The Effect of Ex-Ante Management Forecast Accuracy on Post-Earnings Announcement Drift

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ABSTRACT: This paper examines the effect of ex-ante management forecast accuracy on post-earnings announcement drift when management forecasts about next quarter's earnings are bundled with the current quarter's earnings announcements. This paper builds a composite measure of ex-ante management forecast accuracy that takes into account forecast ability, forecast difficulty and forecast environment. The results show that the bundled forecasts can mitigate investors' under-reaction to current earnings and reduce the magnitude of post-earnings announcement drift only when these forecasts have high ex-ante accuracy.

Keywords: *post-earnings announcement drift; bundled management forecast; ex-ante forecast accuracy.*

Data Availability: *The data used in this paper are available from the sources listed in the text.*

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I. INTRODUCTION

Post-earnings announcement drift is one of the most intriguing market anomalies. Following earnings announcements, stock prices move in the same direction as that of earnings surprises for the subsequent 6 to 12 months. The magnitude of the drift also increases with that of earnings news, which is measured by the standardized unexpected earnings. Two main explanations have been advanced for this anomaly: a failure to adjust abnormal returns for risk, and a delayed response to earnings reports (Bernard and Thomas 1989). Existing evidence is more consistent with the market under-reaction explanation. Investors underestimate the implications of current earnings for future earnings, and their under-reaction is corrected at future earnings announcement dates.[1]

This paper examines a prediction of the under-reaction explanation by investigating the effect of bundled management forecasts and their ex-ante accuracy on post-earnings announcement drift. Management forecasts about future earnings are sometimes issued along with current quarter earnings announcements, and these bundled management forecasts have recently become more prevalent (Rogers and Van Buskirk 2009). [2] If post-earnings announcement drift is caused by investors' inefficiency in forming the

[1] See Bernard and Thomas (1989, 1990), Ball and Bartov (1996), Livnat and Mendenhall (2006), and Shivakumar (2006), among others.

[2] In this paper, bundled management forecasts refer to the forecasts issued within one trading day around the earnings announcement date, to yield post-earnings announcement drift window consistent with that in previous literature (Livnat and Mendenhall 2006). This approach is similar in spirit to that employed by Rogers and Van Buskirk (2009), in which bundled management forecasts refer to the forecasts issued within two days of the earnings announcement date.

expectations of future earnings upon current earnings news, the management forecasts of future earnings should accelerate investors' reaction. However, if investors perceive that the bundled management forecasts lack accuracy, they place less weight on the forecasts and keep extrapolating future earnings based on their own information sets. The ability of bundled management forecasts to mitigate post-earnings announcement drift should be dependent on their ex-ante (perceived) forecast accuracy.

Investors are expected to use all available information to estimate the accuracy of the management forecasts. This paper constructs a forecast accuracy prediction model based on the relation between actual forecast accuracy and the forecast properties. The results suggest that the management forecast is more accurate if the prior forecast accuracy is higher, if the forecast horizon is shorter, if the forecast difficulty is lower, if the forecast news is less extreme, if the prior stock return is higher or if the firm's market to book ratio is higher. For each management forecast, the ex-ante forecast accuracy is measured using the estimated relationship and the current forecast properties.[3] Compared with other ex-ante accuracy measures used in the prior literature (the prior forecast accuracy, the previous four quarters' average forecast accuracy), this estimated ex-ante forecast accuracy measure is more significantly associated with the actual forecast accuracy and is a better proxy for investors' perceived accuracy.

[3] To avoid the look-ahead bias, the estimated relationship is based on the data available within four quarters before the management forecast is announced.

From the second quarter of 1997 to the second quarter of 2007, 10,521 quarterly earnings announcements are bundled with the management forecasts of next quarter's earnings in the sample of 68,569 quarterly earnings announcements.[4] 6,237 bundled management forecasts are perceived to be accurate (i.e., the estimated accuracy is higher than the median). Firms which have earnings announcements bundled with accurate management forecasts are significantly larger, have smaller analyst forecast dispersion, more analysts following, higher institutional shareholding, higher trading volume during the past, higher stock price, lower earnings persistence, less negative earnings surprises, and more responsive analysts than firms which have earnings announcements bundled with inaccurate management forecasts.

The main empirical results suggest that the bundled management forecasts on average do not mitigate post-earnings announcement drift when other drift-related variables are controlled. Consistent with the prediction, the bundled management forecasts reduce the magnitude of post-earnings announcement drift only when they have high ex-ante forecast accuracy. The inferences hold after a battery of robustness checks. The additional analysis shows that when the forecasts of next quarter's earnings are issued between the earnings announcements, a large part of the drift is concentrated around the

[4] The main analysis focuses on the bundled management forecasts that are about the next quarter's earnings. Compared with the bundled management forecasts of two-quarter-ahead (and beyond) earnings, these forecasts are most likely to mitigate investors' under-reaction to current earnings.

management forecast announcement dates, especially for the ex-ante accurate forecasts.

This paper adds to the evidence supporting the under-reaction explanation for post-earnings announcement drift. Albeit the long discussion related with the existence and causes of post-earning announcement drift, there is limited evidence about the information provided by managers. The interaction between mandatory reporting and voluntary disclosure has not been adequately investigated in the prior literature (Beyer et al 2009), and my paper contributes to the literature along this line. More importantly, by showing the different effects of accurate bundled forecasts and inaccurate bundled forecasts on post-earnings announcement drift, this paper goes above and beyond simply focusing on the issuance of bundled management forecasts and incorporates their perceived accuracy into the analysis. The evidence that the bundled management forecasts reduce the magnitude of post-earnings announcement drift only when they have high ex-ante forecast accuracy suggests prompt and accurate management forecasts of future earnings effectively resolve investors' uncertainty towards future earnings and mitigate their under-reaction to announced earnings.

The rest of the paper proceeds as follows. Section II reviews the literature and develops the hypothesis. Section III discusses the sample and constructs the ex-ante forecast accuracy measure. Section IV presents the empirical results. Section V concludes.

II. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

In addition to disclosing mandatory financial reports, firms also release financial information voluntarily. Voluntary disclosure, especially forecasts of future performance, is not subject to the restrictions of accounting standards, and could be used to pass managers' private information to investors. Management forecasts are good proxies for voluntary disclosure because they can be precisely measured and their issuance time is known (Healy and Palepu 2001).

Managers may choose to provide voluntary disclosures along with their mandatory financial reports, such as announcing current earnings and their forecasts about future earnings simultaneously. After the enactment of Regulation Fair Disclosure, this phenomenon has become more common, partly because of the greater use of earnings-related conferences calls along with or close to an earnings announcement (Rogers and Van Buskirk 2009).[5] If investors think these bundled management forecasts are accurate, such forecasts will help them understand the implications of current earnings for future earnings, and therefore decrease post-earnings announcement drift. This is a prediction that stems from the under-reaction explanation for post-earnings announcement drift.

[5] Using a sample of 518 firms that initiated conference calls between 1994 and 2000, Kimbrough (2005) shows that the initiation of conference calls leads investors to respond in a more timely fashion to current earnings surprises. Initiation of conference calls is a one-off event in a firm's life, which says very little about how firms can affect post-earnings announcement drift on a regular basis by issuing bundled management forecasts.

The previous literature has provided two main explanations for post-earnings announcement drift: a failure to adjust abnormal returns for risk, and a delayed response to earnings reports (Bernard and Thomas 1989). Existing evidence is more consistent with the market under-reaction explanation. Bernard and Thomas (1990) find that a disproportionate fraction of the drift is concentrated around future earnings announcement dates, which suggests that the under-reaction to current earnings is corrected when future earnings are announced. Bartov et al. (2000) use the institutional holding as a proxy for investor sophistication, and provide evidence that investor sophistication can decrease the magnitude of post-earnings announcement drift because sophisticated investors can 'characterize correctly the process underlying earnings'. Shivakumar (2006) shows that the unexpected cash flows induce greater magnitude of post-earnings announcement drift than the unexpected accruals, which cannot be explained by the risk-based theory.

The under-reaction explanation suggests that the speed with which investors incorporate the implications of current earnings into their expectations of future earnings is associated with the magnitude of the drift. Soffer and Lys (1999) provide the evidence that investors' expectations of future earnings do not reflect the implications of the current earnings up to 15 trading days after they are announced. If managers issue their forecasts of future earnings along with the current earnings announcements, investors have more information to resolve the uncertainty related with the future period's earnings. To the extent that the bundled management forecasts can mitigate investors' under-reaction

and post-earnings announcement drift, I expect investors to evaluate the accuracy of the bundled management forecasts.

Managers' intentional bias leads to lower level of the forecast accuracy. Managers have incentives to bias their forecasts opportunistically. Rogers and Stocken (2005) examine the incentives caused by litigation environment, insider transactions, financial distress and industry concentration. Ertimur et al. (2007) find management forecasts to be less optimistically biased if forecasts are made and verified by actual earnings before IPO lockup expiration, when insider selling is forbidden. Rational expectations theory implies investors will use all the available information to estimate the bias and adjust for it. Managers anticipate investors' response, but continue to behave myopically (Stein 1989). In practice, investor's adjustment may not be complete. Some incentives, such as insider trading incentive, are not observed by investors. Fischer and Verrecchia (2000) find that the adjustment for the reporting bias decreases when the uncertainty towards the manager's objective increases. Managers are also more inclined to bias their forecasts if it is more difficult for market participants to detect this (Rogers and Stocken 2005).

Absent the incentive to bias the forecasts, managers may not be able to forecast accurately when the forecast difficulty level is high. When firms' operating environment is volatile, earnings generating process is subject to multiple contingencies. Even though managers truthfully reveal the inside information through management forecasts, these forecasts are not adequately

accurate. Investors' perceived accuracy towards these forecasts is reduced accordingly.

Managers also have the incentive to build a forecast reputation. Stocken (2000) argues that in a repeated game setting, if accounting reports are useful enough to confirm or refute previously released voluntary information, and voluntary disclosure precision is evaluated over a sufficiently long period, managers have the inclination to release their private information fairly. Current management forecast accuracy is expected to be positively related with prior management forecast accuracy. This accuracy 'momentum' is a reflection of managers' efforts to build a forecast reputation. Prior forecast accuracy could also be viewed as a proxy for forecast ability.

Previous literature documents that investors are likely to estimate the accuracy of the management forecasts and incorporate it into their reaction to the forecast news. Rogers and Stocken (2005) investigate the market's response to the predicted forecast errors and find that, for good news management forecasts, the market's response varies with the predicted forecast errors. Ng et al. (2008) find that forecast credibility mitigates investors' under-reaction to management forecast news. They use various forecast credibility measures, including forecast precision, prior forecast accuracy, firm level litigation risk, industry concentration, and research and development intensity.

This paper argues that only when the bundled management forecasts have high ex-ante accuracy could they mitigate post-earnings announcement

drift. [6] If the bundled forecasts are perceived to be accurate, they can significantly resolve the uncertainty towards future earnings and help investors under-react less to current earnings. Whereas the ex-ante inaccurate forecasts stimulate informed investors to form new expectations about future earnings and they may interpret and incorporate the forecasts in diverse ways (Verrecchia 2001). Hence issuing bundled management forecasts is not necessarily associated with the reduction of post-earnings announcement drift.

In a similar vein, Zhang (2008) examines the effect of analyst responsiveness on post-earnings announcement drift. She defines a responsive analyst as one who revises the forecast of next quarter's earnings within two trading days after the current quarter earnings announcement. She finds that analyst responsiveness accelerates market reaction to earnings announcements, and mitigates post-earnings announcement drift. She also finds that when earnings announcements are bundled with conference calls or management forecasts, analysts are more likely to be responsive. Compared with Zhang (2008), this paper focuses directly on the bundled management forecasts of next quarter's earnings, which are the primary information sources, and incorporates their ex-ante accuracy into the analysis.

A concurrent study by Li and Tse (2008) finds that bundled management forecasts in general mitigate post-earnings announcement drift, regardless of the accuracy of the forecasts. This finding raises a puzzling issue

[6] This paper is a joint test of whether investors use all the available forecast properties to estimate the forecast accuracy and whether they incorporate the accurate forecasts of future earnings into their reaction to current earnings news.

of why managers do not always issue optimistic forecasts along with bad earnings news to avoid the under-valuation of their firms' shares. They use the prior forecast accuracy as the proxy for ex-ante forecast accuracy, but fail to find the significant difference in the drift between earnings announcements bundled with accurate forecasts and inaccurate forecasts.[7] I argue that the ability of bundled management forecasts to mitigate post-earnings announcement drift critically hinges on their ex-ante forecast accuracy.

III. SAMPLE SELECTION, METHODOLOGY AND DESCREPTIVE STATISTICS

Sample Selection

This paper obtains management forecasts announced from year 1995 to year 2007 from First Call's Company Issued Guidance database. In the analysis of the association between actual forecast accuracy and forecast properties, only point estimates and range estimates are included, because the explicit forecast numbers are necessary for the calculation of forecast accuracy. Managers might pre-announce earnings after corresponding fiscal period ends, and these pre-announcements are excluded from the management forecast sample.[8] Because management forecast error is deflated by the average stock price one week before the issuance of the management forecast, observations that do not have

[7] Another contemporaneous paper by Wang (2008) also finds that management forecasts mitigate post-earnings announcement drift regardless of their ex ante accuracy.
[8] The untabulated analysis shows that the actual accuracy of earnings preannouncements is significantly higher than that of ordinary management forecasts.

corresponding stock prices, or which have stock prices smaller than $1, are deleted. Financial firms, and firms whose shares are not traded on NYSE/AMEX/NASDAQ or which have non-ordinary shares, are excluded from the sample as well.

The firms' actual earnings per share (EPS) over the period 1997–2007 are obtained from the I/B/E/S database.[9] The earnings announcement dates in I/B/E/S are cross-checked with those in First Call, and observations that have different earnings announcement dates are deleted.[10] Analyst forecasts are non-split adjusted forecasts from I/B/E/S. The most recent consensus analyst forecast used to calculate the unexpected earnings is the median of the analyst forecasts issued within 90 days before quarterly earnings announcements.[11]

(Insert Figure 1)

Figure 1 shows the timeline for measurement of variables. Consistent with the prior literature (Livnat and Mendenhall 2006), the drift window starts two trading days after the earnings announcement date of Quarter t and ends on the first trading day after the earnings announcement date of Quarter $t + 1$. The earnings announcement window is from trading day −1 to trading day 1 around the earnings announcement date (trading day 0) of Quarter t. The main analysis focuses on the management forecasts of next quarter's earnings issued within

[9] This time range is selected because ex-ante forecast accuracy can be estimated during this period. Specifically, it is from the second quarter of 1997 to the second quarter of 2007.

[10] This paper uses the earnings numbers in I/B/E/S rather than COMPUSTAT because earnings in COMPUSTAT are restated: therefore they are not the actual earnings that investors observe and react to. See Livnat and Mendenhall (2006) for a comparison between I/B/E/S and COMPUSTAT.

[11] The results are similar if I use the latest individual analyst forecast to calculate the unexpected earnings, following Zhang (2008).

the earnings announcement window, and investigates their ex-ante accuracy on the drift period return.[12]

Measurement of Ex-ante Management Forecast Accuracy

I propose that investors estimate the ex-ante management forecast accuracy based on a variety of forecast properties. Rogers and Stocken (2005) develops a management forecast error prediction model which identifies the following explanatory variables: forecast horizon, forecast difficulty, forecast news, previous stock return, litigation risk, industry concentration, financial distress, market value to book value of equity ratio and firm size.[13] In addition, I argue that the accuracy of firms' prior forecasts is a proxy for firm-level management forecast ability and affects investors' perceived accuracy of current forecast (Hutton and Stocken 2009). This paper also takes into account the different accuracy levels of bundled management forecasts and non-bundled management forecasts (Rogers and Van Buskirk 2009). The following model is used to estimate the association between the actual management forecast accuracy and the forecast properties.

[12] Annual forecasts which have the next quarter ends as the forecast period end dates are also included.

[13] The prediction model in Rogers and Stocken (2005), specifically, is about forecast bias. This paper focuses on forecast accuracy, which is subject to the effects of intentional forecast bias, forecast ability, and forecast difficulty.

$$ActualAccuracy_{i,t} = \alpha_0 + \alpha_1 PriorAccuracy_{i,t} + \alpha_2 ForecastHorizon_{i,t} + \alpha_3 ForecastDifficulty_{i,t} + \alpha_4 ForecastNews_{i,t} \times GoodNews_{i,t} + \alpha_5 ForecastNews_{i,t} \times BadNews_{i,t} + \alpha_6 CAR_{i,t} + \alpha_7 Litigation_{i,t} + \alpha_8 Concentration_{i,t-1} + \alpha_9 Distress_{i,t-1} + \alpha_{10} MB_{i,t-1} + \alpha_{11} Size_{i,t-1} + \alpha_{12} Bundle_{i,t} + \varepsilon_{i,t} \quad (1)$$

The variables are defined below:

Actual forecast accuracy (*ActualAccuracy*): Following Ng et al. (2008), I calculate management forecast accuracy as *ActualAccuracy* = -1×*ABS* (*ActualEarnings-ManagementForecast*)*/Price. Price* refers to the average stock price one week before the management forecast announcement date. Management forecast is more accurate if *ActualAccuracy* is higher (closer to zero).

Prior forecast accuracy (*PriorAccuracy*) refers to the actual accuracy of the prior management forecast. The actual earnings in relation to the prior forecast need to be announced on or immediately before the current management forecast announcement date.

Forecast horizon (*ForecastHorizon*) is calculated as the management forecast period end date minus the announcement date, deflated by 360.

Forecast difficulty (*ForecastDifficulty*) is developed by performing Principal Axis Factoring over analyst forecast dispersion, standard deviation of previous analyst forecast errors, firm's prior performance, future performance forecasted by the management, stock return volatility, bid-ask spread and forecast width (see Rogers and Stocken 2005).

Forecast news (*ForecastNews*) is calculated as the management forecast minus the consensus analyst forecast, deflated by *Price*. *GoodNews* is an indicator variable which equals 1 if *ForecastNews* is non-negative, and 0 otherwise. *BadNews* is an indicator variable which equals 1 if *ForecastNews* is negative, and 0 otherwise.

Other control variables: *CAR* is the firm's abnormal stock return cumulated from day -120 to day -1 relative to the management forecast announcement day. *Litigation* is an indicator variable which equals 1 if the firm is in industries with high litigation risk (Standard Industrial Classification codes 2833-2836, 3570-3577, 3600-3674, 5200-5961, 7370-7374, 8731-8734), and 0 otherwise. *Concentration* is measured by the Herfindahl index using the revenues of firms sharing the same four-digit SIC code. *Distress* is an indicator variable which equals 1 if the firm is in the most distressed decile predicted by Ohlson's (1980) bankruptcy model, and 0 otherwise. *MB* is the firm's market value of equity deflated by the book value of equity. *Size* is the natural log of the firm's total assets. *Concentration, Distress*, *MB* and *Size* are calculated using the most recent accounting data prior to the announcement of the management forecast. *Bundle* is an indicator variable which equals 1 if the management forecast is issued within one trading day around the earnings announcement date and 0 otherwise.

(Insert Table 1)

Model (1) is estimated separately for 20,701 annual forecasts and 21,790 quarterly forecasts issued from year 1995 to year 2007. The results are presented in Table 1. Actual forecast accuracy is positively related with the prior management forecast accuracy. Forecast accuracy is also higher when forecast horizon is shorter. The significantly negative coefficient on *ForecastDifficulty* suggests that this latent variable effectively captures the difficulty for managers to accurately forecast future earnings. The coefficients on $ForecastNews \times GoodNews$ and $ForecastNews \times BadNews$ indicate that forecast accuracy is negatively associated with the magnitude of the management forecast news. Previous stock return is positively related with forecast accuracy, suggesting managers tend to forecast more accurately if they are under less share price pressure. The positive coefficient on *MB* indicates that firms with good growth opportunities are likely to issue accurate forecasts to build forecast reputation on capital market. The actual accuracy of the annual forecast is higher when the forecast is bundled with the earnings announcement.

Using the above prediction model, I build the ex-ante forecast accuracy measure by applying the estimated coefficients to the current forecast properties. For every consecutive four calendar quarters, the actual management forecast accuracy and forecast properties are used to estimate the coefficients of Model (1). To avoid the look-ahead bias, these estimated coefficients are used in the following calendar quarter to obtain the ex-ante accuracy of the management forecasts issued within this quarter. For example, for quarterly earnings announcements made from the first quarter of 1999 to the fourth quarter of

1999, all the management forecasts in relation to these earnings are obtained to estimate Model (1). The estimated coefficients are then used to compute the ex-ante accuracy of quarterly forecasts announced in the first quarter of 2000. In this way, the ex-ante accuracy of 20,148 annual forecasts and 20,929 quarterly forecasts issued from the second quarter of 1997 to the second quarter of 2007 is estimated.[14] Previous literature has used other ex-ante accuracy measures. Ng et al. (2008) use the actual accuracy of the prior management forecast, and Li and Tse (2008) use the previous four quarters' average management forecast accuracy. The association between the actual forecast accuracy (*ActualAccuracy*) and the multiple ex-ante accuracy measures, including the estimated accuracy (*EstimatedAccuracy*) developed by Model (1), the prior forecast accuracy (*PriorAccuracy*), the previous four quarters' average forecast accuracy (*AverageAccuracy*), is shown in Panel B of Table 1. *EstimatedAccuracy* has the highest association with the actual forecast accuracy. The coefficient of the univariate regression is 0.752, and the adjusted R^2 is 24.14%.

In the following analyses, the *EstimatedAccuracy* values are transformed into indicator variables based on the previous four quarters' cut-offs. The indicator variable *Dummy_EstimatedAccuracy* equals 1 if *EstimatedAccuracy* is greater than the median and 0 otherwise. Similarly *Dummy_PriorAccuracy* equals 1 if *PriorAccuracy* is greater than the median

[14] The ex-ante accuracy of forecasts announced before the second quarter of 1997 cannot be estimated because there are no enough observations to generate meaningful coefficients for the prediction model.

and 0 otherwise. *Dummy_AverageAccuracy* equals 1 if *AverageAccuracy* is greater than the median and 0 otherwise.

Test of the Effect of Ex-ante Forecast Accuracy on Post-Earnings Announcement Drift

The effect of ex-ante management forecast accuracy on post-earnings announcement drift is examined by estimating the following model:

$$
\begin{aligned}
ADJ\_RET_{i,t} = {} & \beta_0 + \beta_1\, DSUE_{i,t} + \beta_2\, D\_BUNDLE_{i,t} + \beta_3\, DSUE_{i,t} \times D\_BUNDLE_{i,t} \\
& + \beta_4\, DSUE_{i,t} \times D\_BUNDLE_{i,t} \times Accuracy_{i,t} + \beta_5\, DSUE_{i,t} \times DFD_{i,t} \\
& + \beta_6\, DSUE_{i,t} \times DME_{i,t} + \beta_7\, DSUE_{i,t} \times DAC_{i,t} + \beta_8 DSUE_{i,t} \times DVOL_{i,t} \\
& + \beta_9\, DSUE_{i,t} \times DPRC_{i,t} + \beta_{10} DSUE_{i,t} \times DINS_{i,t} + \beta_{11} DSUE_{i,t} \times DEP_{i,t} \\
& + \beta_{12}\, DSUE_{i,t} \times BADNEWS_{i,t} + \beta_{13} DSUE_{i,t} \times 4THQTR_{i,t} + \beta_{14} DSUE_{i,t} \\
& \times RESPONSIVE_{i,t} + \beta_{15} DFD_{i,t} + \beta_{16} DME_{i,t} + \beta_{17}\, DAC_{i,t} + \beta_{18} DVOL_{i,t} \\
& + \beta_{19} DPRC_{i,t} + \beta_{20} DINS_{i,t} + \beta_{21} DEP_{i,t} + \beta_{22} BADNEWS_{i,t} \\
& + \beta_{23}\, 4THQTR_{i,t} + \beta_{24} RESPONSIVE_{i,t} + \varepsilon_{i,t} \qquad (2)
\end{aligned}
$$

Where *ADJ_RET* is the size-adjusted return over the drift window and equals the compounded raw return minus the compounded benchmark return of the same CRSP size decile and the same CRSP exchange index (NYSE/AMEX or NASDAQ) that the firm belongs to. Following Shumway and Warther (1999), when a firm is delisted due to poor performance (delisting code is 500

or from 520 to 584), the delisting return is assumed to be −35% if it is traded on NYSE/AMEX, and −55% if it is traded on NASDAQ.[15]

DSUE refers to the decile rank of earnings surprise, which is defined as the actual EPS minus the most recent consensus analyst forecast, scaled by the stock price at the end of the fiscal quarter. The earnings surprises are ranked into deciles within each calendar quarter using the cut-off values from the previous quarter, coded from 0 to 1 to yield *DSUE*. The coefficient of *DSUE* can be interpreted as the abnormal return earned on a zero-investment portfolio that takes a long position in the highest *DSUE* decile (*DSUE* = 1) and a short position in the lowest *DSUE* decile (*DSUE* = 0).[16]

When an earnings announcement is bundled with the management forecast of next quarter's earnings, the indicator variable *D_BUNDLE* equals 1, and 0 otherwise. Bundled management forecasts are expected to mitigate post-earnings announcement drift when their ex-ante forecast accuracy (*Accuracy*) is high. Hence $\beta_3 + \beta_4$ should be significantly negative. β_4 should be significantly negative as well under the prediction that accurate bundled forecasts and inaccurate bundled forecasts should have different mitigating effects on post-earnings announcement drift.

The above equation includes several control variables that prior studies have identified as being associated with post-earnings announcement drift. These are analyst forecast dispersion (*DFD*), firm size (*DME*), analyst coverage

[15] The percentage of firms delisted due to poor performance is 0.04% for the whole sample. The results are not affected if I simply delete these observations.
[16] See Doyle et al. (2006) and Zhang (2008).

(*DAC*), trading volume (*DVOL*), price (*DPRC*), institutional shareholding (*DINS*), earnings persistence (*DEP*), negative unexpected earnings (*BADNEWS*), the fourth fiscal quarter earnings announcement (*4THQTR*) and analyst responsiveness (*RESPONSIVE*).[17] The first three variables are proxies for information uncertainty. Analyst forecast dispersion is defined as the standard deviation of analyst forecasts divided by the stock price at the fiscal quarter end. Firm size is measured by the market value of equity at the fiscal quarter end. Analyst coverage is the number of analysts following the firm based on the analyst estimates from I/B/E/S. Institutional shareholding is the percentage of institutional ownership which is available from CDA/Spectrum. Following Mendenhall (2002), trading volume is estimated by multiplying the closing price and the shares traded from day −272 to day −21 relative to the earnings announcement day, and earnings persistence is the first-order serial correlation of seasonally-differenced earnings estimated over the past 20 quarters. Stock price is the average stock price within one week before the earnings announcement. These drift-related variables are transformed into decile ranks within each calendar quarter using the cut-off values from the previous quarter and coded from 0 to 1(Mendenhall, 2002). In this test, I use the inverse of the standard deviation of analyst forecasts to form *DFD*. Hence, consistent with *DME* and *DAC*, a higher value of *DFD* corresponds to lower analyst forecast dispersion and lower information uncertainty. *BADNEWS* is an

[17] See Bartov et al. (2000), Mendenhall (2002), Rangan and Sloan (1998), Zhang (2006) and Zhang (2008), among others.

indicator variable which equals 1 if the unexpected earnings are negative and 0 otherwise. *4THQTR* is an indicator variable which equals 1 if the earnings announcement is for the fourth fiscal quarter and 0 otherwise. Following Zhang (2008), *RESPONSIVE* equals 1 if there is at least one analyst revising the forecast of next quarter's earnings within two trading days after current quarter earnings announcement and 0 otherwise.

Descriptive Statistics

(Insert Table 2)

Panel A and Panel B of Table 2 present the means and medians of the drift-related variables conditional on the existence of the bundled management forecasts and the ex-ante accuracy of the bundled forecasts. T-tests for means and Wilcoxon-tests for medians are conducted over three sub-samples: earnings announcements bundled with accurate forecasts (*D_BUNDLE* = 1 and *Dummy_EstimatedAccuracy* = 1), earnings announcements bundled with inaccurate forecasts (*D_BUNDLE* = 1 and *Dummy_EstimatedAccuracy* = 0), and standalone earnings announcements (*D_BUNDLE* = 0). From the second quarter of 1997 to the second quarter of 2007, among 68,569 quarterly earnings announcements, 10,521 quarterly earnings announcements are bundled with the management forecasts of next quarter's earnings.[18] 6,237 bundled management forecasts are perceived to be accurate.

[18] To achieve a clean test, observations which have management forecasts of Quarter t + 1 earnings issued before the earnings announcement date of Quarter t or between the earnings announcement date of Quarter t and the earnings announcement date of Quarter t + 1 are deleted.

Based on the t-tests for mean values, firms which have earnings announcements bundled with accurate management forecasts are significantly larger, have smaller analyst forecast dispersion, more analysts following, higher institutional shareholding, higher trading volume during the past, higher stock price, lower earnings persistence, less negative earnings surprises, and more responsive analysts than firms which have earnings announcements bundled with inaccurate management forecasts. Firms which have earnings announcements bundled with inaccurate management forecasts are not significantly different from firms which have standalone earnings announcements in terms of analyst forecast dispersion, but have better information environment in terms of analyst coverage, institutional shareholding and analyst responsiveness. The former firms are significantly smaller in market value of equity than the latter firms based on the mean values, while the median values suggest the opposite. The different characteristics of these three kinds of firms justify the necessity of controlling the drift-related variables.

(Insert Table 3)

Panel A of Table 3 shows the percentage of earnings announcements with bundled management forecasts and with accurate bundled management forecasts by industry. There are 11 industry categories based on the industry classification in Fama and French (1997) and the finance industry (SIC codes 6000-6999) is excluded. Firms in wholesale and retail industry have the highest percentage (19.77%) of earnings announcements with bundled management

forecasts, followed by firms in business equipment industry (19.40%). Firms in chemicals and allied products industry have the highest percentage (12.48%) of earnings announcements bundled with accurate management forecasts. Whereas firms in energy industry and telecommunications industry have quite low percentage (4.04% and 7.10%) of earnings announcements bundled with management forecasts of future earnings, suggesting that firms in high technology firms are less likely to issue bundled management forecasts because of the possible costs of not being able to issue accurate management forecasts or the proprietary costs as suggested by Verrecchia (1983).

Panel B of Table 3 shows the correlations among *DSUE*, *D_BUNDLE* and other drift-related variables used in the test. The upper-right triangle reports the Pearson product moment and the Spearman rank order is presented in the lower-left triangle. The indicator variable *D_BUNDLE* is significantly correlated with all drift-related variables. It is positively correlated with the inverse of analyst forecast dispersion (*DFD*), market value of equity (*DME*), analyst coverage (*DAC*), trading volume (*DVOL*), stock price (*DPRC*), institutional shareholding (*DINS*), earnings persistence (*DEP*) and analyst responsiveness (*RESPONSIVE*), and negatively correlated with the negative earnings surprise (*BADNEWS*) and the fourth fiscal quarter earnings announcement (*4THQTR*). This univariate analysis indicates that firms in better information environment are more likely to issue bundled management forecasts than firms in relatively uncertain information environment.

IV. EMPIRICAL RESULTS

Main Analysis

(Insert Table 4)

Table 4 shows the regression results of Model (2).[19] Model (2a) tests the effect of the bundled management forecasts on post-earnings announcement drift. The average drift is 3.9% if earnings announcements are not bundled with the management forecasts of next quarter's earnings. The coefficient of the interaction term between *DSUE* and *D_BUNDLE* is −0.013, meaning that the bundled management forecasts can decrease the drift by 1.3%; however, the effect is only significant at 10% level (*t*-stat = −1.78). β_3 becomes insignificantly negative when other drift-related variables are controlled, as is shown in the estimation results of Model (2b). Therefore the bundled management forecasts in general do not significantly decrease the magnitude of post-earnings announcement drift when other drift-related variables are controlled.

Models (2c), (2d), (2e), and (2f) test the effect of the ex-ante accuracy of bundled management forecasts on post-earnings announcement drift, using multiple measures of the ex-ante accuracy. Model (2c) and (2d) use *Dummy_ EstimatedAccuracy*, the ex-ante accuracy measure developed by Model (1). When the drift-related variables are not controlled, the coefficient on the interaction term between *DSUE* and *D_BUNDLE* is -0.006 (*t*-stat = −0.80) and

[19] Following Zhang (2008), I delete the observations with absolute value of studentized residuals greater than 2 in all regressions to remove the effects of outliers. This estimation procedure decreases the sample size by about 4% and does not change the inferences.

the coefficient on $DSUE \times D\_BUNDLE \times Dummy\_EstimatedAccuracy$ is −0.015 (*t*-stat = −2.50). This result suggests that the inaccurate bundled management forecasts have no significant effect on the drift, whereas the accurate bundled management forecasts significantly reduce the magnitude of post-earnings announcement drift by 2.1% ($\beta_3 + \beta_4$ with *p-value* of 0.006). The negative coefficient on $DSUE \times D\_BUNDLE \times Dummy\_EstimatedAccuracy$ suggests the different mitigating effects of accurate bundled management forecasts and inaccurate bundled management forecasts on post-earnings announcement drift. When the drift-related variables are controlled in Model (2d), the inaccurate bundled management forecasts do not mitigate post-earnings announcement drift at all (β_3 = 0.003 with *t*-stat of 0.44). The accurate bundled forecasts are shown to have a significant mitigating effect on the drift with the coefficient of −0.024 ($\beta_3 + \beta_4$ with *p-value* of 0.003). Consistent with prior research, the magnitude of post-earnings announcement drift is significantly lower if firms have more analysts following, higher trading volume or when the announced earnings correspond to the fourth fiscal quarter.

When the ex-ante management forecast accuracy is measured by *Dummy_PriorAccuracy* or *Dummy_AverageAccuracy* in Model (2e) and Model (2f), β_4 and $\beta_3 + \beta_4$ become insignificant. [20] I interpret the results as the evidence that these ex-ante forecast accuracy measures fail to correctly capture

[20] When there are no actual earnings related with the prior management forecasts announced during the previous four quarters, *AverageAccuracy* can not be calculated. 1,871 such observations are deleted from the regression.

investors' perceived forecast accuracy and show the different effects of accurate bundled forecasts and inaccurate bundled forecasts on post-earnings announcement drift.

In sum, the above results are consistent with the prediction that the bundled management forecasts of next quarter's earnings mitigate post-earnings announcement drift only when the forecasts have high ex-ante accuracy.

Endogeneity

Firms which choose to issue management forecasts of next quarter's earnings along with current quarter earnings announcements may have certain characteristics which are associated with the relation between earnings and the stock return. The main analysis does not control for the self-selection of issuing bundled management forecasts. To mitigate the issue of omitted correlated variables, I use the Heckman (1979) two-stage approach. In the first stage, I adapt the Probit model in Rogers and Van Buskirk (2009) to estimate the probability of issuing the bundled management forecast for each quarterly earnings announcement. The explanatory variables include the existence of prior management forecast for current quarter (*MF_EXIST*), the existence of bundled management forecast for the most recent quarterly earnings announcement (*LAG_DBUNDLE*), prior stock return (*PRIOR_RETURN*), the natural log of market value of equity (*LOG_ME*), the natural log of analysts following (*LOG_AC*), the proportion of earnings announcements which meet analyst expectations during the prior four quarters (*MEET*), the absolute value

of earnings surprise (*ABS(SUE)*), the indicator variable (*BADNEWS*) which equals 1 if current earnings surprise is negative and 0 otherwise, the indicator variable (*LOSS*) which equals 1 if the reported earnings number is negative and 0 otherwise, and analyst forecast dispersion (*AFD*),

(Insert Table 5)

The results are presented in Table 5. Firms are more likely to issue bundled management forecasts if there is a prior management forecast for current quarter's earnings, if there is a bundled management forecast for the most recent quarterly earnings announcement, if the prior stock return is higher, if the firm is larger, if there are more analysts following or if the firms are more likely to meet analyst estimates during the prior four quarters. The probability of issuing a bundled management forecast is lower when the absolute value of the earnings surprise is larger, when the current earnings announcement conveys bad news, when the announced earnings number is negative, or when the analyst forecast dispersion is higher. The results are largely consistent with the univariate analysis in Panel B, Table 3. The inverse Mills ratios (IMR) for all firms are calculated accordingly using the estimated coefficients. In the second stage, I include the inverse Mills ratios in Model (2) and present the results in Table 6.

(Insert Table 6)

Under all specifications, the coefficients on the inverse Mills ratios are significant, justifying the endogeneity bias. The coefficient on IMR can be interpreted as the covariance of the error terms of the self-selection model and

the post-earnings announcement drift test. It is significantly negative when the drift-related variables are not controlled, and becomes significantly positive when the drift-related variables are added into the regressions. The main results are qualitatively similar with those presented in Table 4. The accurate bundled forecasts continue to significantly mitigate post-earnings announcement drift with the coefficient of -0.022 ($\beta_3 + \beta_4$ with *p-value* of 0.006) when the ex-ante accuracy is measured by *Dummy_EstimatedAccuracy*.

Robustness Checks

The main analysis examines the effect of ex-ante management forecast accuracy on post-earnings announcement drift when earnings announcements are bundled with management forecasts of next quarter's earnings. In this section, I test the robustness of the inferences.

First, in many cases, besides the management forecasts of next quarter's earnings, management forecasts of two-quarter-ahead earnings, three-quarter-ahead earnings or four-quarter-ahead (and beyond) earnings are also issued along with current quarter earnings announcements. These management forecasts may provide incrementally valuable information about the persistence of current earnings into future earnings. To erase this confounding effect, I define *D_BUNDLE* = 1 when an earnings announcement is bundled only with the management forecast of next quarter's earnings. The inferences regarding the effect of the ex-ante accuracy of the bundled management forecasts on post-earnings announcement drift remain unchanged.

Second, the main analysis focuses on the management forecasts of next quarter's earnings issued within one trading day around the current quarter earnings announcements. I also widen the event window for the definition of bundled management forecasts, so as to include any management forecast of next quarter's earnings made in the period [-10, +1] or [-30, +1] around the current quarter earnings announcement date (day 0). Investors will incorporate these earlier management forecasts into their reaction to the current quarter earnings announcements as well. I re-estimate Model (2) by treating these earlier management forecasts as bundled managements, the results are very similar with the ones in the main analysis.

Third, in the post-earnings announcement drift test, the sample period is from the second quarter of 1997 to the second quarter of 2007 which includes the time period before the issuance of Regulation Fair Disclosure. Some earnings announcements might be bundled with private management forecasts which may also reduce post-earnings announcement drift through affecting analyst forecasts, but this effect is not captured due to the limited coverage of First Call CIG database before the issuance of Reg FD. Therefore I use the data after the issuance of Reg FD to estimate Model (2a) and get similar results which suggest that on average the bundled management forecasts do not mitigate post-earnings announcement drift.

Finally, the inferences are unchanged if I define the drift window starting from trading day 2 after the earnings announcement date of Quarter *t*

and ending on trading day -2 relative to the earnings announcement date of Quarter t + 1, or a 60-day drift window as in Liang (2003).

Clustering of the Drift

If management forecasts of next quarter's earnings accelerate investors' reaction to announced earnings, and if management forecasts of next quarter's earnings are not bundled, but issued between earnings announcements, post-earnings announcement drift should cluster around the management forecast announcement dates.[21] Following the method in Zhang (2008), this paper estimates the coefficients of the following model:

$$ADJ\_RET_{i,t} = \gamma_0 + \gamma_1 \ DSUE_{i,t} + \varepsilon_{i,t} \qquad (3)$$

(Insert Table 7)

The model is estimated, separately, with the dependent variable *ADJ_RET* being the drift period return and the management forecast announcement return, which is accumulated over trading days -1, 0, and +1 around the announcement date. As is shown in Table 7, if *ADJ_RET* refers to the drift period return, γ_1 equals 0.060. If *ADJ_RET* refers to the management forecast announcement return, γ_1 equals 0.027[22], which suggests that a large part of the drift is concentrated around the announcements of the management

[21] If the earnings announcements are bundled with management forecasts which are perceived to be inaccurate and there are revised forecasts issued before next earnings announcements, these observations are included as well.

[22] In this regression γ_1 can be interpreted as the abnormal return earned over the management forecast announcement period on a zero-investment portfolio that takes a long position in the highest *DSUE* decile (*DSUE* = 1) and a short position in the lowest *DSUE* decile (*DSUE* = 0).

forecasts, and investors still under-react to last quarter's earnings before that. In addition, γ_2 equals 0.017 if investors regard the management forecasts as inaccurate (*Dummy_EstimatedAccuracy* = 0). The coefficient of *DSUE* equals 0.057 ($\gamma_1 + \gamma_2$) if the ex-ante accuracy of the management forecasts is above the median (*Dummy_EstimatedAccuracy* = 1).

V. CONCLUSION

The under-reaction explanation for post-earnings announcement drift argues that investors do not fully understand the implications of current earnings for future earnings and this under-reaction is corrected at future earnings announcement dates. This paper investigates whether the bundled management forecasts of future earnings, conditional on their ex-ante accuracy, could mitigate post-earnings announcement drift. Using an estimated ex-ante forecast accuracy measure that is based on forecast ability, forecast difficulty and forecast environment, this paper finds that the bundled management forecasts of next quarter's earnings mitigate post-earnings announcement drift only when they are of high ex-ante accuracy. The results hold after modelling the self-selection of issuing bundled management forecasts and a battery of robustness checks.

The additional analysis shows that a large part of the drift clusters around the forecast announcement period when the management forecasts of next quarter's earnings are issued between the earnings announcements, especially when the forecasts are of high ex-ante accuracy, suggesting that the

issuance of management forecasts of future earnings accelerates investors' reaction to announced earnings. This evidence supports the argument that post-earnings announcement drift is at least partly due to investors' failure to fully understand the implications of current earnings for future earnings.

By analyzing the effect of bundled management forecasts and their ex-ante accuracy on post-earnings announcement drift, this paper complements the previous papers which focus on the conference calls and the responsive analysts surrounding the earnings announcement dates. Future study may investigate the effect of other information sources on post-earnings announcement drift, and provide more evidence to explain the formation of the drift.

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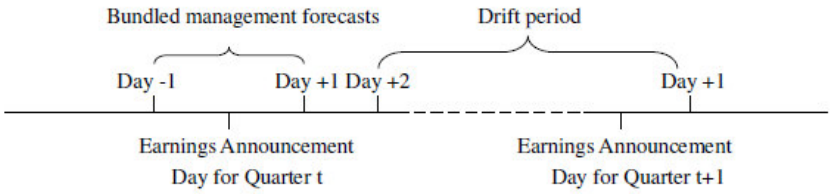

Figure 1. Timeline for measurement of variables. If the management forecast of Quarter t+1's earnings is issued within one trading day around the earnings announcement date of Quarter t, it is treated as the bundled management forecast. Post-earnings announcement drift period starts two trading days after the earnings announcement date of Quarter t and ends on the first trading day after the earnings announcement date of Quarter t + 1.

Table 1. Test of the association between actual management forecast accuracy and forecast properties

Dependent variable: *ActualAccuracy*

	Annual Management Forecasts	Quarterly Management Forecasts
PriorAccuracy (α_1)	0.114***	0.181***
	(5.22)	(9.35)
ForecastHorizon (α_2)	-0.013***	-0.007***
	(-23.02)	(-12.26)
ForecastDifficulty (α_3)	-0.005***	-0.002***
	(−10.07)	(−11.33)
ForecastNews×*GoodNews* (α_4)	-0.935***	-0.997***
	(-10.66)	(-16.75)
ForecastNews×*BadNews* (α_5)	0.441***	0.330***
	(8.28)	(15.20)
CAR (α_6)	0.003***	0.0004***
	(7.26)	(3.86)
Litigation (α_7)	-0.0002	0.0001
	(-0.26)	(0.65)
Concentration (α_8)	-0.001	-0.0002
	(-1.26)	(-0.76)
Distress (α_9)	-0.001	-0.002*
	(-0.27)	(-1.85)
MB (α_{10})	0.0004***	0.0001***
	(5.49)	(6.09)
Size (α_{11})	0.0003*	-0.0001**
	(1.68)	(-1.97)
Bundle(α_{12})	0.001***	0.0001
	(4.51)	(1.22)
Adjusted R^2	45.66%	47.57%
Year Fixed-effect	Yes	Yes
Industry Fixed-effect	Yes	Yes
Number of obs.	20,701	21,790

This table presents results from the regression of actual management forecast accuracy (*ActualAccuracy*) on forecast properties. The management forecasts and the related actual earnings are announced from year 1995 to year 2007. The actual forecast accuracy is calculated as: $ActualAccuracy = -1 \times ABS(ActualEarnings - ManagementForecast)/Price$. *Price* is the average stock price one week before the management forecast announcement date. *PriorAccuracy* is the actual accuracy of the prior management forecast. The actual earnings in relation to the prior forecast need to be announced on or right before current management forecast announcement day. *ForecastHorizon* is the current management forecast horizon, calculated as the management forecast period end date minus the announcement date, deflated by 360. *ForecastDifficulty* is developed by performing Principal Axis Factoring over analyst forecast dispersion, standard deviation of previous analyst forecast errors, firm performance, predicted loss, stock return volatility, bid-ask spread and forecast width, as in Rogers and Stocken (2005). *ForecastNews* is calculated as the management forecast minus the consensus analyst forecast, deflated by *Price.*

(Notes continue on the following page)

GoodNews is an indicator variable which equals 1 if *ForecastNews* is non-negative, and 0 otherwise. *BadNews* is an indicator variable which equals 1 if *ForecastNews* is negative, and 0 otherwise. *CAR* is the firm's abnormal stock return cumulated from day -120 to day -1 relative to the management forecast announcement day. *Litigation* is an indicator variable which equals 1 if the firm is in industries with high litigation risk (Standard Industrial Classification codes 2833-2836, 3570-3577, 3600-3674, 5200-5961, 7370-7374, 8731-8734), and 0 otherwise. *Concentration* is measured by the Herfindahl index using the revenues of firms sharing the same four-digit SIC code. *Distress* is an indicator variable which equals 1 if the firm is in the most distressed decile predicted by Ohlson bankruptcy model, and 0 otherwise. *MB* is the firm's market value of equity deflated by book value of equity. *Size* is the natural log of the firm's total assets. *Bundle* is an indicator variable which equals 1 if the management forecast is issued along with the earnings announcement and 0 otherwise. All continuous variables are winsorized at the 1% and 99% levels. t-stats are in parentheses and are based on standard errors clustered on the firm level. *, **, and *** indicate significance at 10%, 5% and 1% levels respectively.

Panel B: Test of the association between actual management forecast accuracy and ex-ante forecast accuracy measures

Dependent variable: *ActualAccuracy*

Variable	Coefficients	Coefficients	Coefficients
Intercept (α_0)	-0.002***	-0.005***	-0.004***
	(-14.90)	(-29.76)	(-23.35)
EstimatedAccuracy (α_1)	0.752***		
	(29.08)		
PriorAccuracy (α_1)		0.357***	
		(16.96)	
AverageAccuracy (α_1)			0.373***
			(14.02)
Adjusted R^2	24.14%	9.16%	8.92%
Number of management forecasts	41,077	41,077	30,569[#]

This table presents results from the regression of actual management forecast accuracy (*ActualAccuracy*) on ex-ante forecast accuracy measures. *ActualAccuracy* and *PriorAccuracy* are defined in the notes to Panel A. *EstimatedAccuracy* is the ex-ante accuracy measure developed by Model (1). The *EstimatedAccuracy* of 20,148 annual management forecasts and 20,929 quarterly management forecasts can be estimated using Model (1). These management forecasts are issued from the second quarter of year 1997 to the second quarter of year 2007. *AverageAccuracy* is the prior average management forecast accuracy, and the actual earnings related with the prior management forecasts are announced during the previous four quarters relative to the current announcement quarter. *t*-stats are in parentheses and are based on standard errors clustered on the firm level. *, **, and *** indicate significance at 10%, 5% and 1% levels respectively.

[#] *AverageAccuracy* can not be calculated for 10,513 management forecasts because there are no actual earnings related with the prior management forecasts that are announced during the previous four quarters relative to the current announcement quarter.

Table 2. Descriptive statistics

Panel A: Comparison of firm characteristics based on mean values

Mean	Earnings announcements bundled with accurate forecasts	Earnings announcements bundled with inaccurate forecasts	Standalone earnings announcements	Column1 VS Column2 T-stat (p-Value)	Column1 VS Column3 T-stat (p-Value)	Column2 VS Column3 T-stat (p-Value)
Analyst forecast dispersion	0.002	0.007	0.007	-9.94 (<0.01)	-64.23 (<0.01)	-0.39 (0.69)
Firm size (in millions of dollars)	8,049.4	2,743.7	3,427.98	13.34(<0.01)	12.61(<0.01)	-3.78(<0.01)
Analyst coverage	33.06	27.92	18.60	9.53(<0.01)	39.64(<0.01)	22.12(<0.01)
Institutional shareholding	0.60	0.53	0.41	10.09(<0.01)	40.36(<0.01)	20.02(<0.01)
Trading volume (in millions of dollars)	624.64	439.59	317.37	5.71(<0.01)	12.89(<0.01)	7.51(<0.01)
Stock price	32.88	21.34	23.60	33.13(<0.01)	35.64(<0.01)	-7.96(<0.01)
Earnings persistence	0.35	0.36	0.29	-2.66 (<0.01)	13.74(<0.01)	14.57(<0.01)
BADNEWS	0.18	0.24	0.33	-7.90(<0.01)	-28.54(<0.01)	-12.39(<0.01)
4THQTR	0.19	0.22	0.22	-2.97 (<0.01)	-5.45 (<0.01)	-0.76 (0.45)
RESPONSIVE	0.67	0.58	0.36	9.02(<0.01)	48.39(<0.01)	27.90(<0.01)
Number of Firm-Quarters	6,237	4,284	58,048			

Panel B: Comparison of firm characteristics based on median values

Median	Earnings announcements bundled with accurate forecasts	Earnings announcements bundled with inaccurate forecasts	Standalone earnings announcements	Column1 VS Column2 Z-stat (p-Value)	Column1 VS Column3 Z-stat (p-Value)	Column2 VS Column3 Z-stat (p-Value)
Analyst forecast dispersion	0.001	0.003	0.003	-40.11 (<0.01)	-44.90 (<0.01)	7.54 (<0.01)
Firm size (in millions of dollars)	1,672.58	647.15	517.52	32.35(<0.01)	55.15(<0.01)	10.94(<0.01)
Analyst coverage	25	19	11	13.64(<0.01)	57.88(<0.01)	32.11(<0.01))
Institutional shareholding	0.72	0.62	0.44	10.59(<0.01)	43.23(<0.01)	21.42(<0.01)
Trading volume (in millions of dollars)	195.28	149.61	65.79	10.90(<0.01)	49.55(<0.01)	29.02(<0.01)
Stock price	29.17	17.17	17.67	37.03(<0.01)	49.09(<0.01)	-2.18(0.03)
Earnings persistence	0.39	0.41	0.33	-3.69(<0.01)	11.80(<0.01)	13.90(<0.01)
BADNEWS	0	0	0	-8.05(<0.01)	-24.14(<0.01)	-11.46(<0.01)
4THQTR	0	0	0	-2.99 (<0.01)	-5.23 (<0.01)	-0.76 (0.45)
RESPONSIVE	1	1	1	9.06(<0.01)	46.72(<0.01)	28.32(<0.01)
Number of Firm Quarters	6,237	4,284	58,048			

The sample includes 68,569 quarterly earnings announcements from the second quarter of 1997 to the second quarter of 2007. Analyst forecast dispersion is the standard deviation of analyst forecasts divided by the stock price at the fiscal quarter end. Firm size is measured by the market value of equity at the fiscal quarter end. Analyst coverage is the number of analysts following the firm. Trading volume is estimated by multiplying the closing price and the shares traded from day −272 to day −21 relative to the earnings announcement day. Stock price is the average stock price within one week before the earnings announcement. Earnings persistence is the first-order serial correlation of seasonally-differenced earnings estimated over the past 20 quarters. Institutional shareholding is the percentage of shares held by institutional investors at the quarter end that is closest to the earnings announcement day. *BADNEWS* is an indicator variable which equals 1 if the unexpected earnings are negative and 0 otherwise. *4THQTR* is an indicator variable which equals 1 if the earnings announcement is for the fourth fiscal quarter and 0 otherwise. *RESPONSIVE* equals 1 if there is at least one analyst revising the forecast of next quarter's earnings within two trading days after current quarter earnings announcement and 0 otherwise.

Table 3: Analysis about the bundled management forecasts

Panel A: Percentage of earnings announcements with bundled management forecasts by industry

	No of Earnings Announcements	Percentage of Earnings Announcements Bundled with Management Forecasts	Percentage of Earnings Announcements Bundled with Accurate Management Forecasts
Consumer Non-durables	3,487	15.83%	9.15%
Consumer Durables	1,837	13.88%	7.57%
Manufacturing	8,460	15.19%	8.20%
Energy	3,667	4.04%	2.32%
Chemicals and Allied Products	1,507	17.92%	12.48%
Business Equipment	17,186	19.40%	10.22%
Telecommunications	2,664	7.10%	3.90%
Utilities	2,119	12.36%	9.91%
Wholesale and Retail	8,431	19.77%	11.79%
Healthcare	8,358	11.35%	8.85%
Other	10,853	14.84%	9.28%

This table presents the percentage of earnings announcements with bundled management forecasts and with accurate bundled management forecasts by industry. The sample includes 68,569 quarterly earnings announcements from the second quarter of 1997 to the second quarter of 2007.There are 11 industry categories based on the industry classification in Fama and French (1997) and the finance industry (SIC codes 6000-6999) is excluded.

Panel B: Correlation matrix

	DSUE	*D_BUNDLE*	*DFD*	*DME*	*DAC*	*DVOL*	*DPRC*	*DINS*	*DEP*	*BAD*	*4THQTR*	*RESPONSIVE*
DSUE	1.000	0.031	0.039	0.005 (0.19)	-0.014	0.012	0.026	-0.007 (0.05)	-0.016	0.026	-0.007 (0.05)	-0.016
D_BUNDLE	0.033	1.000	0.142	0.137	0.149	0.114	0.143	0.106	0.057	-0.096	-0.017	0.197
DFD	0.048	0.142	1.000	0.403	0.014	0.082	0.545	0.148	-0.058	-0.201	-0.055	0.102
DME	0.012	0.137	0.406	1.000	0.588	0.653	0.748	0.338	0.051	-0.124	0.052	0.354
DAC	-0.009 (0.01)	0.149	0.018	0.587	1.000	0.581	0.389	0.285	0.152	-0.077	0.151	0.454
DVOL	0.015	0.115	0.083	0.648	0.577	1.000	0.307	0.207	0.059	-0.085	0.056	0.353
DPRC	0.033	0.143	0.548	0.748	0.389	0.304	1.000	0.354	0.067	-0.147	0.052	0.255
DINS	-0.004 (0.28)	0.110	0.153	0.348	0.295	0.215	0.363	1.000	0.162	-0.048	0.012	0.168
DEP	-0.017	0.060	-0.055	0.057	0.156	0.062	0.072	0.169	1.000	0.008 (0.03)	0.004 (0.36)	0.081
BAD	-0.777	-0.096	-0.201	-0.124	-0.078	-0.085	-0.148	-0.050	0.009 (0.01)	1.000	-0.010	-0.070
4THQTR	0.009 (0.02)	-0.017	-0.055	0.052	0.151	0.057	0.052	0.013	0.003 (0.37)	-0.010	1.000	-0.082
RESPONSIVE	0.029	0.197	0.103	0.353	0.454	0.352	0.255	0.174	0.082	-0.070	-0.082	1.000

This table presents the correlations among *DSUE, D_BUNDLE* and other drift-related variables. *DSUE* is the decile rank of the standardized

(Notes continue on the following page)

unexpected earnings, and is coded from 0 to 1. *D_BUNDLE* equals 1 if an earnings announcement is bundled with the management forecast of next quarter's earnings, and 0 otherwise. Analyst forecast dispersion (*DFD*), market value of equity (*DME*), analyst coverage (*DAC*), trading volume (*DVOL*), stock price (*DPRC*), institutional shareholding (*DINS*), and earnings persistence (*DEP*) are transformed into decile ranks within each calendar quarter, and coded from 0 to 1. *BADNEWS*, *4THQTR*, and *RESPONSIVE* are defined above. The upper-right triangle reports the Pearson product moment and the Spearman rank order presented in the lower-left triangle. Unless specified in parentheses with the corresponding two-sided p-values, all other correlations are significant at less than 1% level.

Table 4. Regression analysis about the effect of ex-ante management forecast accuracy on post-earnings announcement drift

Dependent variable: *ADJ_RET*

Independent Variable	Model (2a)	Model (2b)	Model (2c)	Model (2d)	Model (2e)	Model (2f)
Intercept (β_0)	−0.027***	−0.085***	−0.027***	−0.085***	−0.085***	−0.085***
	(−8.83)	(−13.58)	(−8.83)	(−13.59)	(−13.55)	(−13.41)
DSUE (β_1)	0.039***	0.068***	0.039***	0.066***	0.067***	0.065***
	(13.40)	(8.12)	(13.40)	(7.95)	(8.07)	(7.66)
D_BUNDLE (β_2)	0.018***	0.008*	0.020***	0.011**	0.010**	0.001
	(4.59)	(1.95)	(4.87)	(2.56)	(2.25)	(0.13)
DSUE × *D_BUNDLE* (β_3)	−0.013*	−0.007	−0.006	0.003	−0.006	0.004
	(−1.78)	(−0.96)	(−0.80)	(0.44)	(−0.85)	(0.51)
DSUE × *D_BUNDLE* ×*Dummy_EstimatedAccuracy* (β_4)			−0.015**	−0.027***		
			(−2.50)	(−4.48)		
DSUE × *D_BUNDLE* ×*Dummy_PriorAccuracy* (β_4)					−0.009	
					(−1.50)	
DSUE × *D_BUNDLE* ×*Dummy_AverageAccuracy* (β_4)						−0.009
						(−1.37)
DSUE ×*DFD* (β_5)		0.048***		0.051***	0.048***	0.053***
		(4.63)		(4.86)	(4.64)	(5.01)
DSUE ×*DME* (β_6)		−0.027		−0.026	−0.026	−0.028
		(−1.57)		(−1.50)	(−1.55)	(−1.61)
DSUE ×*DAC* (β_7)		−0.022*		−0.022*	−0.022*	−0.017
		(−1.82)		(−1.81)	(−1.83)	(−1.42)
DSUE ×*DVOL* (β_8)		−0.036***		−0.036***	−0.036***	−0.034***
		(−3.00)		(−2.98)	(−2.99)	(−2.79)
DSUE ×*DPRC* (β_9)		−0.004		−0.004	−0.004	−0.005
		(−0.28)		(−0.28)	(−0.28)	(−0.36)

(Table continues on the following page)

$DSUE \times DINS$ (β_{10})		0.006		0.005	0.006	0.008
		(0.74)		(0.62)	(0.72)	(0.93)
$DSUE \times DEP$ (β_{11})		0.011		0.011	0.011	0.009
		(1.37)		(1.36)	(1.34)	(1.09)
$DSUE \times BADNEWS$(β_{12})		0.001		0.001	0.001	−0.001
		(0.05)		(0.04)	(0.08)	(−0.07)
$DSUE \times 4THQTR$ (β_{13})		−0.022***		−0.022***	−0.022***	−0.020***
		(−3.42)		(−3.49)	(−3.43)	(−3.10)
$DSUE \times RESPONSIVE$ (β_{14})		−0.008		−0.009	−0.008	−0.010*
		(−1.36)		(−1.41)	(−1.39)	(−1.67)
DFD(β_{15})		−0.018***		−0.019***	−0.018***	−0.019***
		(−3.04)		(−3.07)	(−3.01)	(−3.17)
DME (β_{16})		0.044***		0.043***	0.044***	0.045***
		(4.48)		(4.46)	(4.47)	(4.51)
DAC (β_{17})		0.031***		0.032***	0.031***	0.030***
		(4.50)		(4.53)	(4.50)	(4.22)
$DVOL$ (β_{18})		−0.012**		−0.012*	−0.012*	−0.012*
		(−1.75)		(−1.78)	(−1.75)	(−1.75)
$DPRC$ (β_{19})		0.008		0.008	0.008	0.008
		(1.00)		(1.04)	(0.99)	(0.99)
$DINS$ (β_{20})		0.019***		0.020***	0.019***	0.019***
		(4.12)		(4.16)	(4.13)	(4.06)
DEP (β_{21})		0.011**		0.011**	0.011**	0.011**
		(2.42)		(2.42)	(2.44)	(2.48)
$BADNEWS$(β_{22})		0.009**		0.008**	0.008**	0.009**
		(2.12)		(2.05)	(2.02)	(2.22)
$4THQTR$ (β_{23})		0.029***		0.029***	0.029***	0.028***
		(8.00)		(8.00)	(8.03)	(7.60)
$RESPONSIVE$ (β_{24})		0.001		0.001	0.001	0.002
		(0.21)		(0.26)	(0.25)	(0.57)

(Table continues on the following page)

$\beta_3 + \beta_4$ (*p-value*)			−0.021 (0.006)	−0.024 (0.003)	−0.015 (0.10)	−0.005 (0.63)
Adjusted R^2	1.02%	2.15%	1.03%	2.17%	2.15%	2.15%
Year fixed-effect	Yes	Yes	Yes	Yes	Yes	Yes

This table examines the effect of the ex-ante management forecast accuracy on post-earnings announcement drift, controlling other drift-related variables. The time period is from the second quarter of year 1997 to the second quarter of year 2007. The dependent variable (*ADJ_RET*) is the drift-period return, which equals the compounded raw return minus the compounded benchmark return of the same CRSP size decile and the same CRSP exchange index (NYSE/AMEX or NASDAQ) that the firm belongs to. *DSUE* is the decile rank of the standardized unexpected earnings, and is coded from 0 to 1. The indicator variable *D_BUNDLE* equals 1 if an earnings announcement is bundled with the management forecast of next quarter's earnings, and 0 otherwise. *Dummy_EstimatedAccuracy* equals 1 if *EstimatedAccuracy* is greater than the median, and 0 otherwise. *Dummy_PriorAccuracy* equals 1 if *PriorAccuracy* is greater than the median, and 0 otherwise. *Dummy_AverageAccuracy* equals 1 if *AverageAccuracy* is greater than the median, and 0 otherwise. *DFD*, *DME*, *DAC*, *DVOL*, *DPRC*, *DINS*, *DEP*, *BADNEWS*, *4THQTR*, and *RESPONSIVE* are defined above. *t*-stats (in parentheses) are based on standard errors clustered on the firm level. *, **, and *** indicate significance at 10%, 5% and 1% levels respectively. Year dummies are included in the regressions.

Table 5. Determinants of issuing bundled management forecasts of next quarter's earnings

Dependent variable: *D_BUNDLE*

	Coefficients (p-value)
MF_EXIST	0.976 (<0.01)
LAG_DBUNDLE	1.116 (<0.01)
PRIOR_RETURN	0.144 (<0.01)
LOG_ME	0.064 (<0.01)
LOG_AC	0.096 (<0.01)
MEET	0.254 (<0.01)
ABS(SUE)	−10.876 (<0.01)
BADNEWS	−0.077 (<0.01)
LOSS	−0.431 (<0.01)
AFD	−0.220 (0.07)
Year Fixed-effect	Yes
Industry Fixed-effect	Yes
Number of Obs.	68,567

This table presents the results of the Probit regression with the dependent variable *D_BUNDLE* equals one if the earnings announcement is bundled with the management forecast of next quarter's earnings, and zero otherwise. The time period is from the second quarter of year 1997 to the second quarter of year 2007. *MF_EXIST* is an indicator variable which equals one if there is a prior management forecast for current quarter's earnings. The indicator variable *LAG_DBUNDLE* equals 1 if there is a bundled management forecast for the most recent quarterly earnings announcement. *PRIOR_RETURN* is the prior stock return over day -120 to day -1 relative to the earnings announcement date (day 0). *LOG_ME* is the natural log of market value of equity. *LOG_AC* is the natural log of analysts following. *MEET* is the proportion of earnings announcements which meet analyst expectations during the prior four quarters. *ABS(SUE)* is the absolute value of earnings surprise. The indicator variable *BADNEWS* equals one if current earnings surprise is negative and zero otherwise. The indicator variable *LOSS* equals 1 if the reported earnings number is negative and zero otherwise. *AFD* is the standard deviation of analyst forecasts for current quarter's earnings. All continuous variables are winsorized at the 1% and 99% levels.

Table 6. Regression analysis about the effect of ex-ante management forecast accuracy on post-earnings announcement drift, controlling the self-selection bias

Dependent variable: *ADJ_RET*

Independent Variable	Model (2a)	Model (2b)	Model (2c)	Model (2d)	Model (2e)	Model (2f)
Intercept (β_0)	−0.027***	−0.085***	−0.027***	−0.085***	−0.085***	−0.085***
	(−8.80)	(−13.63)	(−8.80)	(−13.62)	(−13.60)	(−13.44)
DSUE (β_1)	0.039***	0.067***	0.039***	0.066***	0.067***	0.064***
	(13.33)	(8.02)	(13.32)	(7.88)	(7.98)	(7.58)
D_BUNDLE (β_2)	0.024	0.003	0.025***	0.006	0.005	−0.004
	(5.29)	(0.63)	(5.61)	(1.23)	(0.96)	(−0.79)
DSUE × *D_BUNDLE* (β_3)	−0.013*	−0.006	−0.006	0.004	−0.005	0.005
	(−1.87)	(−0.82)	(−0.84)	(0.57)	(−0.73)	(0.61)
IMR	−0.005**	0.005**	−0.005**	0.004*	0.004**	0.004*
	(−2.44)	(2.13)	(−2.57)	(1.93)	(2.09)	(1.93)
DSUE × *D_BUNDLE* ×*Dummy_EstimatedAccuracy* (β_4)			−0.016***	−0.026***		
			(−2.71)	(−4.37)		
DSUE × *D_BUNDLE* ×*Dummy_PriorAccuracy* (β_4)					−0.009	
					(−1.45)	
DSUE × *D_BUNDLE* ×*Dummy_AverageAccuracy* (β_4)						−0.009
						(−1.38)
DSUE ×*DFD* (β_5)		0.048***		0.050***	0.048***	0.053***
		(4.61)		(4.83)	(4.61)	(5.03)
DSUE ×*DME* (β_6)		−0.027		−0.025	−0.027	−0.028
		(−1.56)		(−1.48)	(−1.55)	(−1.62)
DSUE ×*DAC* (β_7)		−0.022*		−0.022**	−0.022*	−0.018
		(−1.84)		(−1.83)	(−1.83)	(−1.44)
DSUE ×*DVOL* (β_8)		−0.036***		−0.037***	−0.036***	−0.034***
		(−3.00)		(−3.03)	(−3.01)	(−2.79)

(Table continues on the following page)

$DSUE \times DPRC$ (β_9)	−0.003	−0.003	−0.003	−0.003	−0.005
	(−0.25)	(−0.25)	(−0.25)	(−0.24)	(−0.35)
$DSUE \times DINS$ (β_{10})	0.006	0.006	0.006	0.006	0.008
	(0.72)	(0.68)	(0.72)	(0.72)	(0.95)
$DSUE \times DEP$ (β_{11})	0.011	0.010	0.011	0.011	0.009
	(1.40)	(1.31)	(1.39)	(1.39)	(1.11)
$DSUE \times BADNEWS$(β_{12})	0.003	0.002	0.003	0.003	0.001
	(0.19)	(0.15)	(0.21)	(0.21)	(0.05)
$DSUE \times 4THQTR$ (β_{13})	−0.022***	−0.022***	−0.022***	−0.022***	−0.020***
	(−3.45)	(−3.46)	(−3.48)	(−3.48)	(−3.13)
$DSUE \times RESPONSIVE$ (β_{14})	−0.008	−0.009	−0.008	−0.008	−0.010*
	(−1.37)	(−1.41)	(−1.38)	(−1.38)	(−1.66)
DFD(β_{15})	−0.018***	−0.018***	−0.018***	−0.018***	−0.019***
	(−2.94)	(−2.97)	(−2.91)	(−2.91)	(−3.10)
DME (β_{16})	0.044***	0.043***	0.043***	0.043***	0.045***
	(4.47)	(4.45)	(4.46)	(4.46)	(4.50)
DAC (β_{17})	0.032***	0.032***	0.032***	0.032***	0.030***
	(4.55)	(4.57)	(4.54)	(4.54)	(4.27)
$DVOL$ (β_{18})	−0.012**	−0.012*	−0.012*	−0.012*	−0.012*
	(−1.71)	(−1.71)	(−1.70)	(−1.70)	(−1.71)
$DPRC$ (β_{19})	0.008	0.008	0.008	0.008	0.008
	(0.99)	(1.01)	(0.98)	(0.98)	(0.97)
$DINS$ (β_{20})	0.020***	0.020***	0.020***	0.020***	0.019***
	(4.15)	(4.15)	(4.16)	(4.16)	(4.07)
DEP (β_{21})	0.011**	0.011**	0.011**	0.011**	0.011**
	(2.42)	(2.45)	(2.43)	(2.43)	(2.49)
$BADNEWS$(β_{22})	0.008*	0.008*	0.008*	0.008*	0.009**
	(1.93)	(1.88)	(1.84)	(1.84)	(2.06)
$4THQTR$ (β_{23})	0.030***	0.030***	0.030***	0.030***	0.028***
	(8.10)	(8.08)	(8.13)	(8.13)	(7.69)

(Table continues on the following page)

RESPONSIVE (β_{24})		0.001 (0.24)		0.001 (0.27)	0.001 (0.27)	0.002 (0.59)
$\beta_3 + \beta_4$ (*p-value*)			−0.022 (0.003)	−0.022 (0.006)	−0.014 (0.13)	−0.004 (0.69)
Adjusted R^2	1.02%	2.16%	1.03%	2.18%	2.16%	2.15%
Year fixed-effect	Yes	Yes	Yes	Yes	Yes	Yes

This table examines the effect of the ex-ante management forecast accuracy on post-earnings announcement drift, controlling the self-selection of issuing bundled management forecasts. The time period is from the second quarter of year 1997 to the second quarter of year 2007. IMR is the inverse Mills ratio calculated for all firms from the estimation results in Table 5. All other variables are defined as before. *t*-stats (in parentheses) are based on standard errors clustered on the firm level. *, **, and *** indicate significance at 10%, 5% and 1% levels respectively. Year dummies are included in the regressions.

Table 7. Market reaction to management forecasts issued between earnings announcements

	Dependent variable is the drift period return	Dependent variable is the management forecast announcement return	Dependent variable is the management forecast announcement return
Variable	Coefficients	Coefficients	Coefficients
Intercept (γ_0)	−0.117*** (−6.59)	−0.077*** (−8.04)	−0.076*** (−7.96)
DSUE (γ_1)	0.060*** (3.57)	0.027*** (3.61)	0.017** (2.13)
DSUE × *Dummy_EstimatedAccuracy* (γ_2)			0.040*** (5.42)
Adjusted R^2	4.06%	5.56%	6.18%
Number of quarterly earnings announcements	3,972	3,972	3,972
Dummy_EstimatedAccuracy = 1	1,488	1,488	1,488
Year fixed-effect	Yes	Yes	Yes

This table compares the drift period return and management forecast announcement return when management forecasts of next quarter's earnings are issued between earnings announcements. The time period is from the second quarter of year 1997 to the second quarter of year 2007. Variables are defined as before. *t*-stats (in parentheses) are based on standard errors clustered on the firm level. Year dummies are included in the regressions. *, **, and *** indicate significance at 10%, 5% and 1% levels respectively.