Essays on corporate disclosure and the capital markets

Miao, Bin

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Essays on Corporate Disclosure and the Capital Markets

Miao Bin

Nanyang Business School

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ABSTRACT

This dissertation consists of two essays, both exploring the role of corporate disclosure in the functioning of the capital market.

The first essay examines an important form of voluntary disclosure: management earnings forecast, and its impact on investors' usage of information supplied by financial analysts. I find a strong a substitute effect between management guidance and analyst research, i.e. earnings guidance supplied by management reduces the informativeness of analyst research as perceived by investors. This relation is significant for both analysts' earnings forecasts and investment recommendations, and is robust to alternative regression model specifications, and correction procedures for sample selection problem. I also find that the substitute effect between management guidance and analyst earnings forecasts significantly strengthens in the post-Reg FD period, which provides support for the effectiveness of Reg-FD in curtailing private dissemination and encouraging public disclosures of earnings information by company managements.

The second essay examines the informativeness of firms' EDGAR 10-Q filings, and how it is affected by the quality firms' preliminary earnings announcements. I perform two groups of tests to examine this issue. In the first test, I investigate the impact of preliminary announcements on investors' reaction to 10-Q filings, and find that investors react to 10-Q filings more strongly when the preliminary announcements are less informative and associated with more uncertainty. In the second test, I examine the impact of 10-Q filings on the post-earnings announcement drift (PEAD). I find that the PEAD effect is stronger for firms that make preliminary earnings announcements before filing 10-Q than firms that do not. In addition, for firms that make preliminary earnings

announcements, the PEAD effects become significantly weakened after 10-Q filings are made. These results are consistent with the joint hypothesis that the PEAD is caused by investors' under-reaction to noisy "pre-announced" earnings news and investors use 10-Q filings to resolve information uncertainty of the earnings news. Collectively, my results suggest that 10-Q filings are value-relevant and provide investors with important information sources that complement preliminary earnings announcements.

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Essay I

Management Guidance and the Informativeness of Analyst Research

Abstract

This study investigates the relation between management issued earning guidance and the informativeness of analyst research. I find strong negative correlations between the informativeness of management guidance and analyst research, i.e., a substitute effect, and that this relation is significant for both analysts' earnings forecasts and investment recommendations. My findings are robust to alternative regression model specifications, and correction procedures for sample selection problem. I also find that the substitute effect between management guidance and analyst earnings forecasts significantly strengthens in the post-Reg FD period, which provides support for the effectiveness of Reg-FD in curtailing private dissemination while encouraging public disclosure of earnings information by company managements.

Management Guidance and the Informativeness of Analyst Research

1. Introduction

The practice of issuing earnings guidance¹ by company management has recently been a subject of hot debate among practitioners, regulators, and researchers. One major criticism against this practice is the concern that company management and analysts who follow the company may engage in the “guidance game”, whereby management manipulate analysts’ expectations by strategically communicating their own forecasts of short-term earnings.² (Schonfeld 1998, 256, for example) Evidence supporting this concern has been uncovered by many studies, which find that analysts update their earnings forecasts in response to management’s guidance, and that these “guided” forecasts are more likely to be “met or beat”. (Waymire 1986, Richardson et al. 2004, Cotter et al. 2006)

While a number of papers have tested the influence of management issued guidance on analysts’ behavior, none has examined investors’ responses to this influence, that is, whether the usefulness of analyst research as perceived by investors is enhanced or discounted as a result of the supply of competing information from company management? The answer to this question is important to both researchers and regulators, as it adds to our understanding of the capital market consequences of management guidance by exploring its impact on investors’ usage of analyst research.

¹ I use the term “management earnings forecast” and “management earnings guidance” interchangeably in this paper.

² Playing such game can be costly to the company and its investors, because in order to please Wall Street, managements may behave myopically by scarifying long-term growth for boosts of short-term results, or even undertake fraudulent actions in extreme cases such as Enron (Fuller and Jensen 2002). However, discussion of these undesirable consequences is beyond the scope of my study.

In addition, it also sheds light on the information content of management guidance and its relation with analyst forecasts, which can help market participants to assess the degree to which the information environment is enriched by management supplied earnings forecasts.

Management guidance could affect the informativeness of analyst research in one of two competing ways: the substitute effect and the complement effect. A substitute effect may be expected because in efficient markets, predictable analyst forecast revisions in response to management guidance will be incorporated into prices as soon as the guidance is issued. In addition, since managers enjoy an informational edge over analysts, the “official guesses”, if made objectively, should have higher accuracy than “street wisdom”. Hence, in the presence of management supplied earnings forecasts, Bayesian theory predicts that investors will allocate less weight to analyst forecasts due to the diminished usefulness. (see the model of Barron et al. 1998, for example)

On the other hand, a complement effect is also likely if investors value analysts’ proprietary research and consider management guidance as an important addition to analysts’ information set, which will enhance the accuracy and value relevance of analyst research. For example, prior research has found that managers have incentive to issue biased or qualitative forecasts, (Lang and Lundholm 2000, Baginski et al. 1993) and as a result investors may need the expertise of analysts to scrutinize or interpret such information. Therefore, the impact of management guidance on the informativeness of analyst forecast remains an empirical issue, which is examined in this study.

My sample management forecasts are collected from the Company Issued Guidance (CIG) database maintained by First Call. I examine management forecasts

issued between 1996 and 2005, so that I can circumvent the impact of Private Securities Litigation Reform Act (PSLRA), which was enacted in 1995 and represents major changes to legal environment. This sample period also allows us to examine the impact of Regulation Fair Disclosure of 2000 (Reg FD), which regulates the way managements' information is disclosed to the market and thus could have substantial influence on the relative importance of management guidance and analyst research. I collect analyst forecasts data from I/B/E/S, and merge them with management forecast data by firm and calendar quarter. I use the normalized absolute abnormal return on the date of issuance to measure the informativeness of management guidance or analyst earnings forecast.³ For each firm-quarter pair, I construct one informativeness measure for management guidance and one for analyst forecast by averaging all the individual management guidance or analyst forecasts for the firm issued during the quarter.

With a sample of over 24,000 firm-quarter observations, I find a strong negative correlation between the informativeness of management guidance and analyst forecasts. This suggests the substitution effect dominates the interrelation between the two information events. To examine whether this result is sensitive to alternative research designs, I subject it to a battery of robustness tests. First, I include in the multivariate regression a series of control variables that are suggested by prior research as important determinants of the informativeness of analyst research, such as firm size, trading volume, institutional ownership, and idiosyncratic risk. (Frankel et al. 2006) Since many of these variables may also be correlated with the informativeness of management guidance, failing to control them may result in omitted variable problems and biased estimates of partial correlation between the

³ Similar measures have been used by prior studies that examine the information content of analyst research. (Frankel et al. 2006, Gintschel and Markov 2004)

variables of interest. However, I find that controlling the effects of these variables has virtually no impact on the estimated negative correlation between informativeness of analyst forecasts and management guidance.

Next, I examine a new sample consisting of investment recommendations made by analysts. This sample differs from the sample of analyst earnings forecasts in important aspects, because stock recommendations are normally considered as the final output of analyst research, while earnings forecasts are generally viewed as one of the key inputs to the recommendation decision. (Schipper 1991, Loh and Mian 2006) Therefore, if analysts also incorporate other information that is less than perfectly correlated with earnings news into their investment recommendations, the substitution effect of management guidance might be weakened for analyst recommendations relative to earnings forecasts.

On the other hand, prior research has questioned the efficiency of analysts' usage of earnings information. (e.g. Abarbanell and Bernard 1992) In particular, several recent studies have raised the concern that analysts' recommendations are based on ad hoc heuristic, rather than rational economic analyses. (Bradshaw 2004, Jegadeesh et al. 2004) Therefore, examining analysts' investment recommendations provides an interesting setting which will shed light not only on whether the substitution effects of management guidance generalizes other types of analyst reports, but also on whether analysts' proprietary research produces incremental value for investors. My results show that the substitution effect remains strong for the recommendation sample. Therefore, in the presence of management supplied earnings forecasts, the usefulness of analyst reports, including both earnings forecasts and investment recommendations, will be heavily discounted by investors.

Lastly, I examine whether potential sample selection problems influence the correlation estimates. Since the issuance of earnings guidance is voluntary, the ex post selection of firm-quarters with management guidance implies my sample is non-random, and thus may be sensitive to the self-selection bias. I use the standard Heckman (1979, 2001) two-step procedure to correct such bias. Specifically, I first estimate a Probit model of a firm's choice to issue guidance, and calculate the inverse Mills ratio. This model contains variables that are shown by prior studies to predict issuance of management forecasts, such as size, ownership, earnings and return volatility, litigation risk, and earnings informativeness. (Brown et al. 2005, Lennox and Park 2006) The model is reasonably well specified, as it has a pseudo- R^2 of almost 16%. I then add the inverse Mills ratio to the multivariate regression, and find that the negative correlation between the informativeness of management guidance and analyst forecasts remains robust.

I also examine the impact of Regulation Fair Disclosure (Reg FD) on the substitution effect reported earlier. Since Reg FD is intended to limit private communications of material information between managements and analysts, I expect the substitution effect to strengthen in the post-Reg Fd period, because after this regulation took effect, analysts should be no better informed than the investing public about insider information. Consistent with my expectation, I find the negative correlation between the informativeness of analyst forecasts and management guidance becomes significantly stronger in the post-Reg FD period.

My study makes several contributions to the literature. First, it explicitly identifies management issued earnings guidance as an important determinant of the informativeness of analyst research, which complements the findings of a recent study by Frankel et al (2006). Second, my study is also related to Francis et al. (2002), who

examine the interaction between analyst research and earnings announcements, but unexpectedly find that the two competing events actually complement each other, as evidenced by the positive correlation coefficients. My results suggest that their findings can at least partially be explained by the lack of timeliness and, more importantly, the retrospective nature of earnings announcements. In particular, since the main purpose of earnings announcements is to present a firm's past performance, the nature of the information contents of earnings announcements is not directly comparable to that of analyst research, which is primarily forward-looking. Therefore, these two sources are more likely to complement each other to the extent that investors may need to rely on analysts' expertise to translate the historical results into projections of future earnings. In contrast, management issued earnings guidance contains mostly forward-looking information, which is more likely to be in direct competition with analyst reports. As a result, consistent with the implication of theoretical studies (e.g. Kim and Verrecchia 1997), I document a strong substitute relation between management guidance and analyst research.

Third, my finding that the substitution effect strengthened in the post-Reg FD period lends support to the effectiveness of this regulation. In particular, my results suggest that analyst reports issued after the passage of Reg FD contain less material insider information, which may have resulted in reduced informativeness of these reports. (Gintschel and Markov 2004)

Finally, this study may also be of interest to firm managements and regulators. Since my results suggest that management issued earnings guidance and analyst reports largely contain similar information that substitute one another, the additional informational benefits to investors brought by management's voluntary forecasts are likely to be limited. I suspect this may be due to the fact that management guidance

has been overly concentrated on firms' short-term results and thus overlaps with the role of analyst research. This is reminiscent of recent calls for management to provide more discussions about the long-run plan of the firm's operations, and avoid giving specific short-term earnings guidance. (Browning 2006) However, in this study I did not investigate the specific contents of guidance and hence cannot verify whether long-term guidance is less correlated with the informativeness of analyst research. I believe exploration of this topic could be a promising area for future research.

The paper proceeds as follows. The next section reviews related literature and develop my hypotheses. Section 3 describes the sample and research design. Results are discussed in Section 4, and Section 5 concludes.

2. Literature Review and Hypotheses Development

As an important form of voluntary disclosure, company management issued earnings guidance has been shown to be influential to capital markets from various aspects. Early research has found significant price adjustments in response to the issuance of management earnings forecasts, suggesting that either the content of the forecast or the issuance of the forecast itself, or both, are viewed as informative by investors. (Patell 1976) Subsequent studies, including Waymire (1984) and Ajinkya and Gift (1984), find abnormal stock returns that are correlated with the unexpected component of management's projected earnings, thus suggesting that the contents of management forecast are informative. Yeo and Ziebart (1996) decompose market reaction to management earnings forecasts into two parts, and find that both the forecast issuance and forecast content are associated with price reactions. In addition to strong price reactions, the informativeness of management earnings forecasts has also been substantiated by studies using alternative research approaches. For example,

Coller and Yohn (1997) examine the bid-ask spread patterns around issuance of management forecasts, and find that the spreads become significantly lower in the post-forecast period relative to pre-forecast period. Their finding is consistent with the view that managers publish earnings forecast to reduce information asymmetry in the market, and that the forecasts have been effective in doing so. Another body of research studies the behavior of financial analysts after management issues earnings guidance. Since analysts are widely regarded as sophisticated investors, whose consensus estimates have often been used as surrogates for the entire market's expectations for a firm's future earnings, then systematic revisions of analyst forecasts should be observed if management forecast contains new information and analysts are able to use it efficiently. Consistent with this expectation, many studies document that analysts respond to management guidance by revising their own forecasts, and often in the same direction as suggested by the guidance (management forecast surprise). For example, Waymire (1986) examines the impact of management forecast on the accuracy of analyst earnings forecasts, and finds that analyst forecasts prepared after the issuance of management forecasts are generally more accurate than those prepared before the issuance. Later studies, including Jennings (1987) and Cotter et al. (2006), find that analysts revise their forecasts in response to management's guidance. Collectively, these findings suggest that management forecasts convey new information to financial analysts.

Given mounting evidence that analysts tend to follow the earnings guidance issued by managements, an ensuing concern, which is important but surprisingly has received scant attention from extant research, is whether the informativeness of analyst research is eroded by issuance of management guidance. The answer to this question is not immediately clear. On one hand, to the extent that future analyst

forecast revisions are predictable based on managers issued guidance, the semi-strong form Efficient Market Hypotheses (Fama 1970) suggests that stock price incorporates such predictability in a timely manner and thus market reactions to analyst reports published after the guidance are likely to be muted. Moreover, in view of the similarity of tasks (both emphasize on prediction of earnings) and managers' apparent informational advantage over analysts, the informativeness of analysts' research may even be discounted by investors ex ante, so long as the market has anticipation of the issuance of management guidance in the near future.⁴ Therefore, management guidance should play a substitute role for analyst forecasts, and hence reduce the usefulness of analyst forecasts to investors.

On the other hand, there are also reasons for analyst research to remain useful even in the presence of management supplied guidance. Above all, a large volume of studies in accounting and finance literature have shown that analysts are important information intermediaries in financial markets, and their research outputs, including earnings forecast, investment recommendations, and other types of reports, are informative to investors. (e.g. Francis and Soffer 1997, Gleason and Lee 2003, Frankel et al. 2006, and many others) In addition, the credibility of management issued forecasts has often been questioned by investors. For example, researchers have found significantly larger magnitude of stock returns around bad news forecasts than good news forecasts, suggesting that good news forecasts are usually deemed less credible than bad news forecasts, probably due to managers' self-served incentives to issue optimistically biased forecasts. (e.g. Skinner 1994, Rogers and Stocken 2005, among others) Also, managers have employed a wide range of formats

⁴ This marks an important distinction between my study and other studies that use earnings announcement and analyst report to examine competing information, such as Francis et al. (2002). Unlike management guidance, which is voluntary and a probabilistic event, earnings announcements are certain events and in most cases, the timing can be accurately estimated.

in their earnings guidance, and many of them, such as lower or higher end forecasts and qualitative guidance, lack the necessary precision for investors to form explicit earnings expectations. Thus, to the extent that management issued earnings guidance is not satisfactorily precise and reliable, investors will continue to count on the expertise of analysts to scrutinize the “quality” of these guidance. However, given the earlier surveyed strong evidence on the informativeness of management forecasts, I doubt these considerations, even though by no means trivial, would overwhelm the substitution role of management guidance for analyst forecasts.

Based on these arguments, I expect management guidance’s influence on analyst forecasts to be mainly a substitute effect. My hypothesis, stated formally, is as follows:

Hypothesis 1: The informativeness of analyst forecasts is negatively correlated with the informativeness of management issued earnings guidance.

The SEC put into effect Regulation Fair Disclosure (Reg FD) in October 2000 to prohibit company managers from selectively disclosing material information to favored analysts. Since its inception, numerous studies have emerged to investigate Reg FD’s impact on financial market’s information environment, and many interesting findings have been published. In general, these studies suggest Reg FD has been effective in leveling the informational play field by encouraging managers to switch from private communications with selected analysts to public disclosure of important information. For example, Bailey et al. (2003) report widened analysts forecast dispersion and heightened trading volume around earnings announcement in the post-FD period, both signaling decreases in the number of privately informed

traders in the market. They also find that companies have increased the frequency of voluntary disclosure, although mainly constrained to release of short-term information. Other studies, including Brown et al. (2003), who examine management forecasts and 8-K filings, and Bushee et al. (2004), who study conference calls, all report evidence consistent with managers' increased usage of these public disclosure vehicles after the passage of Reg FD. Gintschel and Markov (2004) compare the price impacts of analyst research (earnings forecasts and investment recommendations) in the pre- and post-Reg FD period, and document a significant drop in analyst research informativeness after Reg FD was enacted.

In view of the efficacy of Reg FD in curtailing private communications between management and analysts, in the post-Reg FD era, analyst reports issued before public disclosures of earnings news should contain less or ideally no information leakage about the pending disclosure. In other words, any "new" information content from analyst reports should represent fruits of the analyst's independent research, instead of mere dissemination of "insider's message" on behalf of company management. As a result, in the post-Reg FD period, the "new" information contained in analyst reports and management forecasts will have less overlap. Given prior research's findings that earnings forecasts by managements tend to be more accurate than analysts' forecasts, and that analysts tend to make predictable revisions of earnings estimates in response to management forecasts, investors should find analysts research less informative, and management forecast more informative after Reg-FD was enacted. Further, it is important to note that this prediction also applies to analyst forecasts issued before publications of management forecasts, because if investors have anticipation about the forthcoming announcement of management forecasts, their reactions to analyst reports issued beforehand should be

discounted further in the post-FD period. Therefore, I expect the substitute effect of management guidance for analyst research to strengthen in the post-Reg FD era.

Hypothesis 2: The negative correlation between the informativeness of management guidance and analyst forecasts will become stronger in the post-Reg FD period relative to the pre-Reg FD period.

3. Research Design and Data

3.1 Measuring Informativeness

Researchers mostly rely on “unsigned” (absolute value of or squared) abnormal return to gauge the information content of analyst reports. (Francis et al. 2002, Gintchel and Markov 2004, Frankel et al. 2006) In this study, I follow the literature and use a measure of informativeness similar to that used in Frankel et al. (2006).⁵ This measure defines “informativeness” as the impact of a disclosure event (analyst or management earnings forecast) on the firms’ share prices, given the assumption that in an efficient capital market, changes in price should correctly reflect the “new” information released to the investing public. Specifically, for each firm-quarter pair, I calculate the average of absolute size-adjusted abnormal returns on all analyst forecast dates for the firm in the given calendar quarter.⁶ I then divide this measure by the mean absolute size-adjusted return for the firm in the entire quarter.⁷ The calculation is given in the following equation,

⁵ Frankel et al. (2006) report that their absolute return-based informativeness measure is highly correlated with squared return-based measures. It is also positively correlated with analyst forecast surprise-based measure, such as that used in Lys and Sohn (1990).

⁶ If the publishing date of management or analyst forecast falls on a market holiday, then the next trading day is used instead as the event day.

⁷ The AFI measure differs from the AI measure in Frankel et al. (2006) in three aspects. First, their measure is a yearly metric while mine is a quarterly measure. Second, they use the sum of daily absolute abnormal return in the denominator, and I use the average. Third, their size portfolio grouping

$$AFI_{i,j} = \frac{\sum_{t=1toN_{-AF}} |AR_t| / N_{-AF_{i,j}}}{\sum_{t=1toN} |AR_t| / N_{i,j}} \quad (1a)$$

where $AFI_{i,j}$ denotes the informativeness of analyst forecast for firm i and quarter j , AR_t is daily size-adjusted abnormal return, which is calculated as the firm's raw return on day t less the return on the CRSP size decile to which the firm belongs, $N_{-AF_{i,j}}$ denotes the number of trading days with issuance of analyst forecasts in quarter j for firm i , and $N_{i,j}$ denotes the total number of trading days for firm i in quarter j . As such, the numerator in equation (1a) denotes the average daily price movements on trading days with issuance of analyst forecasts, and the denominator reflects the average daily price movements for all trading days within the quarter.

The informativeness of management forecast is defined similarly, and is given in equation (1b).

$$MFI_{i,j} = \frac{\sum_{t=1toN_{-MF}} |AR_t| / N_{-MF_{i,j}}}{\sum_{t=1toN} |AR_t| / N_{i,j}} \quad (1b)$$

In equation (1b), $MFI_{i,j}$ denotes the informativeness of management forecast for firm i and quarter j , $N_{-MF_{i,j}}$ denotes the number of trading days with issuance of management forecasts in quarter j for firm i , and the other variables are the same as defined in equation (1a).

3.2 Data

is based on NYSE size deciles, while mine is based on entire CRSP universe (NYSE+AMEX+NASDAQ) size deciles.

I obtain management forecast data from the Company Issued Guidance (CIG) database maintained by First Call. This database offers the most complete coverage of management forecasts to date, and has been utilized by many recent studies of management guidance. Consistent with prior research, I use only “EPS” guidance, which represents the vast majority (96%) of all observations in the database. In 1995, the Private Securities Litigation Reform Act (PSLRA), which contains a safe-harbor provision to shelter managers from litigation due to unachieved forecasts, was enacted to encourage managers to release more forward-looking information. It represents major shifts of information environment in the market, and the influence it may exert on my results is hard to predict. In order to circumvent the impact of PSLRA, I drop the guidance that was issued before January 1, 1996. After these screening procedures, I am left with 52,800 unique management forecast event days, spreading over 42,432 firm-quarters.⁸ Figure 1 illustrates the temporal distribution of firms that issue earnings guidance in my sample. We can observe that the practice of issuing guidance was relatively rare at the beginning of my sampled period, limiting to only 188 firms in the first quarter of 1996. The number grows gradually since. There is a sudden increase in the fourth quarter of 2000, when Regulation Fair Disclosure took effect, and the number of issuing firms peaked at 986 in the first quarter of 2001. Apparently, under the new regulation, company managers have mostly opted for more public disclosure of earnings guidance, which in the past might be only disseminated privately to selected analysts. In the post-Reg FD period, the number of guidance issuing firms has stabilized at more than 800 firms per quarter.

<Please insert Figure 1 here>

⁸ Recall that I use movements of share price to measure informativeness of management or analyst forecasts. If more than one forecast were issued on the same day, the individual impact of each forecast will not be separated, and the *AFI* or *MFI* measures the combined price impact of these forecasts. As a result, the number of unique event days is generally less than the number of forecasts recorded in the database.

My analyst forecasts data are collected from I/B/E/S Detail History File. I select all “EPS” forecasts for US firms that were issued between January 1, 1996 and December 31, 2005. This generates an initial sample of 1,430,086 unique analyst forecast days, representing 212,671 firm-quarters.

The management forecast sample and analyst forecast sample are then merged with CRSP Daily File to retrieve return data and calculate my informativeness measures *AFI* and *MFI*.⁹ The resulting sample consists of 24,144 firm-quarters with both analyst forecasts and management guidance issuance, which constitute my broad sample for conducting empirical analyses. The sample size may be further reduced for later tests due to additional data availability requirements.

4. Results

4.1 Simple Correlation Analysis

Panel A of Table 1 reports selected summary statistics for the broad sample. The average informativeness for analyst forecast (*AFI*) is 1.35, and the same measure for management forecast (*MFI*) is 1.78. Both of them are reliably higher than 1, suggesting that earnings forecasts, issued either by analysts or company managers, are in general informative to investors. Given the average daily absolute abnormal return of 2.3% for my sampled period, these informativeness metrics translate to daily price impact of 3.1% for a typical analyst forecast report, and 4.1% for typical management guidance. Panel B of Table 1 reports the parametric Pearson product-moment correlation and the non-parametric Spearman rank order correlation between *MFI* and *AFI*. Consistent with the substitution effect that Hypothesis 1 maintains, both statistics show highly significant negative associations between the two variables. (-10.1% for

⁹ Because of difficulty for classification, I exclude all event days that contain both management guidance and analyst forecasts.

Pearson and -11.1% for Spearman) In addition, Panel C of Table 2 shows that the negative correlation is present in each of the 10 years covered by my sample, and has strengthened considerably during recent years.

<Please insert Table 1 here>

4.2 Multivariate Regression Analysis

In this section, I conduct multivariate analyses to examine whether the substitute effect persists after controlling for other variables that are found by prior literature to affect the informativeness of analyst research.

The majority of my control variables are suggested by a recent study by Frankel et al. (2006), which examines a list of candidate cross-sectional determinants of analyst report informativeness. In particular, the variables I control for include the effects of firm size, book-to-market ratio, institutional ownership, trading volume, number of shareholders, association with market return, return volatility, and analyst following. I also include the informativeness of earnings announcements because Francis et al. (2002) find it is positively correlated with the informativeness of analyst research. In addition, Gintschel and Markov (2004) report a significant drop of analyst research's informativeness after the passage of Reg FD. Therefore, I also include variables that capture the effects of temporal trend and Reg FD in the test. The detailed description of variables is given below.

Firm Size (Size): log-transformed market value of equity (from CRSP) as of the last calendar quarter end before the event quarter.

Book-to-Market Ratio (BTM): the ratio of book value of equity to market value of equity. Book value (COMPUSTAT data item #60) is as of the last fiscal year ending at least three months before the event quarter, which is to ensure that the

accounting information has been publicly announced. Market value (from CRSP) is as of the last calendar quarter end before the event quarter.

Institutional Ownership (INST): the percentage of shares owned by institutions as of the last calendar quarter end before the event quarter. Both shares held by institutions and total shares outstanding are obtained from CDA Spectrum.

Trading Volume (VOL): log-transformed total trading volume as of the latest fiscal year ending at least three months before the event quarter. (COMPUSTAT data item #28)

Number of Shareholders (OWNERS): log-transformed number of share owners as of the latest fiscal year ending at least three months before the event quarter. (COMPUSTAT data item #100)

Correlation with Market Return (MMRSQ): the R^2 from a market model regression of daily returns over the entire year before the event quarter. The return on CRSP value-weighted index is used to proxy market return.

Analyst Following (FOLLOW): number of analysts following the firm in the year before the event quarter. (From I/B/E/S Detail History File)

Informativeness of Earnings Announcement (EAI): the average informativeness of eight quarterly earnings announcements before the event quarter. The informativeness is measured as the absolute abnormal return over the three-day window centering at the earnings announcement day. Abnormal return is calculated as raw return less return on value-weighted CRSP index, both from CRSP Daily file. Earnings announcement date is from COMPUSTAT Quarterly file.

Daily Return Volatility (RET_STD): standard deviation of daily raw return for the entire year before the event quarter.

News for the Quarter (NEWS): dummy variable which equals one if the cumulative size-adjusted abnormal return over the event quarter is less than or equal to zero, and zero otherwise.

Temporal Trend (TREND): calendar year of the event quarter less 1996, the beginning year of the sample.

Reg FD (FD): dummy variable which equals one if the event quarter falls after 2000, and equals zero otherwise.

I retrieve data from CRSP, COMPUSTAT, I/B/E/S and CDA Spectrum to calculate the variables, and thus the sample resulting from merging of these databases is smaller than the broad sample and consists of 19,620 firm-quarters. Table 2 shows the summary statistics for variables used in the multivariate analyses. Despite the reduced sample size, the distributional properties of MFI and AFI for the new sample are almost identical to those in the broad sample. Compared to the average firms in CRSP database, my sample firms have larger market capitalization, higher institutional ownership, more analyst following, less idiosyncratic risk, and lower return volatility. Since my sample consists of only firms that issue earnings guidance, these characteristics may be explained by the factors that influence a firm's issuance decision.¹⁰ Table 3 gives the correlation matrix for the variables, with Pearson correlation in the upper triangle and Spearman correlation in the lower triangle. In general, the simple correlations are consistent with those reported in prior studies. (Frankel et al. 2006)

<Please insert Table 2 and Table 3 here>

Table 4 shows results from the following multivariate regression:

¹⁰ I will explore this issue further in the later part of the paper.

$$\begin{aligned}
AFI_{i,t} = & \beta_0 + \beta_1 \cdot MFI_{i,t} + \beta_2 \cdot SIZE_{i,t} + \beta_3 \cdot INST_{i,t} + \beta_4 \cdot BTM_{i,t} + \beta_5 \cdot VOL_{i,t} + \beta_6 \cdot OWNER_{i,t} \\
& + \beta_7 \cdot EAI_{i,t} + \beta_8 \cdot MMRSQ_{i,t} + \beta_9 \cdot RET_STD_{i,t} + \beta_{10} \cdot NUM_ANALYST_{i,t} \\
& + \beta_{11} \cdot NEWS_{i,t} + \beta_{12} \cdot TREND_{i,t} + \beta_{13} \cdot FD_{i,t} + \varepsilon_{i,t} \quad (2)
\end{aligned}$$

The second column shows regression results using a cross-section and time-series pooled sample, where we can see that all the independent variables, with the exception of *MMRSQ*, are significant at less than 0.1% level in the model. In particular, my key variable of interest, *MFI*, remains significantly negative, suggesting that the substitute relation between management guidance and analyst forecast is robust to inclusion of other determinants of the informativeness of analyst research. The marginal effects of the control variables are generally consistent with prior studies' findings. For example, analyst forecasts tend to be more informative for firms with higher trading volume, smaller number of shareholders, higher institutional ownership, and for quarters experiencing negative abnormal returns. These results are also found by Frankel et al. (2006). In addition, *AFI* is positively correlated with *EAI*, which replicates Francis et al. (2002)'s finding that analyst research and earnings announcements complement each other. Table 4 also shows that the informativeness of analyst forecasts have been trending up over the last decade,¹¹ but took an evident hit by Reg FD, which is consistent with what Gintschel and Markov (2004) find. The third column shows results obtained using the Fama-Macbeth (1973) procedure, which controls for potential cross-sectional correlations between residuals. Specifically, I run regression (2) separately for each quarter, and use the average parameter estimates from these quarterly regressions as the new estimates. We can observe that with the exception of some control variables losing statistical significance, the main results are not qualitatively altered by these procedures. Particularly, the negative association between *AFI* and *MFI* remains highly significant.

¹¹ This may be a recent phenomenon, since Francis et al. (2002) report that there was no apparent time trend of analyst research informativeness for their sampled period (from 1986 to 1995).

<Please insert Table 4 here>

4.3 Effect of Regulation Fair Disclosure

Hypothesis 2 predicts that the substitute relation between management forecast and analyst forecast will become stronger in the post-Reg FD period. I test this prediction by estimating the following regression:

$$AFI_{i,t} = \beta_0 + \beta_1 \cdot MFI_{i,t} + \beta_2 \cdot MFI_{i,t} \times FD_{i,t} + Control + \varepsilon_{i,t} \quad (3)$$

where variables *AFI*, *MFI* and *FD* are as previously defined, and other control variables are those included in equation (2). In model (3), parameter β_1 measures the correlation between *MFI* and *AFI* in the pre-Reg FD period, and the sum of β_1 and β_2 reflects the post-Reg FD status. Therefore, β_2 , which is the coefficient on the interaction term *MFI*×*FD*, captures the impact of Reg FD on the relation between *AFI* and *MFI*. Since earlier analyses show that *AFI* and *MFI* are negatively correlated, β_2 should also be negative if Reg FD strengthens the substitute effect.

The results, which are shown in Table 5, suggest that the substitute effects between analyst forecast and management guidance are present both before and after Reg FD was enacted. Moreover, the negative sign on β_2 demonstrates that this relation has significantly strengthened in the post-Reg FD period,¹² which is consistent with the prediction of Hypothesis 2. Therefore, my results suggest that Reg FD has been effective in encouraging company managers to use public disclosures as replacements for private communications with analysts when disseminating material information.

<Please insert Table 5 here>

5. Additional Robustness Checks

¹² The point estimates suggest that the increase is more than 100%. ($\beta_1 = -0.028$, $\beta_2 = -0.031$)

In this section I report results from additional robustness tests to see if the results obtained so far are sensitive to alternative or more strict research designs. I first examine whether the substitute effect of management guidance holds for other types of analyst reports, namely, analysts' investment recommendations. Next, in view of the voluntary nature of management earnings forecasts, I check whether potential sample selection bias has any effect on my results.

5.1 Analysts' Investment Recommendations

While both being important outputs of proprietary research, many studies suggest that there exist marked distinctions between analysts' earnings forecasts and investment recommendations. (Francis and Soffer 1997) One perspective to formulate this distinction is offered by Schipper (1991), who holds that the ultimate job of financial analysts is to provide buy/sell recommendations, and earnings forecasts are one of the components to fulfill this task. Given prior findings that analysts rely on different valuation models to translate earnings estimates into target prices (e.g. Bradshaw 2002, Brav and Lehavy 2003), and use non-earnings based information to support their recommendations (Asquith et al. 2005), it would be expected that the information contents of analysts' earnings forecasts and investment recommendations will be less than perfectly correlated. Therefore, investment recommendations provide an apposite setting to examine whether the substitute effect of management issued guidance pertains to analyst research in general or confines only to earnings forecasts.

The empirical test is carried out in a similar manner to the multivariate analyses of analyst earnings forecasts reported in section 4.2. Specifically, I estimate the following regression:

$$ARI_{i,t} = \beta_0 + \beta_1 \cdot MFI_{i,t} + Control + \varepsilon_{i,t} \quad (4)$$

where *ARI* denotes the informativeness of analyst investment recommendations, which is constructed similarly to *AFI* and *MFI*, except that the issuing dates of recommendations are used as event dates. All the other variables are as of previously defined.

Data on investment recommendations are collected from I/B/E/S Detail Recommendations File. After merging with management forecasts and control variables data, the final sample contains 20,314 firm-quarters. Table 6 gives the summary statistics for variables used in the test¹³, and the regression results are reported in Table 7. As shown in the left panel of Table 7, the coefficient on *MFI*, β_2 , is negative and has high statistical significance. ($\beta_2 = -0.081$, $t = -15.16$)¹⁴ In addition, the coefficient estimates for the control variables are mostly in the same directions as those with analyst forecast (*AFI*) presented in Table 4, suggesting that these factors influence the informativeness of analysts' investment recommendations and earnings forecasts in a parallel way. The right panel of Table 7 reports the effect of Reg-FD. Interestingly, I find that Reg-FD has no significant impact on the relation between *ARI* and *MFI*, as evidenced by the insignificance of β_2 . This is not entirely unexpected, however, because even though Reg-FD limits private communications of insider information between company managers and their favored analysts, this regulation should have no impact on the analyst's personal ability to process such information. Therefore, if the informativeness of recommendations reflects the analyst's ability and possession of other proprietary information in addition to earnings-related "tips" from

¹³ *ARI* is winsorized at 0.1% and 99.9% to exclude outliers.

¹⁴ It is interesting to note that the point estimate is lower than that reported in table 4 (-0.081 vs. -0.047), which seems to suggest that the substitute effect is stronger for analysts' investment recommendations. However, it could also be due to the scale difference between *ARI* and *AFI*, as *ARI* on average tend to be larger than *AFI*.

company management, Reg-FD need not have any major impact on the interaction between management forecasts and analysts' recommendations.¹⁵

<Please insert Table 6 and Table 7 here>

5.2 Correction for Sample Selection Bias

5.2.1 Methodology

As discussed earlier, my sample consists of only firms that issue earnings guidance during the event quarter. This sample is not randomly selected, however, because prior research finds that the decision by firm managers to issue guidance is jointly determined by a number of factors. If some of these factors also influence the informativeness of analyst forecast, but are incidentally omitted in the multivariate regression, then the marginal effects of explanatory variables estimated in model (2) will be inconsistent. (Greene 2003, 783) In this section, I investigate whether such potential sample selection bias has any impact on the estimated negative association between *MFI* and *AFI*.

I use the Heckman's (1979, 2001) two-step procedure to address the sample selection problem. Specifically, in the first step I estimate a Probit model of a firm's choice to issue earnings guidance:

$$MG_{i,t} = Z'_{i,t} \cdot \Gamma + u_{i,t} \quad (5)$$

In equation (5), $MG_{i,t}$ is the indicator variable which equals 1 if firm i issues earnings guidance in quarter t , and 0 otherwise. $Z_{i,t}$ is the vector of independent variables influencing the firm's decision to issue guidance, which will be described in detail later. Γ is the vector of coefficients to be estimated, and $u_{i,t}$ is the error term. The parameter estimates from equation (5) are then used to calculate the inverse Mills ratio:

¹⁵ Gintchel and Markov (2004) find smaller reduction of informativeness for recommendations than earnings forecasts (22% v.s. 34%). My results provide a potential explanation for their findings.

$$Mill_{i,t} = \frac{\phi(Z_{i,t} \cdot \Gamma)}{\Phi(Z_{i,t} \cdot \Gamma)} \quad (6)$$

where $\Phi(\cdot)$ is the standard normal cumulative density function, and $\phi(\cdot)$ is the standard normal probability density function.

In the second step of Heckman's method, the inverse Mills ratio is included in the multivariate model (equation (2)) as an additional explanatory variable, and the new model is estimated using ordinary least square methods.

5.2.2 Determinants of Management Guidance

There is a rich literature exploring the factors behind managers' decision to issue earnings guidance.¹⁶ I draw on findings from these studies to construct the following variables that will be included in the Probit model (5).

It is commonly believed that an important reason why managers issue earnings guidance is to reduce the information asymmetry between investors and company insiders. Accordingly, I include size and analyst coverage, since they are important characteristics of a firm's information environment, and have been found to correlate with issuance of management guidance. (e.g. Kaznik and Lev 1995, Yeo and Ziebart 1995) I also include two variables that are directly linked to a firm's information risk, CAPM beta and return volatility, which are also found by recent studies to relate to management guidance. (Lennox and Park 2006, Feng and Koh 2006)

There is also an expectation adjustment hypothesis for management guidance, which maintains that managers use guidance to align the market's expectation with their own. (Ajinkya and Gift 1984) This argument, coupled with recent findings that managers are inclined to release negative warnings to "walk down" analyst forecasts

¹⁶ Please see Verrecchia (2001), Healy and Palepu (2001) for reviews of this literature. In addition, Hirst et al. (2006) survey more recent advancements in the field.

(Richardson et al. 2004, Cotter et al. 2006), suggests that guidance are more likely if optimism prevails in the market. I use analysts' mean forecast of earnings growth to accommodate this optimism effect.

The survey results of Graham et al. (2005) suggest that managers voluntarily issue earnings guidance to build reputation for reporting transparency. According to this theory, managers will refrain from issuing guidance if they are not confident with their forecasting ability. I include a variable measuring firms' earnings volatility to control for this effect.

Skinner (1994) proposes that firms issue guidance to minimize litigation costs arising from disappointing investors. This theory has also been supported by empirical evidence. (Francis et al. 1994, Kasznik and Lev 1995, Brown et al. 2005) Following the literature, I use a dummy variable indicating whether the firm is a member of the high tech industry to control for its litigation risk exposure. In addition, I include another dummy variable identifying firms of regulated industries, since prior studies find these firms are less likely to issue guidance. (Kasznik and Lev 1995, Lennox and Park 2006)

I include another two variables which measure a firm's institutional ownership and informativeness of earnings, respectively, because recent evidence from Ajinkya et al. (2005) and Lennox and Park (2006) suggest that both of them are positively correlated with the likelihood of management forecast issuance.

Frankel et al. (1995) find that firms tapping the capital market to raise funds are more likely to issue earnings forecasts, which may be attributed to managers' incentive to reduce cost of capital associated with information asymmetry. Following Brown et al. (2005), I use a firm's free cash flow as an inverse measure of the firms' need for external capital.

Many companies, such as Microsoft, have maintained a policy of publishing guidance for future earnings. In addition, some studies have found that past records of issuance is a good predictor of future issuance. (Yeo and Zirbart 1995, Brown et al. 2005) I use a firm's past frequency of issuing guidance to control for such auto-correlations.

Finally, I include a time trend variable and a Reg-FD dummy variable, as Figure 1 shows a clear upward trending pattern, and significant impact of Reg-FD.

The embodied version of the Probit model (5) is as follows¹⁷:

$$\begin{aligned}
 MG_{i,t} = & \beta_0 + \beta_1 \cdot Lag_MG_{i,t} + \beta_2 \cdot SIZE_{i,t} + \beta_3 \cdot FOLLOW_{i,t} + \beta_4 \cdot INST_{i,t} + \beta_5 \cdot BETA_{i,t} \\
 & + \beta_6 \cdot RET_STD_{i,t} + \beta_7 \cdot FCF_{i,t} + \beta_8 \cdot EAI_{i,t} + \beta_9 \cdot RISK_E_{i,t} + \beta_{10} \cdot OPT_{i,t} \\
 & + \beta_{11} \cdot LIT_{i,t} + \beta_{12} \cdot REG_{i,t} + \beta_{13} \cdot FD_{i,t} + \beta_{14} \cdot TREND_{i,t} + u_{i,t} \quad (7)
 \end{aligned}$$

Some of the variables in model (7) have been defined earlier in section 4.2, and below are detailed definitions for the new variables.

Past issuance of management guidance (Lag_MG): the number of management guidance issued during the entire year before the event quarter.

Earnings Volatility (Risk_Earnings): the standard deviation of quarterly earnings changes over the eight fiscal quarters before the event quarter, deflated by closing price the day before the event quarter. Earnings change is calculated as current quarter earnings per share before extraordinary items (COMPUSTAT Quarterly Data Item #19) less the same measure for the same quarter of last year.

Free Cash Flow (FCF): Free cash flow generated in the latest fiscal year ending at least three months before the event quarter. Free cash flow is calculated as

¹⁷ It is worth noting that many of these variables may in effect capture the combined effects of multiple factors. For example, size is also related to a firm's litigation risk (Brown et al. 2005), and analyst following may influence a manager's incentive to maintain good reputation for reporting transparency (Graham et al. 2005).

the sum of COMPUSTAT Data Item #308 and #311, deflated by market value of equity as of the last trading day before the event quarter.

Systematic Risk (BETA): Beta estimated from a market model of daily return on CRSP value-weighted return over the entire year before the event quarter.

Analyst Optimism (OPT): Most recent mean estimate of current year EPS (from I/B/E/S Summary File) less reported EPS (COMPUSTAT Data Item #58) of last year, then deflated by the price as of the last trading day before the event quarter.

Litigation Risk (LIT): dummy variable that equals one if the firm operates in high-tech industry and zero otherwise. High-tech industry is defined as SIC numbers falling in 2833-2936, 8731-8734, 3570-3577, 7370-7374, 3600-3674, 5200-5961.

Regulated Industry (REG): dummy variable that equals one if the firm operates in regulated industry and zero otherwise. Regulated industry is defined as SIC numbers falling in 4812, 4813, 4833, 4841, 4922, 4923, 4924, 4931, 4941, 6021, 6022, 6023, 6035, 6036, 6141, 6311, 6321, 6331, 4811-4899.

5.2.3 Sample and Results

In order to construct the sample for estimating model (7), I begin with the analyst forecast sample described in section 3.2, which contains 212,671 firm-quarters from 1996 to 2005. This sample is then merged with the broad sample of management guidance used in the univariate analyses (section 4.1), generating a sample of 152,780 firm-quarters. Requirement of data availability for calculating variables in model (7) reduces the sample size further, resulting in a final sample of 119,029 firm-quarter observations. Of these event quarters, 21,973 have both management guidance and analyst forecasts, and the remaining 97,056 contain only analyst forecasts. Panel A of

Table 8 reports the summary statistics of variables for the entire sample.¹⁸ Panel B and Panel C describe management guidance sub-sample and analyst forecast-only sub-sample, respectively. A comparison of the two sub-samples reveals that firms that issue earnings guidance tend to have larger market capitalization, more analyst following, higher institutional concentration, higher systematic risk, more informative earnings, and less earnings volatility. In addition, these firms are less likely to operate in regulated industries, but more likely to be member of high litigation risk industries. These firms also issue more earnings guidance in the past year, and analysts are more optimistic about their earnings prospects. These findings are generally consistent with evidence from prior studies. Estimation results of model (7) are given in Table 9. I can see that most of the variables, except for the two risk proxies (*BETA* and *RET_STD*), are significantly correlated with a firm's decision to issue earnings guidance during the event quarter.¹⁹ Moreover, the McFadden's pseudo R^2 is 15.9%, suggesting that the model is reasonably well specified.²⁰

<Please insert Table 8 and Table 9 here>

As outlined in section 5.2.1, I use the coefficient estimates from model (7) to calculate the inverse Mills ratio, which will be added to regression (2) as a control variable for sample selection effect. The results are reported in Table 10. The inverse Mills ratio enters into the model significantly, suggesting that my concern for the sample selection problem is not redundant. However, it turns out that controlling this effect has virtually no impact on the estimated correlation between *MFI* and *AFI*, which remains significantly negative. Therefore, the substitute relation between

¹⁸ To mitigate the impact of outliers, all the variables, with the exceptions of *SIZE*, *FOLLOW*, *TREND* and the three dummy variables, are winsorized at 1% and 99%. *FOLLOW* is log-transformed.

¹⁹ Some variables, such as *SIZE* and *FOLLOW*, enter in the model with signs different from those suggested by Table 8. This is likely due to the high correlations among many of the explanatory variables.

²⁰ In addition, as another evidence of the goodness-of-fit of the model, untabulated results show that the classification accuracy rate is as high as 82.7%.

management issued guidance and analyst forecast is robust to correction of sample self-selection biases.

<Please insert Table 10 here>

6. Conclusion

This study investigates the relation between management issued earning guidance on the informativeness of analyst research. I find a strong negative correlation between the informativeness of management guidance and analyst research, i.e., a substitute effect, and that this relation is significant for both analysts' earnings forecasts and investment recommendations. The findings are robust to alternative regression model specifications, and correction procedures for sample selection problem. I also find that the substitute effect between management guidance and analyst earnings forecasts significantly strengthens in the post-Reg FD period, which provides support for the effectiveness of Reg-FD in curtailing private dissemination and encouraging public disclosure of earnings information by company managements.

This study contributes to the existing literature from several aspects. First, it explicitly identifies management issued earnings guidance as an important determinant of the informativeness of analyst research, which complements the findings of a recent study by Frankel et al (2006). Second, the negative correlation between management forecast and analyst research documented in this study provide strong empirical support to analytical predictions of the relation between competing events. (e.g. Kim and Verrecchia 1997) Third, my finding that the substitution effect strengthened in the post-Reg FD period suggest analyst reports issued after the passage of Reg FD contain less material insider information, which may have resulted in reduced informativeness of these reports. (Gintschel and Markov 2004) Finally, this study may also be of interest to firm managements and regulators. Since my

results suggest that management issued earnings guidance and analyst reports largely contain similar information that substitute one another, the additional informational benefits to investors brought by management's voluntary forecasts are likely to be limited. I suspect this may be due to the fact that management guidance has been overly concentrated on firms' short-term results and thus overlaps with the role of analyst research. Future research could explore the specific contents of guidance, and examine whether long-term guidance is less correlated with the informativeness of analyst research.

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Table 1. Management Guidance and Analyst Earnings Forecast: Univariate Results

Panel A. Summary Statistics (Full Sample)

Variable	Mean	Median	Lower Quartile	Upper Quartile	Std Dev
AFI	1.351	1.179	0.902	1.577	0.840
MFI	1.782	1.166	0.546	2.242	1.980
ABRET_MEAN	0.023	0.020	0.013	0.029	0.014
ABRET_STD	0.024	0.019	0.012	0.030	0.017

Panel B. Correlations between MFI and AFI (Full Sample)

	Pearson Product-Moment Correlation	Spearman Rank Order Correlation
Parameter Estimates	-0.10	-0.11
<i>p</i> -value	<0.001	<0.001

Panel C. Time-series of Results

Year	N	Pearson	Spearman	MFI (Mean)	AFI (Mean)	MFI (Std Dev)	AFI (Std Dev)
1996	849	-0.105	-0.098	2.176	1.161	2.487	0.568
1997	1174	-0.078	-0.098	2.131	1.213	2.461	0.693
1998	1788	-0.047	-0.083	2.125	1.229	2.383	0.681
1999	1905	-0.123	-0.134	2.061	1.232	2.339	0.738
2000	1937	-0.092	-0.120	1.824	1.278	2.014	0.711
2001	3202	-0.071	-0.062	1.550	1.223	1.604	0.647
2002	3081	-0.067	-0.068	1.623	1.324	1.699	0.770
2003	3160	-0.113	-0.129	1.662	1.401	1.776	0.874
2004	3569	-0.130	-0.134	1.709	1.485	1.866	1.010
2005	3479	-0.115	-0.143	1.754	1.575	1.964	1.033

The full sample consists of 24,144 firm-quarter observations from 1996Q1 to 2005Q4. *AFI* and *MFI* are the informativeness of analyst earnings forecasts and management earnings guidance, respectively, and are calculated as

$$AFI_{i,j} = \frac{\sum_{t=1toN} |AR_t| / N - AF_{i,j}}{\sum_{t=1toN} |AR_t| / N_{i,j}} \quad MFI_{i,j} = \frac{\sum_{t=1toN} |AR_t| / N - MF_{i,j}}{\sum_{t=1toN} |AR_t| / N_{i,j}}$$

*ABRET_MEAN*_{*i,t*} is the average of daily absolute size-adjusted return for firm *i* over quarter *t*.

*ABRET_STD*_{*i,t*} is the standard deviation of daily absolute size-adjusted return for firm *i* over quarter *t*.

Table 2 Summary Statistics of Variables
(Management Guidance and Analyst Earnings Forecasts: Multivariate Analyses)

Variable	Mean	Median	Lower Quartile	Upper Quartile	Std Dev
AFI	1.359	1.181	0.910	1.584	0.848
MFI	1.782	1.180	0.553	2.246	1.951
SIZE	13.478	13.386	12.302	14.497	1.693
BTM	0.557	0.423	0.243	0.675	0.710
INST	0.595	0.619	0.420	0.783	0.244
VOL	3.976	3.962	2.909	4.985	1.572
OWNERS	0.788	0.797	-0.671	2.130	1.969
EAI	0.065	0.057	0.038	0.083	0.038
MMRSQ	0.146	0.119	0.047	0.220	0.120
RET_STD	0.034	0.030	0.021	0.042	0.017
FOLLOW	11.260	9.000	5.000	15.000	9.074
NEWS	0.551	1	0	1	0.497
TREND	5.771	6.000	4.000	8.000	2.526
FD	0.712	1.000	0.000	1.000	0.453

The sample consists of 19,620 firm-quarter observations from 1996Q1 to 2005Q4.

AFI and **MFI** are the informativeness of analyst earnings forecasts and management earnings guidance, respectively. Other variables are:

Firm Size (Size): log-transformed market value of equity (from CRSP) as of the last calendar quarter end before the event quarter.

Book-to-Market Ratio (BTM): the ratio of book value of equity to market value of equity. Book value (COMPUSTAT data item #60) is as of the last fiscal year ending at least three months before the event quarter, which is to ensure that the accounting information has been publicly announced. Market value (from CRSP) is as of the last calendar quarter end before the event quarter.

Institutional Ownership (INST): the percentage of shares owned by institutions as of the last calendar quarter end before the event quarter. Both shares held by institutions and total shares outstanding are obtained from CDA Spectrum.

Trading Volume (VOL): log-transformed total trading volume as of the latest fiscal year ending at least three months before the event quarter. (COMPUSTAT data item #28)

Number of Shareholders (OWNERS): log-transformed number of share owners as of the latest fiscal year ending at least three months before the event quarter. (COMPUSTAT data item #100)

Correlation with Market Return (MMRSQ): the R^2 from a market model regression of daily returns over the entire year before the event quarter. The return on CRSP value-weighted index is used to proxy market return.

Analyst Following (FOLLOW): number of analysts following the firm in the year before the event quarter. (From I/B/E/S Detail History File)

Informativeness of Earnings Announcement (EAI): the average informativeness of 8 quarterly earnings announcements before the event quarter. The informativeness is measured as the absolute abnormal return over the three-day window centering the earnings announcement day. Abnormal return is calculated as raw return less return

on value-weighted CRSP index, both from CRSP Daily file. Earnings announcement date is from COMPUSTAT Quarterly file.

Daily Return Volatility (RET_STD): standard deviation of daily raw return for the entire year before the event quarter.

News for the Quarter (NEWS): dummy variable which equals one if the cumulative size-adjusted abnormal return over the event quarter is less than or equal to zero, and zero otherwise.

Temporal Trend (TREND): calendar year of the event quarter less 1996, the beginning year of the sample.

Reg FD (FD): dummy variable which equals one if the event quarter falls after 2000, and equals zero otherwise.

Table 3. Correlation Matrix: Management Guidance and Analyst Earnings Forecasts
(Pearson upper triangle, Spearman lower triangle)

	AFI	MFI	SIZE	BTM	INST	VOL	OWNERS	EAI	MMRSQ	RET_STD	FOLLOW	NEWS	TREND	FD
AFI	1	-0.103 *** (19620)	-0.064 ***	-0.031 ***	0.060	-0.005 ***	-0.110 ***	0.095	0.010	0.022	-0.085 ***	0.026 ***	0.157 ***	0.112 ***
MFI	-0.113 *** (19620)	1	-0.053 ***	-0.009 ***	-0.024 ***	-0.058 ***	-0.009 ***	0.012 *	-0.055 ***	0.002	-0.082 ***	0.050 ***	-0.063 ***	-0.080 ***
SIZE	0.006 ***	-0.023 *** (19620)	1	-0.299 ***	0.400 ***	0.722 ***	0.528 ***	-0.277 ***	0.527 ***	-0.436 ***	0.722 ***	-0.041 ***	0.168 ***	0.128 ***
BTM	-0.063 ***	-0.022 ***	-0.371 *** (19620)	1	-0.124 ***	-0.111 ***	-0.030 ***	0.063 ***	-0.123 ***	0.163 ***	-0.108 ***	-0.031 ***	-0.043 ***	0.003 ***
INST	0.106 ***	-0.016 **	0.425 ***	-0.129 *** (19620)	1	0.342 ***	0.043 ***	-0.104 ***	0.357 ***	-0.314 ***	0.258 ***	-0.040 ***	0.312 ***	0.263 ***
VOL	0.063 ***	-0.027 ***	0.701 ***	-0.213 ***	0.357 ***	1 (19620)	0.356 ***	0.126 ***	0.511 ***	0.020 ***	0.740 ***	-0.033 ***	0.239 ***	0.220 ***
OWNERS	-0.084 ***	0.002 ***	0.481 ***	-0.016 **	0.035 ***	0.313 ***	1 (19620)	-0.278 ***	0.235 ***	-0.307 ***	0.377 ***	-0.035 ***	-0.018 **	-0.011 ***
EAI	0.109 ***	0.002 ***	-0.327 ***	-0.038 ***	-0.089 ***	0.108 ***	-0.324 ***	1 (19620)	-0.115 ***	0.645 ***	-0.044 ***	0.024 ***	0.038 ***	0.103 ***
MMRSQ	0.081 ***	-0.026 ***	0.566 ***	-0.140 ***	0.415 ***	0.531 ***	0.214 ***	-0.127 *** (19620)	1 (19620)	-0.180 ***	0.398 ***	-0.011 ***	0.333 ***	0.332 ***
RET_STD	0.026 ***	-0.004 ***	-0.500 ***	0.042 ***	-0.291 ***	-0.031 ***	-0.354 ***	0.699 ***	-0.246 ***	1 (19620)	-0.117 ***	0.046 ***	-0.188 ***	-0.049 ***
FOLLOW	0.021 ***	-0.046 ***	0.732 ***	-0.205 ***	0.356 ***	0.749 ***	0.331 ***	-0.082 ***	0.441 ***	-0.195 ***	1 (19620)	-0.038 ***	0.050 ***	0.051 ***

NEWS	0.026 ***	0.027 ***	-0.044 ***	-0.035 ***	-0.040 ***	-0.037 ***	-0.035 ***	0.026 ***	-0.011 ***	0.053 ***	-0.035 ***	1 (19620)	-0.089 ***	-0.108 ***
TREND	0.171 ***	-0.034 ***	0.180 ***	-0.034 ***	0.320 ***	0.238 ***	-0.024 ***	0.002 ***	0.369 ***	-0.281 ***	0.067 ***	-0.081 ***	1 (19620)	0.840 ***
FD	0.125 ***	-0.054 ***	0.140 ***	0.023 ***	0.267 ***	0.223 ***	-0.011 ***	0.093 ***	0.358 ***	-0.090 ***	0.066 ***	-0.108 ***	0.791 ***	1 (19620)

The sample consists of 19,620 firm-quarter observations from 1996Q1 to 2005Q4.
AFI and *MFJ* are the informativeness of analyst earnings forecasts and management earnings guidance, respectively.
Please see Table 2 for definitions of other variables

Table 4 Regression Results
(Management Guidance and Analyst Earnings Forecasts: Multivariate Analyses)

Dependent Variable: AFI

Variables	Pooled	Fama-Macbeth
INTERCEPT	1.435 *** (13.94)	1.489 *** (9.97)
MFI	-0.047 *** (-15.40)	-0.041 *** (-9.74)
SIZE	-0.032 *** (-4.03)	-0.019 (-1.67)
BTM	-0.048 *** (-5.33)	-0.073 *** (-3.77)
INST	0.140 *** (4.88)	0.119 *** (4.04)
VOL	0.042 *** (5.44)	0.026 *** (2.98)
OWNERS	-0.023 *** (-6.18)	-0.016 *** (-3.90)
EAI	1.785 *** (8.31)	1.441 *** (5.48)
MMRSQ	-0.019 (-0.30)	0.017 (0.19)
RET_STD	-1.914 *** (-3.37)	-0.564 (-0.67)
FOLLOW	-0.010 *** (-8.90)	-0.009 *** (-8.72)
NEWS	0.058 *** (4.90)	0.075 *** (4.97)
TREND	0.065 *** (13.94)	---
FD	-0.147 *** (-5.90)	---
F-STAT	99.96 ***	---
R ²	0.062	0.064

The sample consists of 19,620 firm-quarter observations from 1996Q1 to 2005Q4.
The left column reports results from pooled sample regression, and the right column reports results from Fama-Macbeth procedure.
Please see Table 2 for definitions of variables.

* significant at 10% ** significant at 5% *** significant at 1%

Table 5 Regression Results
(The Effect of Regulation Fair Disclosure)

Dependent Variable: AFI	
Variable	Model (a)
INTERCEPT	1.381 *** (13.35)
MFI	-0.028 *** (-5.66)
MFI*FD	-0.031 *** (-4.90)
SIZE	-0.031 ** (-3.89)
BTM	-0.047 *** (-5.25)
INST	0.140 *** (4.87)
VOL	0.041 *** (5.38)
OWNERS	-0.023 *** (-6.08)
EAI	1.799 *** (8.38)
MMRSQ	-0.023 (-0.37)
RET_STD	-1.895 *** (-3.34)
NUM_ANALYST	-0.010 *** (-9.01)
NEWS	0.057 *** (4.79)
TREND	0.066 *** (14.14)
FD	-0.094 *** (-3.45)
F-STAT	94.650 ***
R ²	0.063

The sample consists of 19,620 firm-quarter observations from 1996Q1 to 2005Q4.
Please see Table2 for definitions of variables.

* significant at 10% ** significant at 5% *** significant at 1%

Table 6 Summary Statistics
(Management Forecasts and Analyst Investment Recommendations)

Variable	Mean	Median	Lower Quartile	Upper Quartile	Std Dev
ARI	1.690	1.302	0.794	2.039	1.562
MFI	1.970	1.363	0.652	2.539	2.010
SIZE	14.036	13.893	12.869	15.112	1.708
BTM	0.490	0.379	0.219	0.605	0.623
INST	0.638	0.663	0.487	0.806	0.234
VOL	4.421	4.416	3.411	5.404	1.541
OWNERS	1.101	1.112	-0.480	2.507	2.083
EAI	0.063	0.055	0.037	0.080	0.037
MMRSQ	0.169	0.147	0.068	0.247	0.126
RET_STD	0.032	0.028	0.020	0.040	0.016
FOLLOW	14.364	12.000	7.000	20.000	10.167
NEWS	0.534	1.000	0.000	1.000	0.499
TREND	5.922	6.000	4.000	8.000	2.440
FD	0.745	1.000	0.000	1.000	0.436

The sample consists of 20,314 firm-quarter observations from 1996Q1 to 2005Q4.
ARI is winsorized at top and bottom 0.1%.
Please see Table 2 for variable definitions.

Table 7 Regression Results
(Management Forecasts and Analyst Investment Recommendations)

Dependent Variable: ARI		
Variables	Model (a)	Model (b)
Intercept	2.341 *** (12.11)	2.318 *** (11.88)
MFI	-0.081 *** (-15.16)	-0.074 *** (-7.68)
MFI*FD	---	-0.011 (-0.94)
SIZE	-0.084 *** (-5.7)	-0.083 *** (-5.66)
BTM	-0.093 *** (-5)	-0.092 *** (-4.98)
INST	0.221 *** (4.29)	0.222 *** (4.29)
VOL	0.068 *** (4.58)	0.067 *** (4.57)
OWNERS	-0.028 *** (-4.13)	-0.028 *** (-4.12)
EAI	2.726 *** (6.65)	2.731 *** (6.66)
MMRSQ	0.039 (0.37)	0.039 (0.38)
RET_STD	-4.953 *** (-4.5)	-4.948 *** (-4.49)
NUM_ANALYST	-0.012 *** (-6.62)	-0.012 *** (-6.64)
NEWS	0.229 *** (10.58)	0.228 *** (10.54)
TREND	0.116 *** (13.41)	0.116 *** (13.45)
FD	-0.452 *** (-9.82)	-0.432 *** (-8.55)
F-STAT	82.14 ***	76.33 ***
R ²	0.049	0.049

The sample consists of 20,314 firm-quarter observations from 1996Q1 to 2005Q4.
The left column reports results with the interaction term MFI*FD excluded, and the right column reports results with the interaction term MFI*FD included.

ARI is the informativeness of analyst investment recommendations, which is winsorized at top and bottom 0.1%.

Please see Table 2 for variable definitions.

* significant at 10% ** significant at 5% *** significant at 1%

Table 8 Summary Statistics
(Management Guidance and Analyst Earnings Forecast: Corrections for Sample Selection Bias)

Panel A. Full Sample					
Variable	Mean	Median	Lower Quartile	Upper Quartile	Std Dev
LAG_MG	1.183	0.000	0.000	2.000	1.827
SIZE	13.054	12.946	11.811	14.127	1.749
INST	0.490	0.496	0.277	0.699	0.258
FOLLOW	1.529	1.609	0.693	2.197	0.914
RISK_EARNINGS	0.080	0.012	0.004	0.038	0.282
FCF	0.000	0.000	0.000	0.000	0.000
BETA	0.931	0.813	0.470	1.269	0.639
RET_STD	0.037	0.033	0.022	0.047	0.019
LIT	0.309	0.000	0.000	1.000	0.462
OPT	0.030	0.006	-0.010	0.031	0.431
REG	0.057	0.000	0.000	0.000	0.232
TREND	4.280	4.000	2.000	7.000	2.874
FD	0.457	0.000	0.000	1.000	0.498
EAI	0.066	0.060	0.038	0.097	0.034

Panel B. Sub-sample with both management guidance and analyst forecasts					
Variable	Mean	Median	Lower Quartile	Upper Quartile	Std Dev
LAG_MG	2.738	2.000	1.000	4.000	2.282
SIZE	13.391	13.303	12.229	14.397	1.679
INST	0.576	0.601	0.391	0.773	0.248
FOLLOW	2.070	2.079	1.609	2.639	0.835
RISK_EARNINGS	0.064	0.011	0.004	0.032	0.245
FCF	0.000	0.000	0.000	0.000	0.000
BETA	1.028	0.908	0.565	1.377	0.642
RET_STD	0.035	0.031	0.022	0.044	0.018
LIT	0.360	0.000	0.000	1.000	0.480
OPT	0.045	0.006	-0.008	0.029	0.332
REG	0.042	0.000	0.000	0.000	0.199
TREND	5.602	6.000	4.000	8.000	2.575
FD	0.686	1.000	0.000	1.000	0.464
EAI	0.068	0.062	0.041	0.097	0.035

Panel C. Sub-sample with only analyst forecasts

Variable	Mean	Median	Lower Quartile	Upper Quartile	Std Dev
LAG_MG	0.831	0.000	0.000	1.000	1.499
SIZE	12.980	12.862	11.729	14.059	1.755
INST	0.471	0.470	0.256	0.677	0.257
FOLLOW	1.839	1.792	1.099	2.485	0.923
RISK_EARNINGS	0.083	0.012	0.004	0.039	0.290
FCF	0.000	0.000	0.000	0.000	0.000
BETA	0.909	0.790	0.449	1.245	0.637
RET_STD	0.037	0.033	0.022	0.047	0.019
LIT	0.297	0.000	0.000	1.000	0.457
OPT	0.026	0.005	-0.011	0.032	0.449
REG	0.061	0.000	0.000	0.000	0.239
TREND	3.982	4.000	2.000	6.000	2.854
FD	0.406	0.000	0.000	1.000	0.491
EAI	0.065	0.060	0.037	0.097	0.034

The full sample consists of 119,029 firm-quarter observations from 1996Q1 to 2005Q4. The sub-sample of Panel B consists of 21,973 firm-quarter observations with both management guidance and analyst forecasts. The sub-sample of Panel C consists of 97,056 firm-quarter observations with analyst forecasts only.

Past issuance of management guidance (Lag_MG): the number of management guidance issued during the entire year before the event quarter.

Earnings Volatility (Risk_Earnings): the standard deviation of quarterly earnings changes over the eight fiscal quarters before the event quarter, deflated by closing price the day before the event quarter. Earnings change is calculated as current quarter earnings per share before extraordinary items (COMPUSTAT Quarterly Data Item #19) less the same measure for the same quarter of last year.

Free Cash Flow (FCF): Free cash flow generated in the latest fiscal year ending at least three months before the event quarter. Free cash flow is calculated as the sum of COMPUSTAT Data Item #308+#311, deflated by market value of equity as of the day before the event quarter.

Systematic Risk (BETA): Beta estimated from a market model of daily return on CRSP value-weighted return over the entire year before the event quarter.

Analyst Optimism (OPT): Most recent mean estimate of current year EPS (from I/B/E/S Summary File) less reported EPS (COMPUSTAT Data Item #58) of last year, then deflated by the price of the day before the event quarter.

Litigation Risk (LIT): dummy variable that equals one if the firm operates in high-tech industry and zero otherwise. High-tech industry is defined as SIC numbers falling in 2833-2936, 8731-8734, 3570-3577, 7370-7374, 3600-3674, 5200-5961.

Regulated Industry (REG): dummy variable that equals one if the firm operates in regulated industry and zero otherwise. Regulated industry is defined as SIC numbers falling in 4812, 4813, 4833, 4841, 4922, 4923, 4924, 4931, 4941, 6021, 6022, 6023, 6035, 6036, 6141, 6311, 6321, 6331, 4811-4899.

Please see Table 2 for definitions of other variables.

All variables, except for FOLLOW, TREND, LIT, and REG, are winsorized at 1% and 99%. FOLLOW is log-transformed.

* significant at 10% ** significant at 5% *** significant at 1%

Table 9 Probit Regression Results
(Management Guidance and Analyst Earnings Forecast: Corrections for Sample Selection Bias)

Dependent Variable: MG (dummy variable which equals 1 if a quarter contains at least one management guidance)

Variables	Parameter Estimates
INTERCEPT	-1.302 *** (-23.20)
LAG_CIG	0.252 *** (97.03)
SIZE	-0.032 *** (-7.13)
INST	0.300 *** (13.35)
FOLLOW	-0.011 (-1.38)
RISK_EARNINGS	-0.149 *** (-7.77)
FCF	83.139 *** (5.02)
BETA	0.006 (0.62)
RET_STD	0.367 (0.92)
LITIGATION	0.058 *** (5.53)
OPTIMISM	0.065 *** (5.55)
REGULATION	-0.062 *** (-2.82)
TREND	0.019 *** (5.53)
FD	0.142 *** (7.62)
EAI	1.722 *** (10.08)
McFadden's R ²	0.159

The sample for estimating the probit model consists of 119,029 firm-quarter observations from 1996Q1 to 2005Q4.

All variables, except for FOLLOW, TREND, LIT, and REG, are winsorized at 1% and 99%. FOLLOW is log-transformed.

Please see Appendix for definitions of variables.

* significant at 10% ** significant at 5% *** significant at 1%

Table 10 Regression Results
(Management Guidance and Analyst Earnings Forecast: Corrections for Sample Selection Bias)

Dependent Variable: AFI

Variables	Parameter Estimates
INTERCEPT	1.305 (11.90)
MFI	-0.048 *** (-15.57)
MILL	0.078 *** (4.23)
SIZE	-0.035 *** (-4.25)
BTM	-0.048 *** (-5.27)
INST	0.168 *** (5.62)
VOL	0.044 *** (5.54)
OWNERS	-0.023 *** (-6.02)
EAI	1.884 *** (8.63)
MMRSQ	-0.011 (-0.17)
RET_STD	-2.131 *** (-3.68)
FOLLOW	-0.010 *** (-8.52)
NEWS	0.057 *** (4.69)
TREND	0.071 *** (14.60)
FD	-0.132 *** (-5.14)
F-STAT	93.72 ***
R ²	0.064

The sample consists of 19,121 firm-quarter observations from 1996Q1 to 2005Q4. MILL is the inverse Mills ratio calculated from the probit model in Table 9. Please see Table 2 for definitions of other variables.

* significant at 10% ** significant at 5% *** significant at 1%

Figure 1 Temporal Distribution of Firms Issuing Guidance

Essay II

Preliminary Earnings

Announcements and Investors'

Reaction to 10-Q Filings

Abstract

This study examines the information contents of EDGAR 10-Q filings that are preempted by preliminary earnings announcements. The investigation consists of two groups of tests. In the first test, I assess the influence of preliminary announcements on investors' reaction to 10-Q filings, and find that investors react to 10-Q filings more strongly when the preliminary announcements are less informative and leave investors with more uncertainty. In the second test, I examine the impact of 10-Q filings on the post-earnings announcement drifts (PEAD). I find stronger PEAD effect for firms that make preliminary earnings announcements before filing 10-Q than firms that do not. In addition, for firms that make preliminary earnings announcements, the PEAD effects become significantly weakened after 10-Q filings are made. These results are consistent with the joint hypothesis that the PEAD is caused by investors' underreaction to noisy "pre-announced" earnings news and investors use 10-Q filings to resolve information uncertainty of the earnings news. Collectively, my results suggest that 10-Q filings are value-relevant and provide investors with important information sources that complement preliminary earnings announcements.

JEL classification: M4; G14

Keywords: Capital market; Earnings announcement; 10-Q filing

Preliminary Earnings Announcements and Investors' Reaction to 10-Q Filings

1. Introduction

Publicly held companies are required to file 10-Q forms with the SEC to disclose their quarterly financial results. These 10-Q filings represent the most comprehensive financial information source available to investors, and thus should be informative to the market. However, in addition to filing 10-Q forms with SEC, most companies also voluntarily publicize their results through popular press or conference calls. These disclosures, which I call preliminary earnings announcements in this study, are usually made before the filings of 10-Q's and in effect constitute the first release of earnings results to the public. Given the dominating importance of timeliness of information to the capital markets, the value relevance of 10-Q filings, especially those preempted by preliminary earnings announcements, are now subject to question. For example, consistent with the preemption effect, most earlier studies find significant increases in return volatility and trading volume in response to preliminary earnings announcements, but much more limited market reactions to 10-Q filings (e.g. Bamber 1986, Easton and Zmijewski 1993).

More recent studies, however, report that 10-Q filings have value relevance beyond preliminary earnings announcements. (e.g. Griffin 2003, Balsam et al. 2002, and Callen et al. 2005) The purpose of this study is to extend these findings by investigating what incremental information content 10-Q filings have and how investors' reactions to 10-Q filings are influenced by the quality of preliminary earnings announcements. These questions, which have not been examined before, are

important for our understanding of the role 10-Q filings play in the functioning of capital markets. While it has been shown by prior studies that 10-Q filings receive investors' attention and are usually associated with abnormal price changes, it remains unclear what information content investors seek from 10-Q filings, especially when much of the critical financial information, such as earnings and accruals, has been pre-announced before the 10-Q's are filed. I present evidence that 10-Q filings are used by investors to resolve the information uncertainty left by preliminary earnings announcements.

Because preliminary earnings announcements are voluntary, companies usually have large discretion over the content, timing, and format of the announcements. As a result, the quality of these announcements varies greatly across companies and many announcements do not provide enough information contents that are necessary for investors to use in valuation analyses. As empirical evidence of the associated information uncertainty, researchers have found that, rather than "leveling the playing ground", preliminary earnings announcements instead increase the information asymmetry between market participants. (e.g. Krinsky and Lee 1997, Libby et al. 2002) In contrast, the contents and presentation formats of information to be disclosed in 10-Q filings are strictly regulated and highly standard across different firms under the same reporting regime. Therefore, 10-Q filings should serve as important complementary information source that helps investors resolve the uncertainty left by preliminary earnings announcements. In addition, this proposition suggests that, under the assumption of an informationally efficient capital market, investors' reaction to 10-Q filings should be related to the quality of preliminary earnings announcements that preceded the filings.

In this study, I perform statistical tests of these conjectures and conduct empirical analyses of the way 10-Q information is incorporated into security prices. My investigation consists of two groups of tests. In the first test, I examine the impact of preliminary earnings announcements on investors' reaction to 10-Q filings by estimating the statistical correlations between the market's reaction to 10-Q filings and the informativeness of preliminary earnings announcements. This test is motivated by theoretical research which predicts that rational investors' reaction to a particular disclosure event (in my case the 10-Q filings) should be a *negative* function of the informativeness of pre-disclosure information (in my case the preliminary earnings announcements). (e.g. Holthausen and Verrecchia, 1988, Kim and Verrecchia, 1991, Demski and Feltham, 1994) Following prior literature, I use abnormal trading volume and price changes to infer the informativeness of the preliminary announcements. Specifically, abnormal trading volumes reflect the disagreement among investors and capture the uncertainty associated with the disclosure events. Therefore, it is used as an *inverse* measure of the informativeness of these disclosures. In contrast, abnormal price changes reflect the consensus view of investors and thus are used as direct proxy for the disclosures' informativeness. As these two measures capture different aspects of the information contents of preliminary earnings announcements, I use them jointly to assure the robustness of the results. With a sample of 17,381 firm-quarter observations spanning from 1996 through 2004, I find the strength of market reaction to 10-Q filings are positively related with the abnormal trading activity, and negatively related with the absolute price change at preliminary earnings announcements. These results confirm my conjecture that investors' use of 10-Q information is heavily influenced by the

characteristics of preliminary announcements, and perhaps more interestingly, is in a way consistent with the Bayesian behavior suggested by theoretical research.

My second test draws on properties of post-earnings announcement drift (PEAD) to investigate whether 10-Q filings help resolve the information uncertainty of preliminary earnings announcements. Theories from behavioral finance literature suggest that PEAD results from investors' under-reaction to the information contained in the noisy, but informative earnings signal. (Daniel et al. 1998, Barberis et al. 1998, and Bloomfield et al. 2000) Moreover, recent evidence suggests that there is a positive correlation between the degree of uncertainty and the magnitude of under-reaction. (Zhang 2006a and 2006b) Extending this argument, I hypothesize that the PEAD effect would be weakened if the information uncertainty gets at least partially resolved by 10-Q filings. I examine this prediction in two ways. First, I estimate and compare the price drifts in a time-series setting, and find that the drift in the pre-filing period is much more strongly related to the earnings surprise than that in the post-filing period. Moreover, I find that the abnormal trading activity, which is my proxy for the noisiness of preliminary earnings announcement, is positively correlated with the pre-filing drift, but uncorrelated with the post-filing drift. In addition to the time-series test, I also perform a cross-sectional test, in which I expand my sample to include firms that do not pre-announce earnings¹ and find that the PEAD effect is less pronounced for these firms than those that make preliminary earnings announcements. Collectively, these results are supportive of the joint hypothesis that PEAD is caused by investors' under-reaction to noisy earnings news and that investors use 10-Q filings to resolve the information uncertainty associated with preliminary announcements.

¹ For these firms, earnings and other results are in effect first made public through 10-Q or 10-QSB (small business version of 10-Q) filings.

My study makes several contributions to the literature. First, while extant evidence of increased return volatility around 10-Q filings has seemingly addressed the issue of *whether* these filings are informative to investors,² the more interesting question of *what* information content the 10-Q filings have remain unanswered. A likely reason for this void in literature is the difficulty for researchers to construct an empirical summary measure for the “new” information in 10-Q filings, particularly when some of the key contents, such as earnings and accruals, have been pre-announced. Some recent attempts towards addressing this issue have centered on examining the “accruals news” in 10-Q filings by singling out firms that do not provide accrual information through preliminary earnings announcements. (e.g. Balsam et al. 2002, Callen et al. 2006) In contrast to these studies, I adopt a new approach based on disclosure theories and properties of PEAD, which allows us to investigate the general role of 10-Q information in the capital markets. My results suggest that 10-Q filings are used by investors as important complements to preliminary earnings announcements.

Second, this paper also speaks to studies examining the relation between competing information events. There exists some incongruence between analytical predictions and empirical results in this line of research. For example, theoretical models of disclosure show that the disclosure’s informativeness should be inversely related to the informativeness of pre-disclosure information. (e.g. Kim and Verrecchia 1997) Francis, Schipper, and Vincent (2002) examine this prediction in the context of analyst reports versus preliminary earnings announcements, but find little support for

² It is worth noting that even this “established” finding may be cast into question as a result of mounting evidence of potential inefficiency of prices and irrationality of investors’ trading behavior. For example, Barber and Odean (2004), and Hirshleifer et al. (2003) report that individual investors tend to be net buyers of stocks in news, regardless of whether the news is positive or negative in nature. Therefore, whether the abnormal price changes associated with 10-Q filings are results of investors obtaining value relevant information or are simply due to the noisy trading by naïve investors remains a debatable issue.

it.³ In the current study, I revisit this issue using the context of preliminary earnings announcements versus 10-Q filings. These two events provide a natural experiment setting for testing the models, as they are temporally aligned, homogeneous in content, and issued by the same party. Therefore, my findings, which are consistent with the theoretical predictions, raise the possibility that the exact relation between competing information events may be sensitive to the specific events examined and empirical proxies employed by researchers.

Finally, although in a less direct manner, this study also contributes to the PEAD literature by providing new empirical evidence in support of the hypotheses that PEAD results from investors' under-reaction to the earnings signals that are noisy and associated with high uncertainty.

The rest of this paper proceeds as follows. Section II briefly reviews related literature and develop my hypotheses. Data and methodology are discussed in section III, and empirical results are presented in section IV. The last section concludes.

2. Literature review and development of hypotheses

2.1 Informativeness of SEC filings

Prior research of market reactions to SEC filings have mostly focused on examining 10-Q and 10-K reports, and can be chronologically classified into two groups with the introduction of EDGAR (electronic data gathering, analysis, and retrieval) system by SEC as the cutoff point.⁴ Studies from different periods often report different results as well. The pre-EDGAR studies generally find only limited

³ In their study, Francis et al. find mixed evidence about the correlation between the informativeness of analyst reports and firm earnings announcements, although the results tilt more towards a positive correlation. Hence, the authors conclude that "... the question of the exact relation between market reactions to earnings announcements and analyst reports, and the related question of the underlying causes of that relation, remain unsettled". (P. 317)

⁴ Please see Griffin (2003) for detailed descriptions of the EDGAR system.

market reactions surrounding filing dates. For example, Stice (1991) examines 342 firm-quarter observations for which the SEC filings dates precede Wall Street Journal earnings announcements dates, and finds no significant market reaction for these filing dates, despite the apparent timeliness advantage. Easton and Zmijewski (1993), who examine a much larger sample of SEC filings, also find no significant market reaction around filing dates except for the firm-quarters that no earnings announcement dates are available on COMPUSTAT. Therefore, these results suggest that investors seemingly do not use information contained in SEC filings efficiently. In contrast, many recent studies find that investors' reaction to 10-K/Q filings has increased as the pre-EDGAR paper filing systems were replaced by the electronic filing system. A representative study is Griffin (2003), who directly retrieves the filing dates from the EDGAR website, and finds significant abnormal returns around 10-Q/K filing dates. The inconsistent results from these two groups of studies may be explained by two factors. First, since the earlier pre-EDGAR studies mostly use a handful of manually collected observations, the tests may lack statistical power due to limited sample size. In contrast, the more recent studies take advantage of the readily machine-readable data provided by the EDGAR system, and hence are able to examine a larger sample of filing events. Second, as argued by Griffin (2003), in the pre-EDGAR era, immediate access to the filing reports "was costly and often required a visit to the SEC's reading room in Washington DC". Therefore, during that period the date when 10-Q/Ks were filed may not be the exact time when the information contained in these reports become publicly available. As a result, it is often difficult for researchers to accurately locate the "event date". For this reason, the failure to find statistically significant abnormal returns may be caused by the "errors-in-variable" problem.

While increased return volatilities around 10-Q filing dates have been found by many recent studies, the value relevance of 10-Q information to investors remains a less examined issue. In particular, since most firms pre-announce their quarterly results before filing 10-Q forms with the SEC, much of the critical financial information, such as earnings and sales, should have already been incorporated into prices before the 10-Q filings are made. The “new” information in 10-Q filings, such as the MD&A section, undoubtedly should also be of importance for investors. However, researchers interested in investigating the value relevance of this information are often encountered with the difficulty to appropriately quantify the information, which tends to be highly qualitative.

In this study, I employ a new research design to examine the value relevance of 10-Q information. In particular, I perform two groups of tests to examine whether 10-Q filings provide information that help investors resolve the uncertainty left by preliminary announcements.

Preliminary earnings announcements are made voluntarily and unregulated in terms of content and format, and as a result the quality of information from these disclosures varies greatly across firms. For example, Chen et al. (2002) find only 37% of the 23,086 quarterly earnings announcements they examined include a balance sheet, while in a more recent study, Li et al. (2005) shows that of the 13,705 quarterly earnings announcements press releases in their sample, only 6,422 (47%) contains complete balance sheet information. It is well known from both practice and academic research that information from balance sheet and statement of cash flow is important for equity valuation. (e.g. Sloan 1996) Therefore, not being able to know such information, investors still face great amount of information uncertainty even after the earnings results are released. In contrast to preliminary announcements, the contents

and presentation formats of the information that firms must include in 10-Q filings are highly regulated and standardized under the same reporting regime. To the extent that information disclosed via preliminary earnings announcements varies across firms, the “new” information contained in 10-Q filings should also exhibit significant cross-sectional variation. In other words, 10-Q filings should serve as important complementary information sources for investors seeing uncertainty with pre-announced earnings.

Theory suggests that Bayesian investors’ reaction to new information in 10-Q filings should be a negative function of the quality (precision) of pre-filing information. (see Kim and Verrecchia 1997, for example) This is not contra-intuitive: the noisier the information (the lower the quality of information) made available at the preliminary announcements, the more useful investors should find ensuing 10-Q filings. Building on this maintained relation, it follows immediately that the value relevance of 10-Q information should be conditional on the informativeness of pre-announced earnings news, given that investors are able to price the information rationally. This forms my first test of the value relevance of 10-Q filings. My empirical proxies for the quality of pre-announced information are derived from trading volumes and price changes, which will be detailed in the following sub-sections.

2.2 Trading Volume, Information Uncertainty, and Earnings Announcement

It has been documented by a large volume of empirical studies that trading volume tends to increase sharply around both annual and quarterly earnings announcement dates. (e.g. Beaver 1968, Bamber 1986, 1987) This observation is somewhat puzzling to researchers because it is common belief that non-liquidity

trading only occurs when there are disagreements among investors, while earnings announcements are supposed to reduce, rather than increase, such disagreements by disclosing more information. Various theoretical models have been developed to explain the excess trading activity of market participants in response to the earnings disclosures.⁵ (Holthausen and Verrecchia 1990, Kim and Verrecchia 1991, 1994, 1997, and Kandel and Pearson 1995) According to the specific assumption made about investors' endowment and procurement of information, most of these models can be classified into two categories. The first group of studies, which includes Kim and Verrecchia (1991a, b), Demski and Feltham (1994), and many others, assumes investors are diversely informed about the pending disclosure, and the trading triggered by the disclosure is mainly attributed to the heterogeneous pre-disclosure information possessed by investors. The second group of studies, which includes Holthausen and Verrecchia (1990), Kim and Verrecchia (1994), make different assumptions. In particular, these studies assume investors hold homogeneous pre-disclosure beliefs, but interpret the disclosed information differently. As a result, investors will trade at announcements because they obtain heterogeneous information in conjunction with the disclosure. Since these two types of models each capture one particular characteristic of investors in isolation of the others, they are unlikely to be descriptive of the real market environments. A comprehensive model of trading at earnings announcements that incorporate both features is created by Kim and Verrecchia (1997), who decompose the total discretionary trading volume into three elements according to the sources that have caused the trading⁶ In their model, the first reason why heterogeneous investors adjust their net demands for the disclosing company's share is because they hold different private beliefs about the stock's value

⁵ Please see Verrecchia (2001) for an extensive survey and excellent delineation of these models.

⁶ Please see Barron et al. (2005) for a more detailed discussion about the three sources of information that trigger trading around earnings announcements.

prior to the announcement. Second, the model shows that another portion of trading can be explained by the consensus information disclosed in the announcement. This type of information is labeled “consensus” because it is indicative of firm value and investors hold few or no disagreements about its implications. A third source of information that triggers trading, which is also the focus of this study, is the “private” information that investors obtained from the announcement. The model defines these “private information” as investors’ differential interpretations of the same earnings news released via earnings announcements. Because it is a maintained assumption in the model that the released earnings information is only a noisy signal about the firms’ liquidating value, investors with heterogeneous private knowledge tend to disagree on the implication of the signal and hence trade on their own interpretations. In other words, it is the information uncertainty of the released earnings news that triggers the third type of trading in the Kim and Verrecchia (1997) model. Consistent with the model’s prediction, many empirical studies have found that the information asymmetry among investors tend to increase, rather than decrease, after earnings announcements, even though more information has become publicly available. For example, Krinsky and Lee (1997) investigate the behavior of bid-ask spreads surrounding earnings announcements and find that the adverse selection component of bid-ask spread usually increase, suggesting that the earnings announcements result in higher information asymmetry. In addition, other studies that directly examine the behavior of trading volume at earnings announcements also report significant trading activities triggered by investors’ heterogeneous interpretations of earnings news. Ziebart (1990) is among the first studies that associate investors’ trading activity at earnings announcements with changes of opinion about firm value. Using analysts’ consensus forecasts as proxy for investors’ belief, this study documents a positive

relation between the two variables, suggesting that investors' trading activity is a positive function of their belief changes. Bamber et al. (1997) examine three aspects of disagreements among investors at earnings announcements, namely dispersion in prior beliefs, change in dispersion, and belief jumbling, and find that all three are associated with investors trading decisions. Utama and Cready (1997) use institutional ownership as proxy for investor heterogeneity and also find a significant relation between opinion divergence and trading volume at earnings announcements. Barron et al. (2005) employ the methodology developed in Barron et al. (1998) to estimate the private information analysts obtained through earnings announcements, and show that the private information is positively related to the trading activities at earnings announcements.

Following this research, some recent studies use the abnormal trading volume around earnings announcements as an empirical measure for the information uncertainty of the earnings news. For example, Garfinkel and Sokobin (2006) use the abnormal turnover unexplained by price change at earnings announcement to measure the investors' opinion divergence, and find that the post-announcement cumulative returns are positively related to the opinion divergence. They conclude that their findings can be explained by a risk-based theory that the divergence of investors' opinion suggests the firm has higher informational risk, and thus is expected to return more to the investors for them to bear such additional risk.

In view of the strong theoretical foundation and empirical evidence, I follow prior literature and employ investors' trading activity to derive my first measure of information quality. I do so also because the research question examined here fits in well with the settings in the typical "association-based disclosure" models (Verrecchia

2001), and therefore draws more relevance from the empirical implications of these models.

Prior research has proposed different methods to estimate “abnormal” trading volumes. I use two of them as measures for information uncertainty around preliminary earnings announcements. The first measure is based on Tkac (1999), who proposes a model for trading volume benchmark and suggests that abnormal trading for a stock can be estimated by adjusting the stock’s raw trading volume by the concurrent market-wide trading volume. Among various measures of trading activity that have been used in prior studies (such as dollar volume, share volume, turnover, etc), I choose turnover, which is calculated as trading volume divided by shares outstanding. As such, this variable, abnormal turnover (ATOVER), is calculated by the following equation:

$$ATOVER = 0.5 \times \sum_{t=0,1} \left[\left(\frac{Vol}{Shrout} \right)_{firm} - \left(\frac{Vol}{Shrout} \right)_{mkt} \right] \quad (1)$$

In equation (1), VOL and SHROUT denote the daily trading volume and total shares outstanding, respectively. The market turnover in equation (1) is the equal-weighted average turnover of all stocks listed on NYSE and AMEX. The abnormal turnover for a firm is thus calculated as the firm’s average daily excess turnover around the earnings announcement window $[0,1]$ ⁷, where day 0 is COMPUSTAT earnings announcement date.

The second measure of information uncertainty is the unexpected turnover (UTOVER), which is calculated by the following procedure.⁸ I first estimate the

⁷ I include day 1 in the event window because when the earnings is released after market close, the “event” day is actually the next trading day.

⁸ My measure is similar to the SUT variable used in Garfinkel and Sokobin (2006), but differs from theirs in three important aspects. First, I use turnover while they use raw volume. Second, they standardize their variable while I do not. Third, their estimation window is $[-54, -5]$, ten days longer than ours.

following model of absolute daily return and turnover over the estimation window [-44,-5] for each firm-quarter:

$$Turnover = \alpha + \beta \cdot |RET^+| + \gamma \cdot |RET^-| + \varepsilon \quad (2)$$

where TURNOVER denotes the daily turnover. $|RET^{+(-)}|$ measure the absolute value of positive (negative) return, and is set equal to zero if the return is negative (positive).

The coefficients for positive returns and negative returns are allowed to be different in the model because prior research suggests that the relationship between price change and volume is non-linear. (Karpoff 1987)

The parameter estimates from model (2) are then used to calculate the expected turnover for the event window [0,1]. Unexpected turnover (UTOVER) is defined as the difference between actual turnover and forecasted turnover at preliminary earnings announcements.

$$UTOVER = 0.5 \times (Turnover_{[0,1]} - E[Turnover]_{[0,1]}) \quad (3a)$$

where $E[Turnover] = \hat{\alpha} + \hat{\beta} \cdot |RET^+| + \hat{\gamma} \cdot |RET^-|$ (3b)

In equations (3a) and (3b), $E[Turnover]$ denotes the expected turnover, and $|RET^{+(-)}|$ is as defined in equation (2).

It is important to note that both of these two variables (*ATOVER* and *UTOVER*) are inverse measures of the quality of preliminary earnings information, and hence should be positively correlated with investors' reaction to 10-Q filings. Formally, my first set of hypotheses is stated as follows:

Hypothesis 1a: The market reaction to subsequent 10-Q filings will be positively correlated with abnormal turnover (*ATOVER*) at preliminary earnings announcements.

Hypothesis 1b: The market reaction to subsequent 10-Q filings will be positively correlated with unexpected turnover (UTOVER) at preliminary earnings announcements.

2.2 Market reaction to preliminary earnings announcements and 10-Q filing

Prior studies mostly use unsigned abnormal return to measure the informativeness of disclosure events. For example, Easton and Zmijewski (1993) use squared abnormal return, and Griffin (2003) use absolute value of excess returns to measure the market's reaction to 10-Q/K filings. Francis et al. (2002) use absolute value of beta-adjusted returns to measure the informativeness of preliminary earnings announcements and analyst reports. Following the literature, I use the absolute value of beta-adjusted excess return on the event day as proxy for the information content that investors receive from 10-Q filings.⁹

The variable is calculated by the following equation:

$$AXRET_F = \underset{t=0}{\overset{4}{Max}}(|XRET_t|) \quad (4)$$

In addition, I also calculate a similar variable for investors' reaction to preliminary earnings announcements, which will be used together with abnormal trading volume to assess the informativeness of pre-announced earnings news.

$$AXRET_E = \underset{t=-1}{\overset{1}{Max}}(|XRET_t|) \quad (5)$$

In equation (4) and (5), $XRET_t$ is the beta-adjusted excess return on CRSP daily file, and $AXRET_E$ and $AXRET_F$ denote the market's reactions to preliminary earnings announcements and 10-Q filings, respectively. Due to reasons such as information leakage and recording delay in databases, I follow Francis et al. (2002) to use the maximum value from a short window surrounding the event to pinpoint the accurate

⁹ I choose absolute return over squared return because of the econometric concerns raised by prior studies regarding use of squared returns. (e.g. Marai (1984) and Rohrbach and Chandra (1989))

event day. For preliminary earnings announcements, I use a three-day window centering on COMPUSTAT earnings announcement date. For 10-Q filings, I use a longer 5-day event window [0, 4] (day 0 is the filing day) because I expect it takes longer time for the investors to digest the hundreds of pages of information in the 10-Q reports.¹⁰ Prior research finds clustering of analysts forecast revisions in the few days immediately following preliminary earnings announcements. (Cotter et al. 2006) In order to minimize its contamination effect on my estimates of investors' reaction to 10-Q filings, I require there must be at least 10 trading days between a firm's preliminary earnings announcement and 10-Q filing date for the same fiscal quarter. Figure 1 illustrates the timeline of the reporting events for a firm-quarter observation in my sample.

<Please insert Figure 1 about here>

Since $AXRET_E$ is directly related to the information content of preliminary earnings announcements, I expect to see a negative correlation between this variable and my measure of market's reaction to 10-Q filings, $AXRET_F$.

Hypothesis 2: The market reaction to subsequent 10-Q filings ($AXRET_F$) will be negatively correlated with the market reaction to preliminary earnings announcements ($AXRET_E$).

2.3 Post-earnings announcement drift

Post-earnings announcement drift (PEAD) refers to the puzzling pattern that after earnings announcements, stock prices tend to move in the same direction as the earnings news. Since first reported in the seminal study by Ball and Brown (1968), the PEAD has survived various robustness tests, such as using different expected return model specifications and samples from different periods. (e.g. Foster et al. 1984,

¹⁰ Asthana et al. (2004) use a 4-day window [-1,3], probably for a similar concern.

Livnat and Mendenhall 2005) Researchers have attempted to find a rational, economic explanation for the drift but with little success. For example, Ball et al. (1988) examine whether inadequate adjustment of systematic risk explains the PEAD anomaly. They find that the estimated beta tend to shift upwards after announcements of positive earnings news, and downwards after negative earnings news. However, as pointed out by Bernard and Thomas (1989), the shifts in beta are too small in magnitude to entirely explain away the drift. Bhushan (1993) tests the hypothesis that transaction costs impede the process of price discovery at earnings announcements and finds that the PEAD effect tends to be stronger for firms with high transaction costs. In a summary of these studies, Kothari (2001) argues that the PEAD is unlikely due to market imperfections such as transaction costs or methodological issues such as mismeasurement of risk, and cannot be subsumed by other well-known market anomalies. Hence, he concludes that the PEAD anomaly “poses a serious challenge to the efficient markets hypothesis”. While the earlier efforts to rationalize PEAD have been unsuccessful, more recent studies have reported mounting evidence which suggests that PEAD results from investors’ under-reaction to earnings news. This proposition is first examined by Bernard and Thomas (1989, 1990). They find that the bulk of abnormal returns from a PEAD strategy are earned during the short windows surrounding subsequent earnings announcements, which suggests investors fail to understand the implications of current earnings for future earnings. Later studies, including Ball and Bartov (1996), Burstahler et al. (1999), and Soffer and Lys (1999) all report findings consistent with the under-reaction explanation. Recent research has proposed behavioral models based on cognitive psychology theory to explain why investors under-react to earnings news. Barberis et al. (1998) model investors’ behavior in response to the earnings news. In their model, the non-Bayesian investors

underreact to the news because they believe the earnings series are in a mean-reverting regime and therefore are too conservative to rationally update their prior beliefs. Daniel et al. (1998) analyze different behavioral biases than Barberis et al. (1998), but come to similar predictions. In their model, investors are subject to overconfidence and self-attribution bias, which means they tend to overweight private information and underweight public information. As a result, they under-react to earnings news if the news contradicts with their prior beliefs. In a laboratory setting, Bloomfield et al. (2000) show that under-reaction to earnings news can also occur when the reliability of the news is uncertain and investors have “moderated confidence”.

Most of the behavioral models of investors’ under-reaction to earnings news share the common assumption that the earnings information itself is only a noisy signal of firms’ liquidating value. In other words, after the disclosure of earnings, investors still face a great amount of information uncertainty about the stock’s intrinsic value. More interestingly, it has recently been documented by empirical research that the magnitude of investors’ under-reaction, as reflected by the short-term price continuation, is a positive function of the degree of information uncertainty. (Zhang 2006a and 2006b) When generalized to the PEAD effect, this finding suggests that the post-announcement drift will be stronger for earnings announcements that are associated with more uncertainty and less informative to investors.

I employ this property of PEAD to construct a second test of the value relevance of 10-Q information. Specifically, if 10-Q filings are useful for investors to resolve the information uncertainty left by preliminary earnings announcements, the following results should be observed. For firms that make preliminary announcements of earnings before filing 10-Q, if I divide the entire post-announcement period into

two sub-periods with the date of 10-Q filing as cutoff, I expect that the price drift should be stronger in the pre-filing period than in the post-filing period. I follow prior studies to use the magnitude of correlation between post-announcement abnormal return and unexpected earnings to measure the strength of PEAD, and accordingly, my hypotheses are formally stated as follows.

Hypothesis 3: The positive correlation between abnormal returns (the drift) and unexpected earnings will be stronger for the pre-filing period than the post-filing period.

I note, however, that while the weakened PEAD in the post-filing sub-period is consistent with my hypothesis that 10-Q filings resolve information uncertainty, it is also consistent with an alternative explanation that PEAD becomes weaker simply due to the passage of time. In order to rule out the alternative explanation and increase the power of my test, I also test a cross-sectional version of my hypothesis as a complement to the time-series version stated in Hypothesis 3. Specifically, I expand my sample to include firms that do not make preliminary announcements of earnings before filing 10-Q. Since for these firms the earnings and other quarterly financial results are in effect first made public through 10-Q filings, I predict that PEAD for these firms will be weaker than firms that make preliminary announcements, given that 10-Q filings contain a more complete set of information and leave investors with less information uncertainty.

Hypothesis 4: The positive association between abnormal returns (the drift) and unexpected earnings will be stronger for firms that make preliminary earnings announcements than the firms that do not.

3. Data and variables

3.1 10-Q Filings

I retrieve the master index files of all company filings from SEC's EDGAR website http://www.sec.gov/cgi-bin/edgar_archive_indices. The variables contained in the master index file are CIK (Central Index Key, EDGAR's unique identification for filing companies), Company Name, Form Type, Date Filed, and Filename (location of the file in the system). Because the electronic filing became mandatory in 1996, I select all 10-Q's and 10-QSB's¹¹ that were filed through EDGAR between January 1, 1996 and December 31, 2004, which form my initial sample of 318,300 10-Q filings. The 10-Q filings data are then merged with the 2005 COMPUSTAT quarterly file. Since the master index files from EDGAR neither use CUSIP for company identification nor explicitly indicate the fiscal periods to which each of the 10-Q filings applies, I take the following procedures to match each of the firm-filing observations in my 10-Q sample with the corresponding firm-quarter observations in the COMPUSTAT file.

- (1) Because Standard & Poor's uses abbreviations when necessary to limit the length of company names to 28 characters in COMPUSTAT, I first transform the company names in my 10-Q filings sample using the abbreviations provided by Standard & Poor's CUSIP Directory¹² to make them consistent with the company names in COMPUSTAT.
- (2) For each firm-quarter observation in COMPUSTAT file, I look for the corresponding firm-filing observation in my 10-Q sample that is matched by transformed company name and has a filing date falling between the current fiscal quarter end and next fiscal quarter end. For example, if a firm's current

¹¹ For brevity, I use 10-Q to refer to my sample of both 10-Q and 10-QSB filings.

¹² The CUSIP abbreviation table can be downloaded free of charge at http://www.cusip.com/NASApp/cusipweb/com/sp/apps/cusipaccess/html/whats.html?GXHC_JSESSIONID=4f144030d66518b4&#abv

fiscal quarter ends on June 30, 2001, then the matched 10-Q for that firm-quarter must be filed between June 30, 2001 and September 30, 2001. For the rare cases that more than one firm-filing satisfy this criterion, the entire firm-quarter observation will be dropped from my sample.¹³ Also, the preliminary earnings announcement date must not be missing from COMPUSTAT file.

By following the above steps, I expect to maximize the accuracy of matching while minimizing data loss. The COMPUSTAT-matched sample consists of 83,023 firm-quarter observations. It is then merged with CRSP conditioned on meeting the following selection criteria:

- (1) To be consistent with prior empirical studies on trading volume (e.g. Garfinkel and Sokobin 2006), I include only firms with a primary listing on NYSE and AMEX. This is because reported trading volume for NASDAQ listed firms may be inaccurate. (e.g. Anderson and Dyl 2005)
- (2) I exclude close-end funds, Real Estate Investment Trusts, American Depository Receipts and foreign stocks, because these securities' trading may differ from that of common shares. As a result, I only use stocks with CRSP share code 10 or 11.
- (3) In order to isolate the market reactions to 10-Q filings from the impact of other events such as preliminary earnings announcements and analyst forecast revisions, I require there must be at least 10 trading days between the preliminary earnings announcement date and the subsequent 10-Q filing date.

¹³ This procedure also ensures that cases of partial filings are excluded from my sample.

- (4) For all the remaining firm-quarter observations, returns, trading volume, and shares outstanding data must not be missing from CRSP daily stock file.

Table 1 provides a reconciliation of the initial sample and the final sample. The final sample consists of 17,381 firm-quarter observations spanning from 1996 to 2004. Figure 2 depicts the temporal distribution of the observations in the sample.

<Please insert Table 1 and Figure 2 about here >

3.4 Other variables

The definitions and calculations of all the other variables used in my empirical tests are listed below.

Cumulative Pre-filing Drift ($CXRET_PRE$): the cumulative beta-adjusted excess return from one day after preliminary earnings announcement to one day before 10-Q filing date.

Daily Pre-filing Drift ($DXRET_PRE$): the average daily drift during the pre-filing period, which is calculated as $CXRET_PRE$ divided by the number of days cumulated.

Cumulative Post-filing Drift ($CXRET_POST$): the cumulative beta-adjusted excess return from five days after 10-Q filing date till one day before next preliminary earnings announcement date.

Post-filing Daily Drift ($DXRET_POST$): the average daily drift during the post-filing period, which is calculated as $CXRET_POST$ divided by the number of days cumulated.

Size (MV): the firm's market value as of the end of the last month before earnings announcement.

Standardized Unexpected Earnings (SUE): For observations with available analyst forecast data, SUE is calculated as the difference between actual EPS and the mean of

analyst EPS forecast, both from Unadjusted I/B/E/S Summary File, and scaled by the closing stock price of last month end. For observations that analyst forecasts data are unavailable, SUE is calculated by a simple seasonal random walk model, i.e. the current quarter income before extraordinary items (COMPUSTAT quarterly data item #8) less the same measure for the same quarter in the previous year, and scaled by *MV*.

AXRET_ALL: average daily absolute beta-adjusted excess return over the entire quarter. I define the quarter as starting with COMPUSTAT earnings announcement day for current fiscal quarter and ending with one day before next earnings announcement date. The variable is calculated as $AXRET_ALL = \frac{1}{n} \times \sum_{t=1}^n |AXRET_t|$.

AXRET_STD: the standard deviation of daily absolute beta-adjusted excess return over the entire quarter, where the quarter is defined the same as in *AXRET_ALL*.

Book-to-market ratio (*BTM*): the firm's book value of equity as of last fiscal year end divided by the firm's market value of equity as of last calendar year end.

DRIFT_N: cumulative size-adjusted daily return over the n-day period after earnings announcement.

4. Results

4.1 Summary statistics and correlations

Table 2 presents descriptive statistics of the sample. The mean (median) market capitalization of my sample firm is 6.18 (1.06) billion, which is larger than the average firms on CRSP file. This is not unexpected, however, because I select firms listed on NYSE and AMEX only, and thus exclude many mini-cap firms on NASDAQ. Another reason may be that by construction, the firms in my sample all pre-announce quarterly results before filing 10-Q with SEC, which is typically

practiced by relatively large companies. Notwithstanding the relatively larger firm size, the mean book-to-market ratio for my sample is in general comparable to that of the CRSP population.

The mean (median) market reaction to 10-Q filings, measured by absolute abnormal returns on the filing date, is 3.28% (2.51%). However, both the mean and median values are less than their counterparts for preliminary earnings announcements, which on average move stock prices by 4.52% (median 3.19%). Therefore, even though the informativeness of 10-Q filings has increased in recent years, they are still eclipsed by the more timely preliminary earnings announcements.

My first measure of information uncertainty, UTOVER, has a mean of 0.26%, which is significantly different from 0. Similar results are also obtained for the other measure, ATOVER, which has mean 0.3%. These results are consistent with many prior studies which find that 1) trading volume usually increases around earnings announcements (e.g. Bamber 1986, 1987) and 2) preliminary earnings announcements leave investors with considerable amount of uncertainty about the firm value (e.g. Barron et al. 2005).

Finally, it is interesting to note from Table 1 that the mean cumulative beta-adjusted return in the pre-filing period is much higher than that in the post-filing period (0.32% versus -1.17%). Also, this result is not due to a difference in the number of days of return-accumulation for the two periods, as the same result obtains with the daily figure. If post-announcement expected returns reflect information risk, as argued by Garfinkel and Sokobin (2006), then these rudimentary results suggest information risk is reduced after the filing of 10-Q, which is consistent with my main hypothesis.

<Please insert Table 2 here>

Table 3 reports the correlations between the key variables, with Pearson correlations in the upper triangle and Spearman correlations in the lower triangle of the table. Not surprisingly, the two abnormal trading activity proxies are highly correlated (the Pearson correlation between *UTOVER* and *ATOVER* is 0.88). In addition, both of the two information quality measures are positively correlated with the proxy for market's reaction to 10-Q filings, *AXRET_F*, and the correlations are all statistically significant at 1% level. This is consistent with the Hypothesis 1, which predicts that high information uncertainty at preliminary earnings announcements will lead to stronger market reactions to subsequent 10-Q filings. It can also be seen that market reactions to the two information events, preliminary earnings announcement and 10-Q filing, are positively and significantly correlated. At first glance, this finding suggests these two competing information events do not substitute each other, which contradicts with my hypothesis. However, in the later analyses I will show that this result is in fact spurious because of the absence of important control variables.

<Please insert Table 3 here>

To summarize, the results from the descriptive statistics and simple correlations provide only preliminary evidence on investors' use of 10-Q filings and how it is influenced by the quality of pre-announced earnings information. In the next section, I report results of more rigorous tests of my hypotheses using regression analyses.

4.2 Regression Analyses

4.2.1 Information uncertainty and 10-Q filings

Hypotheses 1 and 2 state that market reactions to 10-Q filings should be positively correlated with the abnormal trading volume, but negatively correlated with the abnormal price changes in response to preliminary earnings announcements. I run the following regressions to test whether this prediction is supported by my sample data.

$$AXRET_F = \beta_0 + \beta_1 \cdot UTOVER + \beta_2 \cdot AXRET_E + \beta_3 \cdot AXRET_ALL + \beta_4 \cdot AXRET_STD + \varepsilon \quad (6)$$

$$AXRET_F = \beta_0 + \beta_1 \cdot ATOVER + \beta_2 \cdot AXRET_E + \beta_3 \cdot AXRET_ALL + \beta_4 \cdot AXRET_STD + \varepsilon \quad (7)$$

Equation (6) and (7) only differ in the proxy variable for information uncertainty (*UTOVER* and *ATOVER*). In addition to the two key variables of interest, *UTOVER* and *AXRET_E*, I also include two control variables *AXRET_ALL* and *AXRET_STD* to filter out the impact of firm-quarter specific variations in return volatility that may affect the estimation of correlation between the key variables. This procedure is critical because as Table 2 shows, all of the dependent variable and explanatory variables are highly correlated with the control variables. Hence, failing to control for these effects would result in a classic omitted variable problem and produce spurious correlation between key variables.¹⁴ The estimation results of regression (6) are given in Panel A of Table 4. The left panel reports the parameter estimates and their associated t-statistics from a pooled sample regression, which shows that the coefficient on *UTOVER* is positive, the coefficient on *AXRET_E* is negative, and both are different from zero at high significance levels. It also shows that model (6) is reasonably well fitted, as it explains more than 34% of the variations of dependent variable, *AXRET_F*, and has an intercept statistically indistinguishable from zero. The right panel presents results using a Fama and Macbeth (1973) procedure, which produces standard error estimates that are robust to cross-sectional correlation of observations. Specifically, I run cross-sectional regressions of equation (6) every year, and use the equal-weighted average of these yearly estimates to compute the parameter estimates and associated t-statistics. The results are generally comparable

¹⁴ Francis et al. (2002) use similar control variables.

to those reported in the left panel, except for a little weakening of statistical significance for the variable *UTOVER*, which is now significant at 5% level.

Panel B of Table 4 presents estimation results for equation (7), which uses abnormal turnover (*ATOVER*) as the information uncertainty proxy. In Panel B, both pooled regression results and Fama-Macbeth results generally mirror what I have seen in Panel A, except that when using Fama-Macbeth approach, the coefficient on *ATOVER* loses its statistical significance, even though the sign remains correct. I suspect this could be due to the way this variable (*ATOVER*) is constructed. Recall that *UTOVER* captures the unexpected trading triggered by the divergence of opinion among investors after the preliminary earnings results are released, while *ATOVER* is a measure of the overall abnormal trading triggered by the announcement. The difference between these two variables suggests that *UTOVER* should be a more accurate measure of information uncertainty than *ATOVER*. Therefore, if the stronger market reactions around 10-Q filing dates partially result from investors seeking value-relevant information from 10-Q reports when they have uncertainty about firm value, then I should not be surprised to see that *UTOVER* turns out to be more strongly correlated with *AXRET_F* than *ATOVER*.¹⁵

To summarize, the results reported in this section are consistent with the predictions of hypothesis 1 and 2. Investors' reactions to 10-Q filings are strongly related to the informativeness of preliminary earnings announcements that precede the

¹⁵ As robustness check, I also select three other control variables that are likely to affect market reactions to 10-Q filings. Firm size and analyst coverage are used to control for the firm's information environment, based on the argument that investors will be less reliant on SEC filings to become informed if the firm has a high-quality information environment. They are measured by the market capitalization as of current fiscal quarter end and the number of analysts issuing one-year-ahead earnings forecast, respectively, and the coefficients on both variables are expected to be negative. I also include the variable *YEAR* to control for the year effect, as Griffin (2003) finds that investors' reaction to 10-Q/K filings displays a monotonically increasing trend in recent years. The variable is calculated as the calendar year of the observation less 1996 and is expected to have a positive coefficient. However, I found that adding the control variables has virtually no impact on the existing variables in the model, and none of them are statistically significant.

10-Q filings. Moreover, the estimated correlations are all in the same direction as suggested by analytical research, that investors would react to 10-Q filings more strongly if the pre-announced earnings are less informative and associated with higher uncertainty. Therefore, these observations suggest that the 10-Q information is value-relevant to investors in that it helps resolve the uncertainty left by preliminary earnings announcements. In the next section, I revisit this issue using a different research design, and see if the results obtained here are robust to alternative testing procedures.

<Please insert Table 4 here>

4.2.2 Post-earnings announcement drift and 10-Q filings

Building upon the under-reaction theory from the behavioral finance literature, Hypothesis 3 states that if investors efficiently use 10-Q filings to resolve the information uncertainty about the firm value, then the drift in the post-filing period would be less significant than that in the pre-filing period. Following prior PEAD studies, I measure the strength of the drift by estimating the correlation between standardized unexpected earnings (SUE) and excess returns in the post-announcement period. I test Hypothesis 3 by dividing the entire post-announcement drift into pre-filing drift and post-filing drift and estimating the following regressions for each period separately:

$$DXRET_PRE = \beta_0 + \beta_1 \cdot SUE + \beta_2 \cdot UTOVER + \beta_3 \cdot SUE \cdot UTOVER + \beta_4 \cdot SUE \cdot MV + \varepsilon \quad (8)$$

$$DXRET_POST = \beta_0 + \beta_1 \cdot SUE + \beta_2 \cdot UTOVER + \beta_3 \cdot SUE \cdot UTOVER + \beta_4 \cdot SUE \cdot MV + \varepsilon \quad (9)$$

In equation (8), the dependent variable $DXRET_PRE$ is the average daily beta-adjusted return in the pre-filing period. I use average instead of cumulative daily excess return because for my sample, the number of days in the pre- and post-filing period are usually not equal, and thus using cumulative returns may incorporate the

undesirable impact of such variations. The independent variables include standardized unexpected earnings (*SUE*), unexpected turnover (*UTOVER*), and two interaction terms between *SUE* and *UTOVER*, and *SUE* and market capitalization (*MV*). I include *UTOVER* because prior studies suggest that the strength of post-earnings announcement drift is related to the information uncertainty of the announcement. (Garfinkel and Sokobin 2006) Firm's market capitalization is included because the PEAD effect is found to be stronger among smaller firms. (Foster et al. 1984) Based on findings from prior literature, I expect the signs on β_1, β_2 , and β_3 to be positive, and that β_4 will enter into the model with a negative sign. Equation (9) models the drift in the post-10-Q filing period, and differs from Equation (8) only in the dependent variable. Before estimating equations (8) and (9), I replace all the explanatory variables with their transformed deciles rankings.¹⁶ Specifically, I rank the variables into deciles for each quarter, and transform the rankings from a range of 0 to 9 to the new range of -0.5 to 0.5 by performing the following calculation:

$$New_Rank = \frac{Old_Rank}{9} - 0.5.$$

As prior literature suggests, using this transformed rankings has two advantages: 1) restrict the impact of outliers and 2) the coefficient on *SUE* can be conveniently interpreted as the arbitrage returns that can be earned based on a *SUE* strategy: long the best earnings news and short the worst earnings news, and thus quantifies the strength of PEAD.

Given equation (8) and (9), the testing of Hypothesis 3 now boils down to comparing the coefficient β_1 , which measures the impact of *SUE* on post-announcement returns, for the pre-filing and post-filing period. If investors use 10-Q information to resolve information uncertainty, then Hypothesis 3 predicts

¹⁶ The interaction terms are thus the product of these transformed rankings.

that $\beta_1_PRE > \beta_1_POST$, that is, the PEAD effect will become weaker after the filing of 10-Q.

The results are presented in Table 5. Again as in Table 4, the left panels give pooled sample results, and the right panels give results using the Fama-Macbeth procedure. As shown in Panel A of Table 5, the results for the pre-filing period are generally in line with prior studies of PEAD. In particular, the coefficient on *SUE* is positive, which confirms the existence of PEAD effect. β_2 is positive, suggesting that post-announcement return tends to be higher if more information uncertainty persists after the announcement, probably reflecting investors' demand for compensation for the higher information risk. The coefficient on the second interaction term, β_4 , is negative, which is also as expected, but not statistically significant.

The results for post-filing period, as reported in Panel B, are markedly different. Although the coefficient on *SUE* remains significantly positive, its estimated value is dramatically smaller than its counterpart in Panel A. (0.043 versus 0.275) This indicates that, despite its persistence into the post-filing period, the PEAD effect become much weaker after 10-Qs are filed, which is consistent with the prediction of Hypothesis 3. It is also interesting to note that in Panel B, the coefficients on *UTOVER* and *SUE*UTOVER* become no longer significantly different from zero. This finding suggests that information uncertainty at preliminary earnings announcement, to the extent being captured by the unexpected shares turnover, has no impact on the returns in the post-filing period. In my view, one likely explanation for this result is that investors obtain useful information from 10-Q filings, which greatly reduces the uncertainty about the pre-announced earnings. This is again in line with what Hypothesis 3 predicts. Finally, comparison of Panel A and B reveals that my model explains a much smaller portion (as much as 87% less) of variation in post-

filing returns than pre-filing returns. Therefore, the “post-earnings announcement drifts” seem to have less to do with the preliminary earnings announcement per se after 10-Q reports are filed.

As discussed earlier, there is a potential concern with the above test. Since by design the post-filing period is further away from preliminary earnings announcements than the pre-filing period, it is possible that the results I obtained so far may simply reflect the effect of passage of time. Even though I am not aware of any published evidence that PEAD becomes weaker with the progression of time, I nonetheless perform another test to address this concern and strengthen the confidence in my results. Specifically, I perform cross-sectional comparisons of PEAD between firms that make preliminary announcements of earnings and those that do not, by estimating the following regression:

$$DRIFT = \beta_0 + \beta_1 \cdot SUE + \beta_2 \cdot SUE * FL + \beta_3 \cdot SUE * MV + \varepsilon \quad (10)$$

In model (9), *DRIFT* is cumulative size-adjusted abnormal return, *SUE* is standardized unexpected earnings, *MV* is the market value of equity, and *FL* is a dummy variable which equals 1 if the firm makes preliminary earnings announcement before filing 10-Q, and equals 0 otherwise. Again like in tests of hypothesis 3, I use the transformed decile-rankings of *SUE* and *MV* to replace the original variables. In equation (9), the coefficient on the interaction term between *SUE* and *FL*, β_2 , captures the impact of preliminary announcements on the strength of PEAD. A positive value of β_2 suggests preliminary earnings announcements causes greater under-reaction, which is consistent with hypothesis 4, and a negative β_2 suggests the converse. I use an expanded sample for estimating equation (9), which consists of 93,222 firm-quarter observations from 1996 to 2004. The greatly increased sample size is mainly

due to less stringent data requirements, as I now only require data to be available for calculating *DRIFT*, *MV*, and *SUE*. The results are presented in Table 6.

Table 6 gives separate results for post-announcement returns that are cumulated over different length of periods, varying from 10 trading days to 60 trading days. We can see that, regardless of the specific period used, the estimates of β_2 are all significantly positive, consistent with the prediction of hypothesis 4 that the PEAD effect will be stronger for firms that pre-announce earnings results. Interestingly, the variation of β_2 estimates suggests that this result seems to be stronger for earlier periods than for later periods, as the coefficient estimate of β_2 for the entire 60-day period is only marginally significant (at 10%), while that for the first 20-day period is highly significant (at 1%). In untabulated analysis, I find that for the sample firms that make preliminary announcements of earnings before filing 10-Q, 95% of them file 10-Q reports within 21 days after preliminary announcements. Consequently, for the later part of the post-announcement periods, the great majority of all sample firms have already filed 10-Q and so there is little cross-sectional variation for *FL*. Therefore, the impact of *FL* should be most pronounced for the earlier period, when there is larger variation for this variable.

5. Conclusion

In this study I investigate the value relevance of 10-Q information using a sample of EDGAR 10-Q filings that are preempted by preliminary earnings announcements. In particular, I perform two groups of tests to examine whether 10-Q filings help investors resolve the information uncertainty left by preliminary earnings announcements.

In the first test, I investigate how investors' reactions to 10-Q filings are influenced by the quality of pre-announced earnings information, using unexpected shares turnover and return volatility as proxies for the informativeness of the preliminary earnings announcements. Consistent with theoretical predictions, I document that investors react to 10-Q filings more strongly when the preliminary announcements are less informative and leave investors with higher uncertainty.

In the second test, I examine the impact of preliminary earnings announcements on the post-earnings announcement price drift (PEAD). I find that the PEAD effect is stronger for firms that make preliminary announcements of earnings than those that do not. In addition, for firms that make preliminary announcements of earnings, the PEAD effect in the pre-filing period is much stronger than the post-filing period. These results are consistent with the joint hypothesis that the PEAD is caused by investors' underreaction to noisy "pre-announced" earnings signals and investors use 10-Q filings to resolve information uncertainty about the earnings signal. Collectively, my results suggest that 10-Q filings are value-relevant and provide investors with important information sources that complement preliminary earnings announcements.

This study makes several contributions to the literature. First, it adds to extant evidence of investors' reaction to 10-Q filings by exploring the specific information content of the 10-Q filings. The results suggest that 10-Q filings are used by investors as important complements to preliminary earnings announcements. Second, this paper examines the relation between competing information events using the context of preliminary earnings announcements versus 10-Q filings. These two events provide a natural experiment setting for testing the models, as they are temporally aligned, homogeneous in content, and issued by the same party. The findings lend strong empirical support to the theoretical predictions. Finally, although in a less direct

manner, this study also contributes to the PEAD literature by providing new empirical evidence in support of the hypotheses that PEAD results from investors' under-reaction to the earnings signals that are noisy and associated with high uncertainty.

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Table 1 Data screening procedures and results

Screening procedures	No. of Obs. Dropped	No. of Obs. Left
Beginning Balance	-	318,300
Matched with COMPUSTAT by company name	183,154	135,146
Non-missing earnings announcement dates in COMPUSTAT and Filings are made after preliminary earnings announcement and within 90 days of fiscal quarter end	52,123	83,023
US common shares (CRSP share code equal to 10 or 11) and Primary listing on NYSE or AMEX	54,717	28,306
At least 10 trading day between COMPUSTAT earnings announcement date and Filing date	9,734	18,572
Non-missing return, trading volume, and shares outstanding data	1,191	17,381
Ending Balance		17,381

Table 2 Descriptive Statistics

Variable	N	Mean	Median	Lower Quartile	Upper Quartile	Std Dev
UTOVER (%)	17381	0.256***	0.066	-0.034	0.306	0.866
ATOVER (%)	17381	0.299***	-0.015	-0.217	0.405	1.203
AXRET_F (%)	17381	3.284	2.513	1.630	3.955	3.083
AXRET_E (%)	17381	4.515	3.193	1.855	5.537	4.533
AXRET_ALL (%)	17381	1.721	1.500	1.109	2.062	0.935
AXRET_STD (%)	17381	1.673	1.391	0.985	2.006	1.151
DXRET_POST (%)	17381	-0.025	-0.027	-0.207	0.158	0.369
DXRET_PRE (%)	17381	0.020	0.001	-0.340	0.356	0.732
SUE (%)	17295	0.009	0.028	-0.055	0.167	6.507
CXRET_POST (%)	17381	-1.166	-1.249	-9.290	7.074	16.776
CXRET_PRE (%)	17381	0.320	0.009	-4.609	4.964	9.689
MV (BIL)	17381	6.181	1.061	0.315	3.514	21.992
BTM	16483	0.652	0.531	0.315	0.817	0.936

The sample consists of 17,381 firm-quarter observations from 1996Q1 through 2004Q3.

AXRET_E is the absolute value of beta-adjusted excess return at preliminary earnings announcement (by COMPUSTAT).

AXRET_F is the absolute value of beta-adjusted excess return at 10-Q filing date (by EDGAR).

AXRET_ALL is the mean of daily absolute beta-adjusted excess return over the entire quarter, where the quarter is defined as beginning from the earnings announcement date for current fiscal quarter and ending the preliminary earnings announcement date for next fiscal quarter. AXRET_STD is the standard deviation of daily absolute beta-adjusted excess return over the entire quarter, where the quarter is defined the same as in AXRET_ALL.

UTOVER is the unexpected turnover at preliminary earnings announcement, which is calculated as the prediction error of a model that regress daily turnover on absolute value of daily price changes.

ATOVER is the abnormal turnover of the firm's shares in excess of market turnover at preliminary earnings announcements.

MV is the market value as of the end of the month before earnings announcement.

BTM is the book-to-market ratio. Book value of equity is as of last fiscal year end, and market value of equity is as of last calendar year end.

SUE is the standardized unexpected earnings. For observations that required analyst forecast data are available, SUE is calculated as the difference between I/B/E/S actual EPS and the most recent mean EPS forecast, scaled by price of last month end. For observations that analyst forecasts data are unavailable, SUE is calculated by a simple seasonal random walk model, i.e. the current quarter income before extraordinary items (COMPUSTAT quarterly data item #8) less the same measure for the same quarter in the previous year, then scaled by MV.

(Continued Table 2)

DXRET_PRE is the average daily beta-adjusted return for the pre-filing period, which begins one day after preliminary earnings announcement and ends one day before 10-Q filing date.
DXRET_POST is the average daily beta-adjusted return for the post-filing period, which begins 5 days after 10-Q filing date and ends one day before next quarter's preliminary earnings announcement.
CXRET_PRE is the cumulative daily beta-adjusted return for the pre-filing period, which begins one day after preliminary earnings announcement and ends one day before 10-Q filing date.
CXRET_POST is the cumulative daily beta-adjusted return for the post-filing period, which begins 5 days after 10-Q filing date and ends one day before next quarter's preliminary earnings announcement.

*** significantly different from zero at 1% level.

Table 3 Correlation Matrix
(Upper triangle Pearson Correlation, Lower triangle Spearman Rank Correlation, P-value beneath)

	UTOVER	ATOVER	AXRET_ F	AXRET_ E	AXRET_ ALL	AXRET_S TD
UTOVER	1	0.879	0.075	0.418	0.111	0.156
		<.0001	<.0001	<.0001	<.0001	<.0001
ATOVER	0.657	1	0.112	0.486	0.181	0.215
	<.0001		<.0001	<.0001	<.0001	<.0001
AXRET_ F	0.059	0.120	1	0.265	0.581	0.533
	<.0001	<.0001		<.0001	<.0001	<.0001
AXRET_ E	0.286	0.407	0.340	1	0.499	0.528
	<.0001	<.0001	<.0001		<.0001	<.0001
AXRET_ ALL	0.086	0.190	0.640	0.535	1	0.886
	<.0001	<.0001	<.0001	<.0001		<.0001
AXRET_ STD	0.121	0.203	0.577	0.553	0.930	1
	<.0001	<.0001	<.0001	<.0001	<.0001	

The sample consists of 17,381 firm-quarter observations from 1996Q1 through 2004Q3.
AXRET_E is the absolute value of beta-adjusted excess return at preliminary earnings announcement (by COMPUSTAT).
AXRET_F is the absolute value of beta-adjusted excess return at 10-Q filing date (by EDGAR).
AXRET_ALL is the mean of daily absolute beta-adjusted excess return over the entire quarter, where the quarter is defined as beginning from the earnings announcement date for current fiscal quarter and ending the preliminary earnings announcement date for next fiscal quarter.
AXRET_STD is the standard deviation of daily absolute beta-adjusted excess return over the entire quarter, where the quarter is defined the same as in AXRET_ALL.
UTOVER is the unexpected turnover at preliminary earnings announcement, which is calculated as the prediction error of a model that regress daily turnover on absolute value of daily price changes.
ATOVER is the abnormal turnover of the firm's shares in excess of market turnover at preliminary earnings announcements.

Table 4
The impact of preliminary earnings announcement on market reaction to 10-Q filings

Panel A.

Dependent Variable: AXRET_F				
Model:				
$AXRET_F = \beta_0 + \beta_1 \cdot UTOVER + \beta_2 \cdot AXRET_E + \beta_3 \cdot AXRET_ALL + \beta_4 \cdot AXRET_STD + \varepsilon$				
Pooled Regression			Fama-Macbeth Approach	
	Parameter	t-stat	Parameter	t-stat
INTERCEPT	0.000	1.22	0.000	0.43
UTOVER	0.094	3.85***	0.093	2.35**
AXRET_E	-0.039	-7.25***	-0.047	-3.74***
AXRET_MEAN	1.698	38.48***	1.571	8.19***
AXRET_STD	0.278	7.64***	0.459	2.03*
F-STAT	2247.98 ***		---	
R-SQUARE	0.341			

Panel B.

Dependent Variable: AXRET_F				
Model:				
$AXRET_F = \beta_0 + \beta_1 \cdot ATOVER + \beta_2 \cdot AXRET_E + \beta_3 \cdot AXRET_ALL + \beta_4 \cdot AXRET_STD + \varepsilon$				
Pooled Regression			Fama-Macbeth Approach	
	Parameter	t-stat	Parameter	t-stat
INTERCEPT	0.001	1.57	0.001	0.64
ATOVER	0.063	3.48***	0.061	1.38
AXRET_E	-0.040	-7.12***	-0.046	-3.63***
AXRET_MEAN	1.691	38.43***	1.565	8.11***
AXRET_STD	0.281	7.71***	0.458	2.02**
F-STAT	2246.94***		---	
R-SQUARE	0.341			

(Continued Table 4)

The sample consists of 17,381 firm-quarter observations from 1996Q1 through 2004Q3.

AXRET_E is the absolute value of beta-adjusted excess return at preliminary earnings announcement (by COMPUSTAT).

AXRET_F is the absolute value of beta-adjusted excess return at 10-Q filing date (by EDGAR).

AXRET_ALL is the mean of daily absolute beta-adjusted excess return over the entire quarter, where the quarter is defined as beginning from the earnings announcement date for current fiscal quarter and ending the preliminary earnings announcement date for next fiscal quarter.

AXRET_STD is the standard deviation of daily absolute beta-adjusted excess return over the entire quarter, where the quarter is defined the same as in AXRET_ALL.

UTOVER is the unexpected turnover at preliminary earnings announcement, which is calculated as the prediction error of a model that regress daily turnover on absolute value of daily price changes.

ATOVER is the abnormal turnover of the firm's shares in excess of market turnover at preliminary earnings announcements.

* significant at 10% level, ** significant at 5% level, *** significant at 1% level.

Table 5
Comparison of Post-earnings announcement drift between Pre-Filing and Post-Filing periods

Panel A

Dependent Variable: DXRET_PRE				
Model: $DXRET_PRE = \beta_0 + \beta_1 \cdot SUE + \beta_2 \cdot UTOVER + \beta_3 \cdot SUE \cdot UTOVER + \beta_4 \cdot SUE \cdot MV + \varepsilon$				
	Pooled Regression		Fama-Macbeth Approach	
	Parameter	t-stat	Parameter	t-stat
INTERCEPT	0.018	3.26***	0.018	1.82*
SUE_D	0.275	14.7***	0.281	12.93 ***
UTOVER_D	0.069	3.97***	0.058	2.44**
SUE*UTOVER	0.221	3.91***	0.240	3.25***
SUE*MV	-0.016	-0.28	-0.013	-0.16
F-STAT	68.18 ***		---	
R-SQUARE	0.015			

Panel B

Dependent Variable: DXRET_POST				
Model: $DXRET_POST = \beta_0 + \beta_1 \cdot SUE + \beta_2 \cdot UTOVER + \beta_3 \cdot SUE \cdot UTOVER + \beta_4 \cdot SUE \cdot MV + \varepsilon$				
	Pooled Regression		Fama-Macbeth Approach	
	Parameter	t-stat	Parameter	t-stat
INTERCEPT	-0.025	-9.1 ***	-0.025	-4.14***
SUE_D	0.043	4.54***	0.042	4.5***
UTOVER_D	0.012	1.37	0.012	1.46
SUE*UTOVER	0.004	0.14	0.001	0.03
SUE*MV	-0.071	-2.38**	-0.075	-2.09**
F-STAT	9.24 ***		---	
R-SQUARE	0.002			

(Continued Table 5)

The sample consists of 17,381 firm-quarter observations from 1996Q1 through 2004Q3.

UTOVER is the unexpected turnover at preliminary earnings announcement, which is calculated as the prediction error of a model that regress daily turnover on absolute value of daily price changes.

MV is the market value as of the end of the month before earnings announcement.

SUE is the standardized unexpected earnings. For observations that required analyst forecast data are available, SUE is calculated as the difference between I/B/E/S actual EPS and the most recent mean EPS forecast, scaled by price of last month end. For observations that analyst forecasts data are unavailable, SUE is calculated by a simple seasonal random walk model, i.e. the current quarter income before extraordinary items (COMPUSTAT quarterly data item #8) less the same measure for the same quarter in the previous year, then scaled by MV.

DXRET_PRE is the average daily beta-adjusted return for the pre-filing period, which begins one day after preliminary earnings announcement and ends one day before 10-Q filing date.

DXRET_POST is the average daily beta-adjusted return for the post-filing period, which begins 5 days after 10-Q filing date and ends one day before next quarter's preliminary earnings announcement.

The subscript "D" denotes the transformed deciles ranking of the variable.

All parameter estimates have been multiplied by 100 for exhibition convenience.

* significant at 10% level, ** significant at 5% level, *** significant at 1% level.

Table 6 The impact of preliminary earnings announcement on Post-announcement drift

Model: $DRIFT = \beta_0 + \beta_1 \cdot SUE_D + \beta_2 \cdot SUE * FL + \beta_3 \cdot SUE * MV + \varepsilon$

Depend Variable	Intercept	SUE	SUE*FL	SUE*MV	F-Stat	R-square
DRIFT_10	0.09 ** (1.98)	3.13 *** (9.74)	0.71 ** (2.09)	0.63 (1.23)	212.26 ***	0.68%
DRIFT_20	0.66 *** (10.98)	3.53 *** (8.32)	1.29 *** (2.86)	-0.47 (-0.70)	199.85 ***	0.64%
DRIFT_30	0.79 *** (10.92)	4.00 *** (7.82)	1.34 ** (2.47)	-1.50 * (-1.85)	180.71 ***	0.58%
DRIFT_40	0.89 *** (10.68)	4.54 *** (7.72)	1.52 ** (2.43)	-1.55 * (-1.67)	174.34 ***	0.55%
DRIFT_50	1.07 *** (11.62)	5.09 *** (7.79)	1.46 ** (2.11)	-2.29 ** (-2.22)	172.97 ***	0.55%
DRIFT_60	1.69 *** (16.81)	6.12 *** (8.60)	1.30 * (1.72)	-3.70 *** (-3.29)	201.75 ***	0.64%

The sample consists of 93,222 firm-quarter observations from 1996Q1 to 2004Q3. MV is the market value as of the end of the month before earnings announcement. SUE is the standardized unexpected earnings. For observations that required analyst forecast data are available, SUE is calculated as the difference between I/B/E/S actual EPS and the most recent mean EPS forecast, scaled by the closing stock price of last month end. For observations that analyst forecasts data are unavailable, SUE is calculated by a simple seasonal random walk model, i.e. the current quarter diluted income before extraordinary items (COMPUSTAT quarterly data item #8) less the same measure for the same quarter in the previous year, scaled by MV. The transformed decile-rankings of MV and SUE are used in the regression. FL is a dummy variable which equals 1 if the firm's 10-Q filing is made after its preliminary earnings announcements and 0 otherwise. DRIFT_N is the cumulative size-adjusted return in the N days after the preliminary earnings announcement. The subscript "D" denotes the transformed deciles ranking of the variable. All parameter estimates have been multiplied by 100 for exhibition convenience. *** significant at 1% ** significant at 5% * significant at 10%

Figure 1 Timeline of Events

Figure 2 Distribution of Observations by Quarter