of I/B/E/S EPS data, which casts some doubt over their results.

[3] Of course, a rational explanation to cross-sectional variation in market response to meeting/beating or missing expectations presupposes that market reaction to MBE—after controlling for earnings surprise—is itself rational. Bartov et al. (2002) and Kasznik and McNichols (2002) provide evidence suggesting that the market premium attached to MBE firms is not necessarily irrational.

should depend on its unexpected component, which is measured by the *ex ante* MBE probability.

The MBE probability hypothesis is not necessarily inconsistent with rational analysts' behavior. Analysts have incentive to make accurate forecasts. Recent studies (Gu and Wu 2003, Basu and Markov 2004) suggest that their major objective function is the absolute forecast error. Both the popular press and the academic research (Sankaraguruswamy and Sweeney 2005) find that analysts are aware that managers try to guide their forecasts lower than the subsequently announced numbers. Analysts' behavior of letting firm meet or beat more than miss can be a rational reaction in this ongoing game between managers and analysts.

To test the MBE probability hypothesis, I first model a firm's *ex ante* MBE probability as a function of various factors that are known to the market prior to the earnings announcement. The factors that I include in my model are partly identified in prior studies (Matsumoto 2002, Barton and Simko 2002, Rees 2005) and partly developed by me and reflect the following dimensions: managers' ability to meet or beat earnings targets, managers' incentives to meet or beat earnings targets, firms' history of meeting or beating earnings targets and firms' competitive pressure within the industry to meet or beat earnings targets. I apply an out-of-sample rolling estimation procedure for determining MBE probabilities. Specifically, I estimate the model over 12 consecutive quarters (estimation period) and generate out-of-sample fitted MBE probability values for the following quarter (treatment period). Diagnostic tests suggest that the MBE probability model is fairly effective in predicting the MBE outcome both within and out of sample. For example, the model has a mean pseudo R^2 of 17.06% and correctly classifies 72% of actual MBE outcomes.

I next examine the extent to which the estimated MBE probability explains cross-sectional variation in market reaction to earnings announcements separately for those firms

that meet/beat and for those firms that miss analysts' quarterly earnings forecasts. My sample comprises 43,405 firm-quarter observations for which data on stock returns and the MBE probability are available over the period 1996 to 2003. Using both portfolio analyses and multivariate analyses, I find that the MBE probability significantly explains variation in three-day abnormal returns around earnings announcements for firms that meet/beat and for firms that miss earnings forecasts. For example, for firms that meet/beat expectations, abnormal returns for firms in the lowest (highest) quintile of the MBE probability distribution are 1.87% (0.85%), and the difference of 1.02% is significant at $p< 0.01$. Similarly for firms that miss analysts' consensus forecasts, abnormal returns for firms in the lowest (highest) quintile of the MBE probability distribution are –1.64% (-2.86%), and the difference of 1.22% is significant at $p<0.01$.

These results are robust to controlling for other potential determinants of market reaction to earnings announcements including the magnitude of unexpected earnings and various determinants of earnings response coefficients (ERC). Specifically, in multivariate regression analyses with these controls, as the probability of MBE increases from zero to one, the abnormal returns for firms that meet/beat (miss) earnings forecasts decrease by 1.62% (2.15%), on average. These results are both statistically and economically significant.[4]

The primary contribution of my paper is explaining cross-sectional variation in market reaction to meeting/beating or missing earnings expectations. Prior literature has shown that market reaction around earnings announcements is related to meeting/beating consensus analysts' forecasts (e.g., Lopez and Rees 2002). I extend the concept of unexpected earnings to the meeting/beating scenario, and show that market reaction to meeting/beating (or missing) earnings

[4] In a short window setting, prior studies usually find the return differences of comparable magnitudes. For example, DeFond and Park (2001) find the two-day return differences to be 0.3% and 0.7% between income-increasing accruals firms and income-decreasing accruals firms for good news announcements and bad news announcements. Hotchkiss and Strickland (2003) find that the abnormal return differences between high institutional ownership and low institutional ownership vary from –0.40% to –1.03% when there are negative earnings forecast errors.

expectations varies predictably based on its *unexpected* component, which I measure through the MBE probability. In this manner, I provide a rational explanation for cross-sectional variation in market reaction to meeting/beating (or missing) earnings expectations, including the well-known phenomenon of the earnings torpedo.

My paper is related to Skinner and Sloan (2002). Skinner and Sloan explain the earnings torpedo effect through the investor-optimism hypothesis – irrational investors having overly optimistic earnings' expectation for growth (low book-to-market) firms. In contrast, I explain the cross-sectional variation of market reaction to meeting/beating earnings expectations through the MBE probability hypothesis. My study differs from Skinner and Sloan in two important ways. First, unlike Skinner and Sloan, I provide an explanation based on rational investor response to meeting/beating or missing earnings expectations. Second, my paper explains cross-sectional variation to both missing and meeting/beating earnings expectations.

I perform further analyses to distinguish my results from those of Skinner and Sloan. Using multivariate analysis, after controlling for the effect of book-to-market ratio, return variation related to MBE probability still exists both for MBE and MISS firms, but, there is no significant return variation related to the book-to-market ratio after controlling for MBE probability. These results suggest that my primary results are robust to Skinner and Sloan's alternative explanation based on irrational growth expectations.

An additional contribution of my paper is providing a more comprehensive model for predicting firms' likelihood of meeting/beating analysts' earnings forecasts. Matsumoto (2002) and Rees (2005) also model MBE probability through firms' incentives and ability to meet/beat expectations. I develop a more comprehensive model of MBE probability by also including variables that capture firms' history and firms' competitive pressure within the industry to meet or

beat earnings expectations. In addition, I also document the high out-of-sample predictive power of my model.

Finally, my study complements the existing literature that explains market reaction to earnings announcements (Kormendi and Lipe 1987, Collins et al. 1987, Easton and Zmijewski 1989, Collins and Kothari 1989). In particular, my study provides a new perspective to examine market reaction to quarterly earnings announcements. While the ERC literature explains market reaction through unexpected earnings and ERC determinants, recent studies (Lopez and Rees, 2002) show that meeting/beating expectations also helps to explain the market's response to earnings announcements. I show that the unexpected component of meeting/beating expectations (measured using the MBE probability) helps to explain cross-sectional variation in the market's response to meeting/beating expectations. In this manner, my study contributes to understanding market reaction to earnings announcements.

The study proceeds as follows. Section 2 reviews the relevant literature and develops the major hypotheses. Section 3 describes the sample and research design. Section 4 presents the major empirical results of the market reaction tests. The final section summarizes the findings and draws some implications.

2. Motivation and Hypotheses

2.1 Motivation

Since Ball and Brown (1968) and Beaver (1968), researchers have strived to explain stock price reactions to earnings announcements. The literature has hypothesized that the stock price reaction to earnings news must be a function of the unexpected or surprise component of earnings. Beaver et al. (1979) first analyze the relation between the magnitude of unexpected

earnings and stock returns, while analytical models such as Holthausen and Verrecchia (1988) and the ERC literature (Kormendi and Lipe 1987, Collins and Kothari 1989) formalize this relationship.

Anecdotal evidence suggests that, in the 1990s, a firm's stock return around an earnings announcement is related, in addition to unexpected earnings, to whether the firm meets or misses its earnings expectation. In particular, the financial press reports numerous examples of earnings torpedoes, where there is substantial drop in market value when the firm misses expectations even by one cent. [5] For example, in 2000 Disney experienced a price drop of 11% on the day of its earnings announcement even though EPS was only one cent below analysts' consensus forecast. Similarly, in October 2002 Coca-Cola lost 10% of its market value on the day when it announced earnings one cent lower than analysts' expectations. Much of this anecdotal evidence seems to indicate that such extreme market reaction is the result of overreactions to missing forecasts for growth firms that are accorded irrationally high premiums by the stock market (Dreman 1998, Dreman 1999).

Lopez and Rees (2002) are the first to document a significant positive (negative) stock return around earnings announcements for firms that meet/beat (miss) consensus analysts' forecast. Specifically, they find that, after controlling for unexpected earnings, firms beating (missing) analysts' forecasts have three-day market-adjusted abnormal returns around earnings announcements of 0.8% (-1.1%), indicating that a return of 1.9% is attributable to whether a firm beats or misses its earnings expectation. Additionally, Bartov et al. (2002) and Kaznik and McNichols (2002) report evidence of significant price premiums associated with MBE. However, unlike the anecdotal accounts, they are unable to find market irrationality associated with the premiums accorded to MBE firms. In particular Bartov et al. (2002) find no subsequent price

[5] See http://www.torpedowatch.com/page/tpo/aboutus/philosophy.html?sid=1101013965.12250.

reversals for MBE firms, suggesting that the premium to MBE firms is unlikely driven by investors' overreaction to good news. In addition, both Bartov et al. (2002) and Kaznik and McNichols (2002) find that MBE status is associated with higher future earnings, which provides a rational explanation for the premium accorded to MBE firms.

The anecdotal evidence of extreme market reactions to missing expectations is not consistent with the modest average differences in stock returns between MBE and MISS firms documented by Lopez and Rees (2002). This result suggests that there is considerable cross-sectional variation in stock price response to meeting/beating or missing the earnings expectation. Skinner and Sloan (2002) conjecture that high growth stocks are irrationally overpriced and the large price drop after a firm misses analysts' forecasts reflects a correction of expectational errors regarding future performance. They show that when growth (low book-to-market) firms miss analysts' forecasts, the negative price reaction is more pronounced in quarterly return intervals. However, Skinner and Sloan do not find evidence of an asymmetrically large reaction to negative earnings surprises for growth firms around the three-day return windows, which they attribute to the effects of earnings pre-announcements. In addition, Payne and Thomas (2003) correct for the I/B/E/S rounding errors and find no evidence across different return intervals of the asymmetric response to bad news between growth and value firms. Their evidence casts some doubt over the Skinner and Sloan evidence.

In this paper, I extend the concept of unexpected earnings to the literature on meeting/beating expectations. Just as market reaction to earnings announcements depends on unexpected earnings rather than reported earnings, market reaction to meeting/beating (or missing) expectations should depend on its unexpected component, which is measured by the *ex ante* MBE probability. Specifically, I expect that firms with high MBE probability will surprise

the market less (more) when they meet/beat (miss) expectations. This surprise will generate a smaller (larger) than average price response for such firms when meeting/beating (missing) expectation. Therefore, the concept of the MBE probability provides a rational explanation for the return differences to meeting/beating or missing expectations, including earnings torpedoes.

The MBE probability explanation assumes that the market is able to form expectations regarding MBE. Past research shows that firms have different incentives and abilities to meet or beat earnings expectations. Some studies (Bartov et al. 2002, Kaznik and McNichols 2002, Lopez and Rees 200, Matsumoto 2002, Skinner and Sloan 2002, Graham et al. 2005) offer reasons why firms strive to meet or beat the analysts' forecasts. Some other studies (Barton and Simko 2002, Rees 2005) suggest that firms have different abilities to meet or beat earnings expectations. For example, evidence in Barton and Simko (2002) suggests that high net operating assets on the balance sheet or a large number of shares will constrain firms' ability to report positive earnings surprises. In addition, prior studies (Matsumoto 2002, Barton and Simko 2002, Rees 2005) find that the MBE status may be associated with various firm characteristics such as percentage of institutional holding, growth, number of shares outstanding, standard deviation of analysts' forecasts and size. In light of this evidence, MBE should be at least partially predictable. Therefore, knowledge of past MBE information, as well as other relevant firm characteristics, should allow the market to form expectations regarding MBE probability. If the market does form such expectations, then the price response to meeting/beating or missing expectations should depend in part on this probability.

2.2 Hypotheses Development

An efficient capital market should understand that some firms have higher MBE probabilities than others do. Therefore, I expect the surprise from a firm's meeting/beating

(missing) analysts' forecasts varies with its *ex ante* MBE probability. For example, by January 1997 Microsoft had succeeded in meeting or beating analysts' forecasts 41 times in the 42 quarter since it went public. If Microsoft meets or beats forecasts in January 1997, it is not a large surprise, because the market already has a high MBE probability expectation for the firm. On the contrary, the market would be quite adversely surprised if Microsoft failed to meet earnings expectation. According to the notion that the market reacts to the information surprise in earnings (Beaver et al. 1979, Holthausen and Verrecchia 1988), market reaction to earnings announcements should be positively correlated with the extent of MBE surprise around earnings announcements. If market participants understand the implications of MBE probability, I expect a smaller market reaction associated with meeting/beating analysts' forecasts for firms with higher ex-ante MBE probabilities. Thus, my first hypothesis (stated in alternative form) is:

H1: For firms whose quarterly earnings meet or beat the analysts' consensus forecasts, positive abnormal returns around earnings announcements would be less positive for firms with higher MBE probabilities than for those with lower MBE probabilities.

Hypothesis 1 predicts a smaller market reaction for firms who meet or beat analysts' forecasts if they have higher ex-ante MBE probabilities. However, it is an empirical issue, because ex-ante, we do not know whether market can see through such probability of meeting/beating analysts' forecasts.

MBE probability has symmetric implications for firms that miss analysts' forecasts. For firms with higher MBE probabilities, the bad news from missing analysts' forecasts would have a larger negative surprise to the market participants. Thus, my second hypothesis (stated in alternative form) is:

H2: For firms whose quarterly earnings miss the analysts' consensus forecasts, negative

abnormal returns around earnings announcements would be more negative for firms with higher MBE probabilities than those with lower MBE probabilities.

Hypothesis 2 predicts a smaller market reaction for firms who miss analysts' forecasts if they have lower ex-ante MBE probabilities. However, it is also possible that missing analysts' forecasts in the current quarter will signal worse performance for the firm with a bad history of meeting/beating analysts' forecasts. Such alternative argument brings tension to hypothesis 2.

3. Sample and Research Design

3.1 Sample Selection

My sample comprises firm-quarters with available data from I/B/E/S, Compustat, CRSP and CDA/Spectrum Institutional Holdings (13F) over the period 1993 to 2003. I begin my sample from 1993 for two reasons. First, I/B/E/S changed its definition of earnings per share in 1993, so inclusion of pre- and post 1993 data could be problematic.[6] Second, Brown and Caylor (2005) show that from 1993 onward, analysts' forecasts have become the most important earnings benchmark for managers, which is important given that my paper deals with meeting/beating analysts' forecasts. I also limit my sample to December fiscal year-end firms to ensure that I have a consistent relation between fiscal and calendar time periods. Finally, to minimize data error problems I require that (a) the earnings announcement date is no later than 45 (90) days after the fiscal quarter end in quarter 1-3 (4); and (b) the earnings announcement dates reported in I/B/E/S and Compustat are within one day of each other.[7] After applying the above sample selection criteria, I am left with 52,639 firm-quarter observations including 36,956 observations meeting/beating analysts' forecasts (MBE) and 15,683 observations missing analysts' forecasts

[6] See Abarbanell and Lehavy (2002b) for details.
[7] This procedure reduces the sample size by 10.6%. In further sensitivity checks where I require the two dates to be exactly the same, I get qualitatively similar results.

(MISS).

I measure analysts' consensus forecasts using the most recent mean analyst forecasts from the summary data in I/B/E/S.[8] Payne and Thomas (2003) suggest that stock-split adjusted data will lead to classification errors for determining firms' MBE (MISS) status. Therefore, I use stock-split unadjusted forecasts and actual EPS from the I/B/E/S dataset.

3.2 MBE Probability Model

I develop an empirical model that predicts a firm's probability of meeting/beating analysts' forecasts based on both the literature and the rationales I provide. Prior literature indicates that managers have various *incentives* to meet or beat analysts' consensus forecasts (Matsumoto 2002, Graham et al. 2005). In addition, mangers' *abilities* to manipulate earnings and guide analysts' forecasts lower can also affect MBE probability (Barton and Simko 2002, Rees 2005). In addition to these two dimensions suggested by prior literature, I propose variables to capture (1) the firm's history in meeting/beating earnings expectations, and (2) the potential competitive pressure within the industry for meeting/beating expectations. As I intend to check the market's reaction to MBE probability around the earnings announcements, I apply only variables known to the market before earnings announcements as predictors when estimating MBE probability. In other words, the selection of the predictive variables would allow the market/investors to form their MBE probability expectation before earnings announcements. I use a logit model to estimate MBE probability, in which the dependent variable (MBE) is an indicator variable that indicates the meeting/beating or missing status for the firm-quarter. In the following subsections, I define each independent variable used in the MBE prediction model and offer the rationale for its inclusion.

[8] In additional tests, I use the most recent analyst's forecast from the detail data in I/B/E/S as the earnings expectation and get similar results.

3.2.1 Predictors Associated with Managers' Ability to Meet or Beat Earnings Targets

Number of Shares Outstanding

Barton and Simko (2002) find that it is more difficult for managers to manipulate earnings to reach a specified target as the number of shares increase. Such finding is based on the assumption that the dollar amount needed to achieve the same earnings per share increase is larger for firms with a larger number of shares outstanding, assuming that the two firms have similar market value. Barton and Simko (2002) and Rees (2005) find empirical evidence consistent with this argument. I include the natural log of number of common shares outstanding at the end of the quarter (SHROUT) in the prediction model and expect it to have a negative relationship with MBE.

Standard Deviation of Analysts' Forecasts

When analysts' forecasts are more diversified, I expect it to be more difficult for managers to guide analysts' expectations downward and therefore meet or beat their targets. Some prior literature provides evidence consistent with this notion. Payne and Robb (2000) find that firms are more likely to meet/beat expectation when analysts have more homogenous forecasts. In addition, Barton and Simko (2002) find that the precision of analysts' forecasts (measured as the standard deviation scaled by the mean value of analysts' forecasts) and the reporting of a positive forecast error are positively correlated. I include the standard deviation of analysts' forecasts at the end of the quarter (STDEV) in the prediction model and expect it to have a negative relationship with MBE[9].

Net Operating Assets

Barton and Simko (2002) find that the likelihood of reporting larger positive or smaller

[9] In additional analyses where I replace standard deviation of analysts' forecasts with the dispersion of analysts' forecasts, i.e. standard deviation of analysts' forecasts scaled by the mean of analysts' forecasts, I get qualitatively similar results.

negative earnings surprises decreases with overstated net asset values. They argue that the level of net assets reflects the extent of previous earnings management, which curtails managers' ability to manage earnings upward in the current quarter. Therefore, I expect it to be more difficult for managers to meet or beat their earnings targets when their firms have bloated balance sheets. I include the level of net operating assets at the beginning of the quarter scaled by sales (NOA) in the prediction model and expect it to have a negative relationship with MBE.

3.2.2 Predictors Associated with Managers' Incentives to Meet or Beat Earnings Targets

Institutional Ownership

Matsumoto (2002) documents a positive association between a firm's tendency to meet or beat earnings forecasts and the percentage of institutional ownership. The rationale is that market will react more strongly to firms with higher institutional ownership when they have negative earnings surprises. Therefore, managers of firms with greater institutional ownership have greater incentives to both manage earnings upward and guide forecasts downward. Consistent with this argument, Hotchkiss and Strickland (2003) find that when firms report earnings below analyst' expectations, the stock price response is more negative for those firms with higher levels of ownership by momentum or aggressive growth investors. I therefore include the most recent institutional holding proportion before the quarterly earnings announcement (INST) in the prediction model and expect it to have a positive relationship with MBE.

Growth

Skinner and Sloan (2002) attribute earnings torpedoes to growth firms, because they find that market response to negative earnings surprises is stronger for high-growth firms than for low-growth firms. Based on this finding, managers of high-growth firms should have stronger incentives to avoid negative earnings surprises. Matsumoto (2002) and Rees (2005) provide

empirical evidence that high-growth firms are more likely to avoid negative earnings surprises. I include the book-to-market ratio at the end of last quarter (LBM) as an inverse measure of growth potential in the prediction model and expect it to have a negative relationship with MBE.

3.2.3 Predictors Associated with Firms' History of Meeting or Beating Earnings Targets

Prior Meeting/Beating History

Firms' prior MBE history can be an informative indicator of the current quarter's meeting/beating probability, as this history captures various incentives, abilities, firm characteristics and industry characteristics. Accordingly, I include the proportion of the prior twelve quarters during which a firm meets/beats expectations (PCT) in the prediction model and expect it to have a positive relationship with MBE.

Meeting/Beating Status in the Last Quarter

To further reflect the firm's MBE history, I examine the meeting/beating status of the firm during the most recent prior quarter. This variable is informative as long as the economic environment or firm performance has not changed significantly since the last quarter. Accordingly, I include an indicator variable that is equal to 1 if the firm meets or beats the consensus forecasts in the last quarter and 0 otherwise (LMBE) in the prediction model and expect it to have a positive relationship with MBE.

3.2.4 Predictors Associated with Competitive Pressure within the Industry to Meet or Beat Earnings Targets

The Percentage of Meeting/Beating in the Same Industry in the Last Quarter

Meeting/beating earnings targets is particularly important for managers to make within-industry comparisons. The MBE proportion could vary widely across different industries. Therefore, managers in the industry whose meeting/beating percentage is high have greater

incentives to avoid negative earnings surprises. In addition, some intrinsic industry characteristics might suggest higher MBE probabilities for firms within a particular industry.[10] Accordingly, I include the percentage of firms within a firm's industry that achieve MBE status in the previous quarter (LINDPCT) in the prediction model and expect it to have a positive relationship with MBE.[11]

The Percentage of Meeting/Beating in the Same Industry in the Current Quarter

A within-industry comparison of success in meeting/beating expectations in the current quarter is particularly relevant for firm comparisons. As described later in section 3.2.6, I create a variable derived from the percentage of firms within the industry that achieve MBE status *before the firm's earnings announcement* in the current quarter (BINDPCT) as a measure of the current industry competitive pressure. I then include this variable in the prediction model and expect it to have a positive relationship with MBE.

3.2.5 Other Predictors

Size

Larger firms get more attention from the capital market and therefore are expected to have higher incentives to avoid earnings disappointments. In addition, prior studies find that larger firms have less optimistic biases in analysts' forecasts (Brown 1997, Das et al. 1998). Consistent with these observations, Matsumoto (2002) documents a significantly positive association between firm size and its MBE status. Accordingly, I include the natural log of market value at the end of the current quarter (LOGMV) as the size measure in the prediction model and expect it to have a positive relationship with MBE.

[10] For example, Matsumoto (2002) suggests that some industry characteristics like durable goods industry dummy, industrial value-relevance measure and litigation dummy affect the propensity to avoid negative surprises.
[11] I define industry using the Fama and French (1997) 48 industry classification.

The Fourth Quarter

The fourth quarter is potentially different from the prior three quarters. For example, a firm doesn't have to file a 10Q for the 4th quarter. Also, the 10K filing for the year takes places no less than 90 days after the quarter ends, leaving managers with ample opportunity to manage fourth quarter (and hence annual) earnings. In addition, the annual evaluation of the firm takes place right after the fourth quarter ends. Moreover, prior studies (Bradshaw and Sloan 2002) find that the special-item adjustments between GAAP earnings and Street earnings occur more frequently in the fourth quarter. Based on this evidence, I expect that managers have higher incentives to achieve MBE status during the fourth quarter. Accordingly, I include an indicator variable that is equal to 1 if the current quarter is the fourth quarter and 0 otherwise (Q4) in the prediction model and expect it to have a positive relationship with MBE.

Delay in Announcing Earnings

When managers delay earnings announcements, the announcements typically reflect bad news (Chambers and Penman 1984, McNichols 1988, Begley and Fischer 1998, DeFond et al. 2002). I expect that this phenomenon will also apply to the MBE scenario. On the other hand, earlier announcers are more likely to have better news (Atiase et al. 1989). They therefore are more likely to meet/beat earnings targets than later announcers. Accordingly, I include the number of days between the fiscal quarter-end and the earnings announcement date (LAGDAY) in the prediction model and expect it to have a negative relationship with MBE.

Raw Return over the Quarter

The firm's economic performance during the quarter can affect the likelihood of meeting/beating analysts' expectations. I anticipate that firms with better performance will have a

higher probability of generating nonnegative earnings surprises[12]. I measure the firm's economic performance through the raw returns during the current quarter (QRET), which I include in the prediction model and expect to have a positive relationship with MBE.

In addition to the above variables, I also examine a number of other variables such as abnormal accruals at the end of prior quarter, number of analysts following the firm, labor intensity, R&D intensity and a dummy variable measuring litigation risk. Since these variables are not significant in predicting MBE, I do not include them in my prediction model.[13]

3.2.6 Model Estimation Details

I estimate the following logistic regression that models the firm-quarter's probability of meeting/beating analysts' forecasts (firm and time subscripts have been suppressed):

$$Prob(MBE=1)=F(\beta_0+\beta_1 SHROUT+\beta_2 STDEV+\beta_3 NOA+\beta_4 INST+\beta_5 LBM+\beta_6 PCT+\beta_7 LMBE+\beta_8 LINDPCT+\beta_9 BINDPCT+\beta_{10} LOGMV+\beta_{11} Q4+\beta_{12} LAGDAY+\beta_{13} QRET+e) \quad (1)$$

Where:

MBE=one if the quarterly earnings meet or beat the outstanding consensus forecasts from the summary data of IBES, zero otherwise,

SHROUT=natural log of number of common shares outstanding (Quarterly Compustat data#61) at the end of the quarter,

STDEV=standard deviation of analysts' last quarterly earnings forecasts before the earnings announcement,

NOA= net operating assets (i.e., shareholders' equity less cash and marketable securities, plus total debt (Quarterly Compustat data#60-data#36+data#45+data#51)) at the beginning of the quarter scaled by sales (Quarterly Compustat data#2) at last quarter,

INST= the percentage of institutional holding from CDA/Spectrum Institutional Holding (13F) before the earnings announcement,

[12] This assumes that analysts do not react fully to firms' performance. The literature (Abarbanell 1991, Abarbanell and Bernard 1992) indicates that analysts under-react to publicly available information.

[13] In sensitivity checks where those variables are included in the MBE prediction model, I find qualitatively similar results for the market reaction tests.

LBM=book (Quarterly Compustat data#59) to market (Quarterly Compustat data#61* data#14) ratio at the end of the prior quarter,

PCT=proportion of prior 12 quarters when the firm meets/beats analysts' quarterly consensus,

LMBE=one if the firm meets/beats analysts' forecasts in the prior quarter, zero otherwise,

LINDPCT= MBE percentage in the same industry during the prior quarter, where industry is defined using Fama and French (1997),

BINDPCT= MBE percentage in the same industry before the current earnings announcement date in the current quarter, where industry is defined using Fama and French (1997),

LOGMV= log of market value of equity (Quarterly Compustat data#61* data#14) at the end of the quarter,

Q4=one if the quarter is the last quarter of the year, zero otherwise,

LAGDAY=the difference between the actual earnings announcement date and the fiscal quarter end date,

QRET= firm's cum-dividend raw return for the current quarter.

I use out-of-sample rolling estimates for Equation (1), with each estimation period having a twelve-quarter window and the following quarter constituting the holdout period. Specifically, I apply observations in the prior 12 quarters to get coefficient estimates and then use variable realizations in the current quarter and the estimated coefficients to get fitted probabilities of MBE for the current quarter.[14] Since my sample period is from 1993 to 2003, I have 32 separate out-of-sample rolling estimate periods: from the first quarter of 1996 to the fourth quarter of 2003.

3.3 Descriptive Statistics

Table 1 presents descriptive statistics for the 52,639 firm-quarter observations relating to the variables used in the MBE probability estimation in Equation (1). I winsorize all

[14] In additional sensitivity tests, I apply prior 20 quarters for the estimation and the results are qualitatively similar.

continuous variables at the 99th percentile of their absolute values. Panel A presents the major descriptive statistics for these variables. On average, 70% of the observations meet or beat analysts' consensus forecasts (MBE), which is consistent with the patterns documented in Brown (2001) and Matsumoto (2002). The number of shares outstanding (SHARE) has a mean (median) of 90.19 (32.56), slightly larger than those reported in Barton and Simko (2002). The standard deviation of analysts' forecasts (STDEV) has a mean (median) of 0.03 (0.02), which is smaller than the standard deviation of the annual consensus forecasts at the beginning of the year in Rees (2005). The net operating assets has a mean (median) of 4.77 (2.70), indicating that on average the net operating assets are about three or four times as large as sales for most firm quarters. The institutional holding proportion (INST) has a mean (median) of 0.49 (0.50), which is close to that reported by Matsumoto (2002). The book-to-market ratio at the end of prior quarter (LBM) has an average of 0.50. The long-term prior meeting/beating proportion (PCT) has a mean of 0.70 while the dummy of meeting/beating in the prior quarter (LMBE) has a mean of 0.71, both of which are consistent with the average MBE. The percentage of MBE in the same industry at last quarter (LINDPCT) has a mean (median) of 0.68 (0.69), consistent with the statistics for MBE. The percentage of MBE in the same industry before the current earnings announcement at the current quarter (BINDPCT) has a mean (median) of 0.72 (0.75), slightly higher than that of LINDPCT, suggesting that the percentage of MBE increases over time. The size of my sample measured using market value of equity (MV) has a mean (median) of 3269.06 (657.08) million dollars, comparable to that in Matsumoto (2002) and that in Barton and Simko (2002). The dummy variable for the fourth quarter (Q4) has a mean of 0.26, indicating 26% of firm-quarter observations belong to the fourth quarter. The average gap between the actual earnings announcement date and the end of the fiscal quarter (LAGDAY) is 27.15, lower than such gap

only for the year-end in DeFond et al.'s (2002) number of 53.50. The average of quarterly raw return (QRET) is 0.03. To sum up, my sample reflects firm-quarter observations in more recent years with the firm characteristics comparable to prior studies.

Panel B displays the correlation matrix for all variables, with Pearson (Spearman) correlations above (below) the diagonal. Except for SHROUT and Q4, major firm characteristics are significantly correlated with MBE in the predicted direction.[15]

Table 2 classifies the variables from Table 1 according to the outcome, MBE or MISS, along with two-tailed p-values from t-tests and Wilcoxon tests of mean and median differences for each variable across the two groups. Row 1 indicates that both the mean and median of SHROUT in the MBE sample are significantly larger ($p<0.01$, two-tailed) than those in the MISS sample. This result is contrary to my prediction. However, because univariate analyses fail to control for correlated factors associated with MBE, I need multivariate analyses to formally test my predictions. Consistent with my predictions, Row 2(3) suggests that STDEV (NOA) is significantly lower for the MBE sample than for the MISS sample. Row 4 indicates that the mean and median values for INST are 0.51 and 0.52 for the MBE sample, compared with 0.46 and 0.46 for the MISS sample. The differences between the means and the medians are both significant at $p<0.01$ (two-tailed). Thus, univariate tests are consistent with the conjecture that firms with higher institutional ownership or larger size are more likely to meet or beat analysts' forecasts. Row 5 indicates that, consistent with my prediction, both mean and median LBM in the MBE sample are significantly smaller than those in the MISS sample, suggesting that growth is significantly positively associated with MBE. Rows 6-9 indicate that PCT, LMBE, LINDPCT, and BINDPCT are all significantly ($p<0.01$, two-tailed) higher for the MBE sample than for the

[15] The significant positive correlation between MBE and SHROUT might be caused by correlated omitted variables. For example, SHROUT and LOGMV are highly correlated with a significant Pearson (Spearman) correlation of 0.88 (0.86).

MISS sample, suggesting that as predicted, prior meeting/beating history and competitive pressure within the industry are potential determinants of MBE probabilities. Row 10 shows that mean and median LOGMV are 6.73 and 6.59 for the MBE sample and 6.34 and 6.20 for the MISS sample. The differences between means and medians are both significant at $p<0.01$ (two-tailed). Contrary to my prediction, Row 11 indicates that there are no significant differences in Q4 across the MBE and the MISS samples. Row 12 suggests that mean (median) LAGDAY is significantly smaller for the MBE sample than for the MISS sample, indicating that firms that delay earnings announcements are less likely to meet/beat analysts' forecasts (consistent with Chambers and Penman 1984). Finally, QRET is significantly larger for the MBE sample than for the MISS sample, suggesting firms with better economic performance during the quarter tend to meet or beat analysts' forecasts (or alternatively, the stock market anticipates MBE probability). In summary, the descriptive statistics presented in Table 2 are generally consistent with my predictions regarding the factors that may help predict whether or not a firm will meet or beat analysts' earnings expectations. However, univariate analysis considers only one factor at a time. To get a more accurate prediction of the MBE probability, I estimate the multivariate logit model represented by Equation (1), which allows me to consider all the relevant factors together.

3.4 MBE Probability Model Estimation

Table 3 presents results of estimating the logit model of MBE probability using Equation (1). The table presents means generated from the 32 sets of regressions for the 32 twelve-quarter estimation periods (from 1996 Q1 to 2003Q4). Specifically, I report the mean coefficient values, mean p-values and significance of means based on t-tests with 31 degrees of

freedom.[16] In addition, the "mean marginal effects" column reports the average effect of a one-standard-deviation change of the corresponding independent variable on MBE probability.[17] Finally, the "number of positive coefficients" column reflects the number of positive coefficients out of the 32 estimation periods.

The results indicate that my model explains MBE probability fairly well. The average pseudo r-square of the model estimates is 17.06%. Except for NOA and Q4, all mean coefficients are of the predicted sign and significant at better than $p<0.10$ (two-tailed). The marginal effects' statistics indicate that LOGMV, STDEV, LMBE and SHROUT have significant effects in explaining MBE probability. I also measure model performance through the Somers' D, which is calculated as the difference between the percentage of concordant observations and the percentage of discordant observations. The Somers' D has a mean of 44.21% with a range between 40.2% and 47.7% in the 32 estimation periods, supporting the assertion that the specified model does a good job of explaining MBE.

So far I evaluate the in-sample performance of the MBE probability model. Table 4 presents results of a test that evaluates the out-of-sample predictive performance of the model. This test compares the out-of-sample fitted values of MBE probabilities with actual MBE realizations. Specifically, in this test I first sort the sample and then divide the sample into 5 portfolios both according to the fitted values of MBE probability (PHAT). I then compare the actual realization of MBE across these portfolios. As seen in Table 4, as MBE probability increases from Portfolio 1 to Portfolio 5, the number (percentage) of firm-quarter observations that actually meet or beat the forecasts increases monotonically from 4137 to 7818 (from 47.66%

[16] Using this procedure has the following advantages: (1) it presents a parsimonious but representative summary result for the entire sample; (2) it reduces the probability that my results arise from overfitting data; and (3) it eliminates the problem of the cross-sectional correlation in the pooled sample (Bernard 1987).

[17] This average probability change is evaluated at the base-rate probability of the MBE probability in each period.

to 90.06%). As a benchmark, the untabulated mean and median of PHAT for MBE (MISS) group are 74.39% (61.85%) and 78.59% (65.01%). Also, I find that both portfolio mean and median MBE probability estimates are highly correlated with actual MBE realizations. Specifically, I find Pearson (Spearman) correlations between realized MBE percentage across the portfolios and the portfolio mean/median of the estimated MBE probability are 0.99 (1.00), significant at $p<0.01$ (two-tailed). These results demonstrate the high out-of-sample predictive ability of the MBE probability model.

4. Return Results

4.1 Returns Around Earnings Announcements

In this section, I empirically examine the association between MBE probability estimates and return patterns around earnings announcements. I apply portfolio analyses and multiple regression analysis to examine my predictions. Both analyses demonstrate that, as the estimated MBE probability increases, abnormal returns for MBE (MISS) firms become less positive (more negative).

4.1.1 Univariate Analysis

Table 5 presents portfolio-based analyses of market reaction to earnings announcements sorted by the estimated MBE probability. Market reaction is measured as the three-day market adjusted abnormal return from one trading day before the earnings announcement to one trading day after the announcement. I first sort the full sample by estimated MBE probability and divide firm-quarter observations into five portfolios as before. I then separate the MBE sub-sample from the MISS sub-sample within each quintile. The number of observations in the MBE (MISS) sample increases (decreases) monotonically from 4137 (4544) in the lowest PHAT portfolio to 7818 (863) in the highest PHAT portfolio, which suggests that my model appropriately partitions

high and low MBE probabilities. For the MBE sample, as PHAT goes up from Portfolio 1 to Portfolio 5, abnormal returns decrease monotonically from 1.87% to 0.85%, supporting Hypothesis 1. For the MISS sample, as PHAT goes up from Portfolio 1 to Portfolio 5, abnormal returns decrease monotonically from –1.64% to –2.86%, supporting Hypothesis 2. These results suggest that the return difference between the lowest PHAT quintile and the highest PHAT quintile is 1.02% (1.22%) for the MBE (MISS) firms. ANOVA analyses suggest that the differences between groups are significant ($p<0.01$ in two-tailed tests) for both MBE and MISS firms. Overall, the portfolio results support my hypotheses.

4.1.2 Regression Analysis

Prior literature suggests that stock returns around earnings announcements are a function of unexpected earnings (e.g., Beaver et al. 1979). Further, many papers examine various determinants of the relationship between abnormal returns and unexpected earnings (i.e., the ERC). Therefore, to understand the effect of MBE probabilities on stock returns, it is important to control for unexpected earnings and ERC determinants. Accordingly, I estimate the following model using a cross-sectional OLS regression (firm and time subscripts have been suppressed):

$$CAR=\beta_0+\beta_1 MBE+\beta_2 MBE*PHAT+\beta_3 MISS*PHAT+\beta_4 UE+\beta_5 LOGMV+\beta_6 LBM+\beta_7 LEV$$
$$+\beta_8 INST+\beta_9 QRET+\beta_{10} LOGMV*UE+\beta_{11} PER*UE+\beta_{12} LEV*UE+\beta_{13} LBM*UE$$
$$+\beta_{14} BETA*UE+e \qquad (2)$$

Where:

CAR= three-day market-adjusted abnormal returns,

MISS= one if the quarterly earnings miss the outstanding consensus forecasts from the summary data of IBES, zero otherwise,

PHAT=the estimated MBE probability from the logit model of Equation (1),

UE=the actual earnings per share minus the consensus forecasts outstanding scaled by price at the end of the quarter (Quarterly Compustat data#14),

LEV=leverage measured as the sum of current debt (Quarterly Compustat data#45) and long-term debt (Quarterly Compustat data#51) over total assets (Quarterly Compustat data#44),

PER=earnings persistence measured as the first order autocorrelation of UE over the sample period,

BETA=beta measured according to CAPM model using the trading day window of (-60, -11) before earnings announcement date.

All other variables are as defined in Equation (1). To support my first hypothesis the coefficient of MBE*PHAT (β_2) should be *negative* and to support my second hypothesis the coefficient of MISS*PHAT (β_3) should be *negative*.

Table 6 reports regression results based on MBE probability estimates and other controls. Model 1 presents a baseline case, where I only examine the effect of MBE probability without other controls. Model 2 controls for various other potential determinants of market reaction, including the magnitude of unexpected earnings (UE), firm size (LOGMV), growth (LBM), leverage (LEV), percentage of institutional holding (INST), and firm performance measured as the raw return over the quarter (QRET). In addition, prior ERC literature (Kormendi and Lipe 1987, Collins et al. 1987, Easton and Zmijewski 1989, Collins and Kothari 1989) suggests that size (LOGMV), earnings persistence (PER), leverage (LEV), growth (LBM) and risk (BETA) affect market reaction to specified earnings surprises. Accordingly, I interact these variables with earnings surprises and include them as additional controls. [18] According to H1 and H2, I expect the coefficients for MBE*PHAT and MISS*PHAT to be negative. Consistent with such expectations, I find that the coefficients for MBE*PHAT and MISS*PHAT are –0.0205 (-0.0162) and –0.0162 (-0.0215) in Model 1 (2), which are all significant at $p<0.01$ (two-tailed). According to Model 2, these coefficients indicate that as the probability of MBE increases from 0 to 1, on average, abnormal returns in the MBE sample and the MISS sample decrease by 1.62%

[18] In additional checks where I also include the UE*UE to account for possible nonlinearity, I get qualitatively similar results.

and 2.15%, respectively. In addition, the coefficient for MBE is 0.0304 in Model 2, significant at $p<0.01$ (two-tailed). These results suggest that, on average, the abnormal returns for the MBE firms are 3.04% higher than those for the MISS firms.

The magnitude of returns differences (1.62% to 2.15%) within the MBE (MISS) firms is not only statistically significant, but also economically significant. In a short window setting, prior studies usually find the return differences of comparable magnitudes. For example, DeFond and Park (2001) find the two-day return differences to be 0.3% and 0.7% between those firms with income increasing accruals and those with income decreasing accruals for good news (MBE) announcements and bad news (MISS) announcements. Hotchkiss and Strickland (2003) find that the abnormal return differences between high institutional ownership and low institutional ownership vary from -0.40% to -1.03% when there are negative forecast errors. In additional analyses, when I expand the return windows, the returns differences increase correspondingly. Therefore, I conclude that the effect of MBE probability on price reactions to earnings announcements is economically significant.

Prior ERC literature (Kormendi and Lipe 1987, Collins et al. 1987, Easton and Zmijewski 1989, Collins and Kothari 1989) indicates that the earnings response coefficient increases with earnings persistence (PER) and growth (LBM). It decreases with leverage (LEV) and risk (BETA). Therefore, I predict PER*UE coefficient will be positive and the coefficients for LEV*UE, LBM*UE, and BETA*UE will be negative. The results in table 6 in general support the above predictions regarding the sign of the controls, although PER*UE and LEV*UE have insignificant coefficients.

In summary, the multivariate analysis confirms that after controlling for other determinants of price response to earnings announcements, the market response to earnings

announcements is affected by MBE probability in the direction predicted by my hypotheses. The empirical tests support my proposition that the presence of an MBE probability surprise provides a rational explanation for cross-sectional variation in market reaction to earnings announcements including earnings torpedoes.

4.2 Differentiating the MBE and Growth Explanations

Skinner and Sloan (2002) conjecture that the large negative market reactions for MISS firms occur primarily because optimistic earnings expectations regarding growth firms are unrealized. They demonstrate that the market-to-book ratio, (their proxy for growth) is associated with quarterly abnormal returns for MISS firms. However, they do not find an asymmetrically large reaction to negative earnings surprises for growth firms during the three-day return window around earnings announcements. Also, after correcting for I/B/E/S adjustment errors, Payne and Thomas (2003) do not find an association between growth and quarterly returns for firms missing forecasts.

In my sample, univariate tests suggest that growth (LBM) significantly explains variations in stock returns around earnings announcements for MBE and MISS firms. Accordingly, in this section I explore whether my results are robust to controlling for the growth explanation of Skinner and Sloan. First, I explore whether growth explains return variation to meeting/beating or missing forecasts after controlling for all other determinants of market reaction excluding MBE probability by estimating the following model (firm and time subscripts have been suppressed):

$$CAR=\beta_0+\beta_1 MBE+\beta_2 UE+\beta_3 LOGMV+\beta_4 MBE*LBM+\beta_5 MISS*LBM+\beta_6 LEV$$
$$+\beta_7 INST+\beta_8 QRET+\beta_9 LOGMV*UE+\beta_{10} PER*UE+\beta_{11} LEV*UE+\beta_{12} LBM*UE$$
$$+\beta_{13} BETA*UE+e \qquad (3)$$

Where: all variables are as defined earlier.

Table 7 (Model 1) reports results of estimating Equation (3). The results suggest that the growth variable significantly explains return variations for MISS firms, although there is no significant association between the growth variable and returns for MBE firms.

I next simultaneously examine the effect of both growth and MBE probability on return variation around earnings announcements for MBE and MISS firms through the following model (firm and time subscripts have been suppressed):

$$CAR=\beta_0+\beta_1 MBE+\beta_2 MBE*PHAT+\beta_3 MISS*PHAT+\beta_4 UE+\beta_5 LOGMV+\beta_6 MBE*LBM$$
$$+\beta_7 MISS*LBM+\beta_8 LEV+\beta_9 INST+\beta_{10} QRET+\beta_{11} LOGMV*UE+\beta_{12} PER*UE+\beta_{13} LEV*UE$$
$$+\beta_{14} LBM*UE+\beta_{15} BETA*UE+e \quad (4)$$

Where: all variables are as defined earlier.

Table 7 (Model 2) reports results of estimating Equation (4). I find that MBE probability continues to significantly explain return variations for both MBE firms and MISS firms after controlling for growth. Specifically, the coefficient on PHAT interacted with MBE (MISS) is -0.017 (-0.020), and significant at $p<0.01$ ($p<0.01$) level. However, growth is not significantly associated with stock returns around earnings announcements for either MBE or MISS firms.

These results suggest that MBE probability explains return variation to MBE and MISS even after controlling for the effect of growth hypothesized by Skinner and Sloan (2002). On the contrary, the growth explanation does not appear to be robust to controlling for MBE probability. These results indicate that the MBE probability hypothesis is robust to the growth hypothesis proposed by Skinner and Sloan (2002).

4.3 Robustness Checks

In addition to the above analyses, I perform several robustness checks. I discuss the

checks in the following subsections.

4.3.1 Growth Variable in MBE probability Model

In other untabulated analyses, I remove the LBM variable from Equation (1). I find that removing LBM from the model does not significantly affect the model's predictive performance or the return patterns. These results additionally confirm that my MBE probability results are not attributable to growth.

4.3.2 Other MBE Probability Model Specifications

I check the robustness of my results by applying other specifications of the MBE probability estimation model. For example, net operating assets and the fourth quarter dummy do not consistently predict the MBE probability. When I remove them from the model, I get qualitatively similar results for the market reaction tests. In additional checks where I add research and development expenses and labor intensity to the MBE prediction model, I get similar results for the market reaction tests.

4.3.3 The Return Windows

In addition to the three-day return window measures, I apply a seven-day window starting from five days before the earnings announcement date and ending on one day after the announcement date as well as the two-day window starting from the earnings announcement date and ending on one day after the announcement date. My results are qualitatively similar under these alternative return-window measures.

4.3.4 The Analysts' Forecasts Benchmark

I use the most recent mean analyst forecasts from the summary data in I/B/E/S as the analysts' consensus forecasts in my tests. In additional analyses, I use the most recent median analyst forecasts from the summary data in I/B/E/S and the most recent individual analyst's

forecast from the detail data in I/B/E/S as alternative earnings expectations and get qualitatively similar results.

4.3.5 The Abnormal Return Measure

I use market-adjusted returns in my analyses. As a sensitivity check, I also use size-decile adjusted return and find quantitatively similar results. Brown and Warner (1985) find that using various measures of abnormal returns in the daily intervals do not cause much difference in market reaction tests. My tests confirm their conclusions.

4.3.6 Separating the MBE firms from MISS firms

I pool MBE firms and MISS firms together in my returns test for equation (2) in section 4.1.2. As a sensitivity check, I also separate MBE firms from MISS firms. I then examine the relation between the MBE probability and market reaction for MBE firms and MISS firms separately. My tests again support my hypotheses.

5. Conclusion

This paper hypothesizes and documents that the cross-sectional variation in market response to firms' meeting/beating or missing earnings expectation depends on the *ex ante* probability of meeting/beating such expectation. Specifically, I hypothesize that the surprise from firms' meeting/beating (missing) earnings targets will be lower (higher) for firms with higher probabilities of meeting/beating earnings targets, which should result in lower (higher) magnitude of market reaction. To test this hypothesis, I first empirically model the *ex ante* MBE probability and generate out-of-sample MBE probability estimates. Consistent with my hypothesis, I show that three-day abnormal returns around earnings announcements are less positive (more negative) for MBE (MISS) firms with higher MBE probabilities. These results are robust to controls for unexpected earnings and other determinants of stock returns around earnings announcements.

Additional analyses suggest that returns to meeting/beating or missing expectation are predictably associated with the MBE probability after controlling for the book-to-market ratio, which proxies for the alternative growth-stock explanation for the phenomenon that market reacts differently to missing expectations (Skinner and Sloan 2002).

My study is among the first to provide a rational explanation for the well-known phenomenon of earnings torpedoes. Skinner and Sloan (2002) argue that earnings torpedoes are a result of the reversal of irrationally optimistic earnings expectations for growth firms. In contrast, extending the concept of unexpected earnings to the realm of meeting/beating or missing expectations, I hypothesize and document that a rational market reacts to the *unexpected* component of the meeting/beating or missing expectation. My results therefore complement earlier studies that show that market reaction to meeting/beating or missing expectations is unlikely to be irrational (e.g., Bartov et al. 2002, Kaznik and McNichols 2002), by providing a rational explanation for cross-sectional variation in market response to meeting/beating or missing expectation.

My paper is subject to several limitations. Prior studies suggest that the correlation between unexpected earnings and stock returns is generally low (see Lev 1989 for a review). Similarly, I find that MBE probability does not explain a large proportion of abnormal returns around earnings announcements. In addition, I use an event study approach to examine market reaction to earnings announcements. There could be other events occurring concurrent with earnings announcements. However, in a large sample study like mine, it's difficult to control for all concurrent events. Further studies using relatively smaller samples should be able to address this problem.

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Table 1: Descriptive Statistics for Variables Used in the MBE Probability Estimation

Panel A: Descriptive Statistics

	Mean	Median	Std Dev	25th Percent	75th Percent
MBE	0.70	1.00	0.46	0.00	1.00
SHARE	90.19	32.56	180.48	15.47	80.00
SHROUT	3.63	3.48	1.21	2.74	4.38
STDEV	0.03	0.02	0.04	0.01	0.03
NOA	4.77	2.70	5.99	1.53	5.47
INST	0.49	0.50	0.23	0.31	0.68
LBM	0.50	0.43	0.36	0.25	0.65
PCT	0.70	0.75	0.24	0.54	0.92
LMBE	0.71	1.00	0.45	0.00	1.00
LINDPCT	0.68	0.69	0.11	0.62	0.75
BINDPCT	0.72	0.75	0.19	0.64	0.84
MV	3269.06	657.08	8499.21	219.21	2231.68
LOGMV	6.61	6.49	1.66	5.39	7.71
Q4	0.26	0.00	0.44	0.00	1.00
LAGDAY	27.15	25.00	10.78	20.00	32.00
QRET	0.03	0.02	0.28	-0.13	0.16

Table 1 Panel A presents the descriptive statistics for 52,639 firm-quarter observations from 1993 to 2003 with December fiscal year end. The variables are defined as follows:

MBE=one if the quarterly earnings meet or beat the outstanding consensus forecasts from the summary data of IBES, zero otherwise,

SHARE=number of common shares outstanding (Quarterly Compustat data#61) at the end of the quarter,

SHROUT=natural log of number of common shares outstanding (Quarterly Compustat data#61) at the end of the quarter,

STDEV=standard deviation of analysts' last quarterly earnings forecasts before the earnings announcement,

NOA= net operating assets (i.e., shareholders' equity less cash and marketable securities, plus total debt (Quarterly Compustat data#60-data#36+data#45+data#51)) at the beginning of the quarter scaled by sales (Quarterly Compustat data#2) at last quarter,

INST= the percentage of institutional holding from CDA/Spectrum Institutional Holding (13F) before the earnings announcement,

LBM=book (Quarterly Compustat data#59) to market (Quarterly Compustat data#61* data#14) ratio at the end of the prior quarter,

PCT=proportion of prior 12 quarters when the firm meets/beats analysts' quarterly consensus,

LMBE=one if the firm meets/beats analysts' forecasts in the prior quarter, zero otherwise,

LINDPCT= MBE percentage in the same industry during the prior quarter, where industry is defined using Fama and French (1997),

BINDPCT= MBE percentage in the same industry before the current earnings announcement date in the current quarter, where industry is defined using Fama and French (1997),

MV= market value of equity (Quarterly Compustat data#61* data#14) at the end of the quarter,

LOGMV= log of market value of equity (Quarterly Compustat data#61* data#14) at the end of the quarter,

Q4=one if the quarter is the last quarter of the year, zero otherwise,

LAGDAY=the difference between the actual earnings announcement date and the fiscal quarter end date,

QRET= firm's cum-dividend raw return for the current quarter.

Table 1 (Continued)

Panel B: Correlation Table

	MBE	SHROUT	STDEV	NOA	INST	LBM	PCT	LMBE	LINDPCT	BINDPCT	LOGMV	Q4	LAGDAY	QRET
MBE		**0.05**	**-0.19**	**-0.03**	**0.09**	**-0.11**	**0.23**	**0.25**	**0.13**	**0.10**	**0.11**	-0.00	**-0.08**	**0.12**
SHROUT	**0.05**		**0.05**	**0.10**	**0.28**	**-0.13**	**0.04**	**0.04**	**-0.02**	-0.00	**0.88**	-0.00	**-0.15**	**-0.03**
STDEV	**-0.23**	**0.12**		**0.07**	**0.04**	**0.12**	**-0.21**	**-0.15**	**-0.15**	**-0.10**	**0.08**	**0.01**	**0.05**	**-0.03**
NOA	**-0.06**	**0.18**	**0.12**		**-0.07**	**0.16**	**-0.07**	**-0.04**	**-0.03**	**-0.02**	**0.07**	0.01	0.01	**-0.03**
INST	**0.09**	**0.30**	**0.06**	**-0.05**		**-0.07**	**0.12**	**0.09**	**0.04**	**0.02**	**0.40**	-0.00	**-0.05**	**0.04**
LBM	**-0.12**	**-0.13**	**0.15**	**0.28**	**-0.07**		**-0.16**	**-0.13**	**-0.07**	**-0.04**	**-0.28**	**0.03**	**0.09**	**0.09**
PCT	**0.23**	**0.02**	**-0.27**	**-0.15**	**0.11**	**-0.21**		**0.44**	**0.20**	**0.10**	**0.10**	0.00	**-0.07**	0.01
LMBE	**0.25**	**0.03**	**-0.18**	**-0.08**	**0.09**	**-0.14**	**0.43**		**0.24**	**0.07**	**0.10**	**-0.02**	**-0.08**	**0.09**
LINDPCT	**0.12**	**-0.02**	**-0.20**	**-0.09**	**0.04**	**-0.08**	**0.19**	**0.22**		**0.29**	**-0.03**	**-0.07**	**-0.07**	**-0.01**
BINDPCT	**0.12**	**0.01**	**-0.14**	**-0.09**	**0.04**	**-0.07**	**0.12**	**0.09**	**0.34**		-0.01	**0.02**	**-0.03**	**0.06**
LOGMV	**0.11**	**0.86**	**0.13**	**0.15**	**0.42**	**-0.25**	**0.07**	**0.10**	**-0.04**	**0.01**		-0.00	**-0.23**	**0.09**
Q4	-0.00	-0.00	**0.02**	0.01	-0.00	**0.03**	-0.00	**-0.02**	**-0.07**	**0.01**	-0.00		**0.49**	**0.10**
LAGDAY	**-0.06**	**-0.13**	**0.05**	-0.01	**-0.02**	**0.06**	**-0.04**	**-0.07**	**-0.07**	**-0.12**	**-0.22**	**0.41**		**0.02**
QRET	**0.13**	-0.01	**-0.02**	-0.01	**0.06**	**0.10**	0.01	**0.10**	**-0.02**	**0.07**	**0.12**	**0.10**	0.01	

Table 1 Panel B displays the correlation table among the meeting/beating status (MBE) and 13 predictors for 52,639 firm-quarter observations. Pearson correlations appear above the diagonal. Spearman correlations appear below the diagonal. Bold numbers suggest the significant levels greater than $p<0.01$. See table 1 Panel A for variable definitions.

Table 2: Comparisons of MBE Firm-quarter Observations and MISS Firm-quarter Observations

Variables	Mean			Median		
	MBE Sample	Miss Sample	P-value	MBE Sample	Miss Sample	P-value
1. SHROUT	3.67	3.53	(0.00)	3.52	3.40	(0.00)
2. STDEV	0.02	0.04	(0.00)	0.01	0.03	(0.00)
3. NOA	4.67	5.01	(0.00)	2.61	2.92	(0.00)
4. INST	0.51	0.46	(0.00)	0.52	0.46	(0.00)
5. LBM	0.47	0.56	(0.00)	0.41	0.49	(0.00)
6. PCT	0.74	0.62	(0.00)	0.77	0.63	(0.00)
7. LMBE	0.78	0.53	(0.00)	1.00	1.00	(0.00)
8. LINDPCT	0.69	0.66	(0.00)	0.70	0.67	(0.00)
9. BINDPCT	0.74	0.69	(0.00)	0.76	0.71	(0.00)
10. LOGMV	6.73	6.34	(0.00)	6.59	6.20	(0.00)
11. Q4	0.26	0.26	(0.25)	0.00	0.00	(0.25)
12. LAGDAY	26.61	28.44	(0.00)	24.00	26.00	(0.00)
13. QRET	0.05	-0.02	(0.00)	0.04	-0.02	(0.00)

This table compares various firm characteristics between 36,956 firm-quarter observations that meet or beat analysts' forecasts and 15,683 firm-quarter observations that miss analysts' forecasts from 1993 to 2003. The p-values for mean comparisons are p-values for two-sided t tests; the p-values for median comparisons are p-values for two-sided Wilcoxon tests. The variables are as defined in Table 1 Panel A.

Table 3: Regression Results for MBE Probability Estimates

	Predicted Sign	Mean Coefficients	Mean P-values	P-value for Quarterly Coefficients	Mean Marginal Effects	Number of positive Coefficients
Intercept	/	/	/	/	/	/
SHROUT	-	-0.25	(0.02)	(0.00)	-6.28%	(0/32)
STDEV	-	-8.88	(0.00)	(0.00)	-6.87%	(0/32)
NOA	-	0.003	(0.44)	(0.00)	0.36%	(30/32)
INST	+	0.34	(0.01)	(0.00)	1.52%	(32/32)
LBM	-	-0.23	(0.00)	(0.00)	-1.64%	(0/32)
PCT	+	0.85	(0.00)	(0.00)	4.18%	(32/32)
LMBE	+	0.70	(0.07)	(0.00)	6.49%	(32/32)
LINDPCT	+	0.51	(0.00)	(0.00)	1.07%	(32/32)
BINDPCT	+	0.65	(0.00)	(0.00)	2.45%	(32/32)
LOGMV	+	0.25	(0.00)	(0.00)	8.46%	(32/32)
Q4	+	0.04	(0.36)	(0.00)	0.39%	(21/32)
LAGDAY	-	-0.006	(0.07)	(0.00)	-1.20%	(0/32)
QRET	+	0.89	(0.00)	(0.00)	4.71%	(32/32)
Mean Pseudo-rsquare					17.06%	
Mean Concordant (Discordant) Percentage					71.93% (27.73%)	
Mean Somers' D					44.21%	

This table reports the regression results for the MBE probability estimation. I apply the out-of-sample estimates, which use the observations of the prior 12 quarters to get the estimations of coefficients and then apply the observations of the current quarter to get the ex-ante MBE probability estimates. The reported mean coefficients, mean p-values and mean marginal effects are the average values for the 32 estimates (from 1996Q1 to 2003Q4). Two-tailed p-value for quarterly coefficients indicates the significance of the means from the tests with 31 degrees of freedom. Mean marginal effects reflects the average of the change in probability of MBE caused by one standard deviation change of the corresponding independent variable, evaluated at the base-rate probability of the MBE probability in each period. Mean Somers' D equals the average of the difference between the percentage of concordant observations and discordant observations for 32 sub-periods. The variables are as defined in Table 1 Panel A.

Table 4: Performance of the MBE Prediction Model

PHAT	N	MBE Firm-quarter	MBE Percentage	PHAT Mean	PHAT Median
Portfolio 1 (lowest)	8681	4137	47.66%	43.57%	46.36%
Portfolio 2	8681	5559	64.04%	65.31%	65.64%
Portfolio 3	8681	6494	74.81%	75.61%	75.78%
Portfolio 4	8681	7185	82.77%	82.01%	82.05%
Portfolio 5 (highest)	8681	7818	90.06%	87.82%	87.40%
Pearson Correlation				0.99	0.99
(P-Value)				(0.00)	(0.00)

This table reports the performance of the MBE prediction by examining the ex-post MBE percentage realizations for five portfolios sorted by the ex-ante MBE probability. PHAT is the fitted value from the out-of-sample estimation of the MBE model in Table 3. Pearson correlation measures the correlation between the ex-post MBE percentage and the ex-ante PHAT mean and PHAT median.

Table 5: Portfolio Analysis of Abnormal Returns for MBE Probability Estimates

	FULL Sample		MBE Sample		MISS Sample	
PHAT	N	PHAT Range	N	Mean of CAR	N	Mean of CAR
Portfolio 1 (lowest)	8681	0.02-0.58	4137	1.87%	4544	-1.64%
Portfolio 2	8681	0.58-0.71	5559	1.58%	3122	-1.97%
Portfolio 3	8681	0.71-0.79	6494	1.26%	2187	-2.33%
Portfolio 4	8681	0.79-0.84	7185	1.20%	1496	-2.65%
Portfolio 5 (highest)	8681	0.84-0.97	7818	0.85%	863	-2.86%
ANOVA (p-value)				(0.00)		(0.00)

This table reports the abnormal returns for five portfolios sorted by the ex-ante MBE probability (PHAT). I then separate the MBE sample (the sample in which firms' actual earnings are greater than or equal to the consensus forecasts) from the MISS sample (the sample in which firms' actual earnings are less than the consensus forecasts) within each portfolio. The cumulative abnormal returns (CAR) are measured as the three-day market-adjusted abnormal returns from one trading day before the earnings announcement to one trading day after the announcement date. ANOVA tests analyze the CAR difference between the 5 portfolios for the MBE sample and the MISS sample.

Table 6: Regression Results Based on MBE Probability Estimates and Other Controls

		Model 1		Model 2	
	Predicted Sign	Coefficient	P-value	Coefficient	P-value
Intercept		-0.0106	(0.00)	-0.0043	(0.26)
MBE	+	0.0386	(0.00)	0.0304	(0.00)
MBE*PHAT	-	-0.0205	(0.00)	-0.0162	(0.00)
MISS*PHAT	-	-0.0162	(0.00)	-0.0215	(0.00)
UE	+			0.0918	(0.15)
LOGMV	?			-0.0011	(0.00)
LBM	?			0.0009	(0.50)
LEV	?			0.0043	(0.05)
INST	?			0.0077	(0.00)
QRET	?			-0.0001	(0.94)
LOGMV*UE	?			0.0241	(0.08)
PER*UE	+			0.0322	(0.44)
LEV*UE	-			-0.0382	(0.15)
LBM*UE	-			-0.0504	(0.00)
BETA*UE	-			-0.0105	(0.08)
N		43405		42719	
Adj-rsquare		2.60%		2.78%	

This table reports the multivariate analyses of the effects of the estimated MBE probability (PHAT) on the three-day market-adjusted abnormal returns (CAR) after controlling for other potential determinants of CAR. Model 1 has the following specification: $CAR=\beta_0+\beta_1 MBE+\beta_2 MBE*PHAT+\beta_3 MISS*PHAT+e$; Model 2 has the following specification: $CAR=\beta_0+\beta_1 MBE+\beta_2 MBE*PHAT+\beta_3 MISS*PHAT+\beta_4 UE+\beta_5 LOGMV+\beta_6 LBM+\beta_7 LEV+\beta_8 INST+\beta_9 QRET+\beta_{10} LOGMV*UE+\beta_{11} PER*UE+\beta_{12} LEV*UE+\beta_{13} LBM*UE+\beta_{14} BETA*UE+e$. The variables are defined as follows:

CAR= three-day market-adjusted abnormal returns,

MISS= one if the quarterly earnings miss the outstanding consensus forecasts from the summary

data of IBES, zero otherwise,

PHAT=the estimated MBE probability from the logit model of Equation (1),

UE=the actual earnings per share minus the consensus forecasts outstanding scaled by price at the end of the quarter (Quarterly Compustat data#14),

LEV=leverage measured as the sum of current debt (Quarterly Compustat data#45) and long-term debt (Quarterly Compustat data#51) over total assets (Quarterly Compustat data#44),

PER=earnings persistence measured as the first order autocorrelation of UE over the sample period,

BETA=beta measured according to CAPM model using the trading day window of (-60, -11) before earnings announcement date.

All other variables are as defined in Table 1 Panel A.

Table 7: Regression Results Controlling for Growth and Other Controls

		Model 1		Model 2	
	Predicted Sign			Coefficient	P-value
Intercept		-0.0182	(0.00)	-0.0064	(0.12)
MBE	+	0.0346	(0.00)	0.0339	(0.00)
MBE*PHAT	-			-0.0171	(0.00)
MISS*PHAT	-			-0.0203	(0.00)
UE	+	0.0826	(0.20)	0.0898	(0.16)
LOGMV	?	-0.0013	(0.00)	-0.0011	(0.00)
MBE*LBM	?	0.0015	(0.33)	-0.0004	(0.81)
MISS*LBM	+	0.0054	(0.01)	0.0033	(0.13)
LEV	?	0.0064	(0.00)	0.0043	(0.05)
INST	?	0.0055	(0.01)	0.0077	(0.00)
QRET	?	-0.0035	(0.03)	-0.0000	(0.99)
LOGMV*UE	?	0.0239	(0.08)	0.0244	(0.07)
PER*UE	+	0.0224	(0.59)	0.0312	(0.45)
LEV*UE	-	-0.0395	(0.14)	-0.0407	(0.13)
LBM*UE	-	-0.0454	(0.00)	-0.0478	(0.00)
BETA*UE	-	-0.0099	(0.10)	-0.0110	(0.07)
N		42719		42719	
Adj-rsquare		2.72%		2.78%	

This table reports the multivariate analyses of the effects of the estimated MBE probability (PHAT) on the three-day market-adjusted abnormal returns (CAR) after controlling for growth interacted with meeting/beating status and missing status (LBM*MBE, LBM*MISS) and other potential determinants of CAR. Model 1 has the following specification: $CAR=\beta_0+\beta_1 MBE+\beta_2 UE+\beta_3 LOGMV+\beta_4 MBE*LBM+\beta_5 MISS*LBM+\beta_6 LEV+\beta_7 INST+\beta_8 QRET+\beta_9 LOGMV*UE+\beta_{10} PER*UE+\beta_{11} LEV*UE+\beta_{12} LBM*UE+\beta_{13} BETA*UE+e$; Model 2 has the following specification: $CAR=\beta_0+\beta_1 MBE+\beta_2 MBE*PHAT+\beta_3 MISS*PHAT+\beta_4 UE+\beta_5 LOGMV+\beta_6 MBE*LBM+\beta_7 MISS*LBM+\beta_8 LEV+\beta_9 INST+\beta_{10} QRET+\beta_{11} LOGMV*UE+\beta_{12} PER*UE+\beta_{13} LEV*UE+\beta_{14} LBM*UE+\beta_{15} BETA*UE+e$. The variables are as defined in Table 1 Panel A and Table 6.