Voluntary Balance Sheet Disclosure and Post-Earnings-Announcement Drift

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Abstract: This study examines whether voluntary balance sheet disclosure at the time of an earnings announcement mitigates post-earnings-announcement drift (PEAD). Both theory and empirical evidence suggest that balance sheet information complements earnings information in equity valuation. Specifically, prior studies show that investors use a combination of earnings and balance sheet information, such as a firm's book value of equity, to assess a firm's profitability and predict earnings growth. Consistent with these findings, our results show that when firms provide voluntary balance sheet disclosures, the earnings response coefficient in the event window is significantly higher and the corresponding PEAD is significantly lower. These results are robust to controlling for other concurrent disclosures at earnings announcements as well as a set of endogeneity tests. We further find that the impact of voluntary balance sheet disclosure on PEAD is distinct from its potential impact on accrual mispricing.

Key Words: Voluntary Disclosure, Balance Sheet, Post-earnings-announcement Drift

I. INTRODUCTION

In this study, we examine the impact of voluntary balance sheet disclosure on post-earnings-announcement drift (PEAD). It is well-documented in the literature that stock returns drift in the direction of earnings surprises for several weeks after an earnings announcement. This drift was formally identified as a phenomenon by Ball and Brown (1968). Since then, a large number of studies have examined the underlying causes for PEAD.1 One explanation proposed by Bernard and Thomas (1989) is that investors initially under-react to earnings news at the time of an announcement. This underestimation is then corrected at future earnings announcement dates. Consistent with this explanation, Ball and Bartov (1996) find that the market behaves as if it underestimates the magnitude of the serial correlation in quarterly earnings.

This tendency to underestimate the implications of earnings news may reflect a lack of value-relevant information at the time of earnings releases. Indeed, recent studies find that the concurrent disclosure of earnings related information such as management earnings forecasts (Zhang 2012) and analyst earnings forecast revisions (Zhang 2008) can help mitigate PEAD. However, little is known about the effect of non-earnings (balance sheet) information on PEAD. The voluntary disclosure of balance sheet information at the time of quarterly earnings announcements has become an increasingly common practice (e.g., Chen, DeFond and Park 2002; Francis, Schipper, Vincent 2002). This practice has been shown to mitigate accrual anomaly by helping investors better understand the distinction between the accrual and cash flow components of earnings (Louis, Robinson and Sbaraglia 2008; Levi 2008). However, while these studies provide important evidence regarding the usefulness of balance sheet disclosure to investors, they generally do not examine whether such disclosures impact PEAD. In addition, prior literature finds that PEAD and accrual anomaly are two distinct phenomena (Collins and Hribar 2000). Thus, we expect voluntary balance sheet disclosure to impact PEAD and accrual anomaly in different ways. We propose that voluntary balance sheet information can mitigate PEAD by helping investors better assess a firm's profitability and future performance.

The complementary nature of balance sheet information in equity valuation is suggested by both theory and empirical evidence. For instance, Ohlson (1995) finds that information on a firm's total assets can be used to predict the normal component of its future earnings. In another study, Penman and Reggiani (2013) show that, given earnings, information regarding a firm's book value of equity helps to predict both expected earnings growth and returns beyond those indicated by the earnings information. Furthermore, Zhang (2000) shows that equity value is a function of book value of equity, earnings, and investment growth that is conditional on profitability (return on equity). A number of studies have shown that profitability can be used to predict a firm's investment value and growth (Fama and Miller 1972; Bar-Yosef, Callen, and Livnat 1987; Zhang 2000; Hao, Jin, and Zhang 2011). Recognizing the value of balance sheet information, the Financial Accounting Standards Board (FASB) (2008) indicates that income statement data should be interpreted in conjunction with the balance sheet (see SFAC No. 5, paragraph 24b). In sum, the above discussion suggests that the disclosure of balance sheet information at the time of an earnings announcement complements the earnings information for investors and assists them in assessing a firm's profitability and future earnings growth. Thus, we predict that voluntary balance sheet disclosure should improve the pricing efficiency of current earnings news and subsequently reduce the magnitude of PEAD.

We begin our analyses by examining whether the voluntary disclosure of balance sheet at earnings announcements affects market reactions to earnings surprises. This analysis shows that the earnings response coefficient in the event window is significantly higher for firm-quarters with concurrent voluntary balance sheet disclosure. It also shows that the corresponding PEAD for these firms is significantly lower. Specifically, balance sheet disclosure reduces the abnormal return in the drift window by approximately 25 percent.

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[1] See, for example, Bernard and Thomas (1989, 1990), Kothari (2001), and Livnat and Mendenhall (2006) for a comprehensive review.

These results hold when we control for other concurrent information (such as pro forma earnings, managerial guidance, and immediate post-announcement analyst responses) as well as when we control for variables that may affect security pricing anomalies (such as analyst coverage, trading volume, institutional ownership, price, and arbitrage difficulty). These results are also robust to using a Heckman (1979) two-stage approach to control for the endogeneity of voluntary balance sheet disclosure, to using a subsample without cash flows disclosure, and to adding firm fixed effects to address potential concerns about omitted correlated variables. To ensure that our results are not contaminated by the potential impact of balance sheet disclosure on the pricing of accruals (Baber, Chen and Kang 2006; Louis et al. 2008; Levi 2008) or by the potential interaction between accrual anomaly and PEAD (Collins and Hribar 2000), we re-estimate our tests by deleting extreme total accruals or discretionary accruals. Our results continue to hold.

Francis, Lafond, Olsson and Schipper (2007) suggest that announcements with poor earnings quality receive a smaller initial market reaction and have greater PEAD. To address this possibility, we examine whether our results reflect improved earnings quality. Doing so, we find no significant evidence that the voluntary disclosure of balance sheet information at the time of a quarterly earnings announcement reduces the magnitude of discretionary accruals. This result reinforces the notion that our results are due to the supply of additional value-relevant information in a firm's balance sheet rather than any earnings quality improvement. Our results support the argument of Baber et al. (2006) that even firms with managed earnings are likely to commit to their voluntary balance sheet disclosure policy due to the costs related to changing a disclosure policy. Finally, our results also support the finding of Miao, Teoh and Zhu (2015) that investors have only a limited ability to detect discretionary accruals from balance sheet information.

In addition to examining the role of voluntary balance sheet disclosure in reducing PEAD, we examine whether mandatory disclosures in the form of 10Q/10K filings play a similar role. To answer this question, we investigate whether investors correct the underpricing of earnings news in their subsequent 10Q/10K filings a few days to several weeks after the earnings announcement. 10Q/10K filings tend to be lengthier, more complex, and less predictable in their release timing compared to earnings press releases (Li 2008; Loughran and McDonald 2015). As a result, investors likely have much weaker incentives to gather and process information from 10Q/10K filings. Our analysis of 10Q/10K filings provides no evidence that the market corrects its under-reaction to earnings news around 10Q/10K filing dates for firms that did not disclose balance sheet information at the time of their earnings announcements. For these firms, we find that the stocks returns continue to exhibit a greater drift in the direction of earnings surprises several weeks after the 10Q/10K filing dates. These results confirm the important role of earnings-announcement-related voluntary balance sheet disclosure in mitigating PEAD.

Finally, to better understand the mechanisms through which voluntary disclosure at the time of an earnings announcement mitigates PEAD and accrual anomaly, we investigate whether the voluntary disclosure of cash flow information in earnings announcement has an incremental mitigating effect on PEAD.2 Prior studies suggest that cash flow and/or balance sheet information disclosure mitigates accrual anomaly by providing investors with accrual information (Louis et al. 2008; Levi 2008; Miao et al. 2015). 3 In our study we argue that a firm's balance sheet provides information such as book value of total assets or equity that allows investors to better assess a

[2] We examine the *incremental* effect of cash flow disclosure because firms disclosing cash flow almost always disclose balance sheet but firms disclosing balance sheet often do not disclose cash flows. About 40 percent of the firms disclosing balance sheet information also disclose cash flow information while very few firms (around 5 percent) disclose cash flow without disclosing balance sheet information.

[3] These studies generally find that supplemental balance sheets and/or cash flow statements mitigate accrual mispricing or help investors discount the discretionary accrual component of earnings around earnings announcements. With the exception of Miao et al. (2015), these studies generally do not distinguish between cash flow disclosure and balance sheet disclosure.

firm's profitability, investment growth, and future earnings in addition to information that can be used to infer accruals. As a result, balance sheet disclosure can mitigate both PEAD and accrual anomaly. Although cash flow disclosure can mitigate accrual mispricing to a greater extent than can balance sheet disclosure (Miao et al. 2015), we have no reason to predict that it would have an additional impact beyond that of the balance sheet information on PEAD. Our empirical results show that supplementary cash flow disclosure does not affect PEAD for those firms that already disclose their balance sheet information. This finding suggests balance sheet or cash flow disclosure mitigates accrual anomaly and PEAD through different mechanisms.

Our study contributes to the literature on the usefulness of voluntary balance sheet disclosure for investors. While prior literature identifies the importance of balance sheet information for equity valuation (Penman 1992; Ohlson 1995; Burgstahler and Dichev 1997; Collins, Pincus, and Xie 1999; Lev and Zarowin 1999; Zhang 2000; Chen et al. 2002, Penman and Reggiani 2013, among others) and accrual anomaly mitigation (Baber et al. 2006; Louis et al. 2008; Levi 2008), little is known about its impact on PEAD. Our study fills this gap in the literature.

Our findings also provide support for the idea that PEAD is due to the market correction of its under-reaction to earnings news (e.g., Bernard and Thomas 1989, 1990). Recent studies find that the concurrent issuance of earnings forecasts by analysts (Zhang 2008) or managers (Zhang 2012) around the time of an earnings releases helps mitigate PEAD. We extend the findings in these studies by investigating the impact of concurrent non-earnings accounting information such as balance sheet information on PEAD.

The rest of the paper is organized as follows. Section II develops the hypotheses. Section III presents our research design. We describe our main findings in Section IV and additional analyses in Section V. We conclude the paper in Section VI.

II. HYPOTHESES

As mentioned, both theory and empirical evidence suggest that the balance sheet is an important source of value relevant information for investors. For example, Penman (1992) and Ohlson (1995) suggest that information on a firm's total assets can be used to predict the normal component of its future earnings. In another study, Penman and Reggiani (2013) find that the book value of equity complements earnings information in predicting a firm's earnings growth and returns. Other studies find that information on a firm's return on equity can be used to infer both future investments and the value of investment growths (Zhang 2000; Hao et al. 2011). The evidence in these studies suggests that balance sheet disclosures assist investors by helping them promptly understand the valuation implications of current period earnings. Consequently, we predict that the concurrent disclosure of balance sheet information at the time of an earnings announcement should mitigate under-reaction to current earnings news by helping investors better understand the implications of the earnings news.

The concurrent timing of this voluntary disclosure is important in mitigating PEAD. Although balance sheet is disclosed in 10K/10Q filings from a few days to several weeks after an earnings announcement, these mandatory disclosures likely do not play a similar role in forming investors' reactions to current earnings news. The importance and timed nature of earnings announcements leads investors and media to pay closer attention to these announcements (Lee 1992; Sims 2003; Bushee, Core, Guay, and Hamm 2010). Furthermore, earnings announcements are shorter and less complex compared to 10Q/10K filings (Li 2008; Loughran and McDonald 2015). As a result, we expect that voluntary balance sheet disclosure in an earnings release will receive greater attention from investors and will lower their information gathering and processing costs. We thus expect that the voluntary disclosure of balance sheet information at the time of an earnings announcement enables investors to use such information to price earnings news more efficiently and promptly. This leads to the following hypotheses, stated in alternative form:

H1: The disclosure of supplementary balance sheet information together with a firm's quarterly earnings announcement increases the association between the announcement period returns and the earnings news;

H2: The disclosure of supplementary balance sheet information together with a firm's quarterly earnings announcement decreases the association between the post-earnings-announcement returns and the earnings

news.

III. RESEARCH DESIGN AND SAMPLE

Determinants of Balance Sheet Disclosure at Earnings Announcements

We begin our analysis by defining our estimation for the probability that a firm discloses its balance sheet at the time of an earnings announcement. Because balance sheet disclosure at the time of an earnings announcement is voluntary, we use a Heckman's (1979) two-stage approach to statistically correct for any potential self-selection bias in our sample. In stage one, we follow prior studies (Chen et al. 2002; Louis et al. 2008; Levi 2008; D'Souza, Ramesh and Shen 2010) and use the following probit regression to estimate the probability that a firm discloses balance sheet information at the time of its quarterly earnings announcement:

$$Prob(BSD_{ij}) = \rho_0 + \rho_1 TECH_{ij} + \rho_2 LOSS_{ij} + \rho_3 EFE_{ij} + \rho_4 M\&A_{ij} + \rho_5 AGE_{ij} + \rho_6 RETVOL_{ij} + \rho_7 OCFVOL_{ij} + \rho_8 EVOL_{ij} + \rho_9 INST_{ij} + \rho_{10} COVER_{ij} + \rho_{11} CAP_{ij} + \rho_{12} OCF\_RD_{ij} + \rho_{13} OC_{ij} + \rho_{14} ABSTACC_{ij} + \rho_{15} LOGSIZE_{ij} + \rho_{16} BTM + \rho_{17} LEV_{ij} + \rho_{18} QTR4_{ij} + \rho_{19} RATIO\_IS_{ij} + \varepsilon_{ij}, \quad (1)$$

where BSD is an indicator variable that equals 1 if firm i discloses a balance sheet in its quarter j earnings announcement, and 0 otherwise. We identify whether a firm discloses a balance sheet or not in quarterly earnings announcement using Compustat Preliminary History Dataset, which contains accounting data that firms disclosed in their earnings press releases. We define a firm as disclosing its balance sheet if the firm discloses all of the three key balance sheet item: total assets (ATQ_P), total liabilities (LTQ_P), and total equity (SEQQ_P).[4]

In the above estimation, we include a number of control variables. First, following Chen et al. (2002), we include a number of variables to control for investor demand for balance sheet information: high-tech industry (TECH), loss (LOSS), analyst forecast error (EFE), merger and acquisition (M&A), firm age (AGE), and return volatility (RETVOL). Next, following Louis et al. (2008), we include the following additional controls for investor and analyst demand for balance sheet information: operating cash flow volatility (OCFVOL), earnings volatility (EVOL), institutional ownership (INST), and analyst coverage (COVER). Furthermore, since D'Souza et al. (2010) find that firms with higher asset risk as well as cash-strapped firms in the development stage are more likely to provide concurrent balance sheet information, we include capital intensity (CAP) as an inverse measure of asset risk and OCF_RD, an indicator variable equal to 1 if a firm's operating cash flow is negative but its operating cash flow adding R&D expense is positive, and 0 otherwise. In addition, to accommodate the possibility that firm's decision to disclose accruals information (through its balance sheet or cash flow statement) is related to the quality of its accruals (Levi 2008), we include operating cycle (OC) and total accruals (ABSTACC) in our regression.[5] We also control for firm size (LOGSIZE), book to market ratio (BTM), leverage (LEV) (Chen et al.

[4] To verify our classification approach, we randomly select 50 BSD=1 firm-quarters and 50 BSD=0 firm-quarters and read their earnings press releases retrieved from Factiva and Google (we use company name and disclosure date to search for a press release if it is not found in Factiva). Among the 50 BSD=1 firm-quarters, 48 disclose a balance sheet in press releases and 2 provide a summary table containing all three key items (total assets, total liabilities, and total equity). In sharp contrast, among 50 BSD=0 firm-quarters, none disclose a balance sheet or a summary table that contains the three key items. This hand-collected evidence lends support to our balance sheet identification approach.

[5] Barth, Cram and Nelson (2001) report that the predictive power of accruals is decreasing with the length of a firm's operating cycle.

2002; Louis et al. 2008) and fourth quarter indicator (QTR4) (D'Souza et al. 2010). Finally, we include RATIO_IS, the number of non-missing income statement data items disclosed in a firm's earnings press releases divided by the corresponding number of items disclosed in 10Q/10K filings, to control for the potential effect of the disclosure level in income statement on investor interpretations of a firm's earnings (D'Souza et al. 2010).6 We define all of these control variables in greater detail in Appendix A.

In the above regression and all subsequent regressions in our analysis, we include year fixed effects and industry fixed effects based on the Fama and French (1997) 48 industry classification. We also adjust for heteroskedasticity and cluster by both firm and year (Cameron, Gelbach and Miller 2011; Gow, Ormazabal and Taylor 2010). To mitigate any potential multicollinearity concerns, we orthogonalize COVER and LOGSIZE and use the orthogonalized values of COVER for all regressions in which both LOGSIZE and COVER are independent variables.7 We calculate the inverse Mills ratio (IMR) using the parameter estimates we obtain from our first-stage probit regression in Model (1). To control for any potential endogeneity related to balance sheet disclosure, we include the IMR in our second-stage regressions as an additional explanatory variable.

Balance Sheet Disclosure and the Market Pricing of Earnings News

To test whether voluntary balance sheet disclosure increases the market reaction to earnings news around earnings announcement (H1) and mitigates PEAD (H2), we estimate the following second-stage models from our Heckman (1979) framework:

$$CAR3_{ij} = \gamma_0 + \gamma_1 UE_{ij} + \gamma_2 BSD_{ij} + \gamma_3 BSD_{ij} \times UE_{ij} + \gamma_4 CONTROL_{ij} + \gamma_5 CONTROL_{ij} \times UEij + \gamma 6 IMRij + \varepsilon ij \quad (2)$$

$$CARQ1_{ij} = \beta_0 + \beta_1 UE_{ij} + \beta_2 BSD_{ij} + \beta_3 BSD_{ij} \times UE_{ij} + \beta_4 CONTROL_{ij} + \beta 5 CONTROLij \times UEij + \beta 6 IMRij + \varepsilon ij, \quad (3)$$

where CAR3 is the three-day size-adjusted cumulative abnormal returns over trading day -1 to trading day +1 around the earnings announcement date (day 0) of quarter j and CARQ1 is the size-adjusted cumulative abnormal return over the period from two trading days after the earnings announcement for quarter j (current quarter) to one trading day after the earnings announcement for quarter j+1 (the first quarter after quarter j). This drift window is consistent with that used in prior studies (Livnat and Mendenhall 2006, Zhang 2008, and Zhang 2012). Continuing with estimations (2) and (3), UE represents earnings news, defined as the actual earnings per share (from I/B/E/S) for the current quarter minus the mean of the most recent analysts' forecasts related to the current quarter, scaled by the stock price at the beginning of the current quarter. If balance sheet disclosure accelerates the market reaction to earnings news around the time of an earnings announcement (H1), then $\gamma_3$should be significantly positive. Furthermore, if balance sheet disclosure helps mitigate PEAD (H2), then β_3 should be significantly negative.

In the above estimations, CONTROL represents a vector of control variables that prior studies have identified as being associated with either market anomalies or investor responses to earnings news. In particular, we include firm size (LOGSIZE) and book-to-market (BTM) to proxy for risk and growth, respectively (see Collins and Kothari 1989; Chan and Chen 1991; and Fama and French 1996). We also include price (PRICE) and

[6] The income statement items included for calculating this ratio are as follows: ACCHGQ, COGSQ, CSTKEQ, DOQ, DPQ, DVPQ, IBADJQ, IBCOMQ, IBQ, MIIQ, NIQ, NOPIQ, OIBDPQ, PIQ, SALEQ, SPIQ, TXDIQ, TXTQ, XIDOQ, XINTQ, XIQ, XRDQ, XSGAQ, and IBMIIQ.

[7] The correlation between COVER and LOGSIZE is 0.697. We implement this procedure for all regressions in which LOGSIZE and COVER are independent variables.

trading volume (VOLUME) to control for market frictions related to low price levels or liquidity (see Bhushan 1994; Ball, Kothari, and Shanken 1995; and Mendenhall 2002).8 We include institutional ownership (INST) and analyst coverage (COVER) because firm-specific information is incorporated into prices more slowly for stocks with low investor sophistication (Bartov, Radhakristnan and Krinsky 2000; Collins, Gong and Hribar 2003) and for stocks with low analyst coverage (Hong, Lim, and Stein 2000). Since earnings surprise coefficients are smaller for loss firms, we include LOSS (Hayn 1995). Furthermore, since the market reacts differently to good versus bad news, we include BADNEWS, which equals 1 if the unexpected earnings (UE) is negative and 0 otherwise (Hong et al. 2000; Kothari, Shu and Wysocki 2009)9. Collins, Li and Xie (2009) find that the disclosure of Street earnings (non-GAAP earnings or pro forma earnings) at earnings announcement can explain the increase of information content of earnings announcements over time. We therefore control for STREET, which equals 1 if I/B/E/S actual earnings differ from GAAP earnings in the quarter, and 0 otherwise. To control for analyst responsiveness regarding a particular firm's announcement, we include RESPONSE, which equals 1 if there is at least one analyst revising her forecast for the next quarter's earnings within two trading days after current quarter earnings announcement, and 0 otherwise (Zhang 2008). To control for differences in reporting incentives and constraints between the fourth and interim quarters (e.g. Mendenhall and Nichols 1988; Dhaliwal, Gleason and Mills 2004), we include the fourth quarter indicator variable QTR4. Finally, as before, IMR is the inverse Mills ratio using the parameter estimates from the probit regression in Model (1). Detailed descriptions of this set of variables are also provided in Appendix A.

All continuous independent variables are ranked from 0 to 9 and then scaled by 9 to range from 0 to 1 (e.g., Bernard and Thomas 1990).10 We address the issue of potential outliers by deleting any observations with values that fall in the extreme 1 percent for our dependent variables, i.e., CAR3 for Model (2) and CARQ1 for Model (3). In addition, we re-run Models (1) to (3) with a subsample of firms that do not provide concurrent cash flow disclosures. For each firm quarter, if operating cash flow (OANCFQ_P) is included in the Compustat Preliminary History Dataset, we define the cash flow disclosure indicator variable (CFD) as equal to 1, and 0 otherwise.

Sample and Descriptive Statistics

We begin with the set of firm quarters from the first quarter of 2000 to the fourth quarter of 2012 included in the Compustat Preliminary History dataset.11 We then merge this sample with those observations included in the Compustat Fundamentals Quarterly database, which contains accounting data disclosed in 10Q/10K filings. Note that we delete utility and financial companies from our sample because the financial statement format for these firms is different from that for industrial companies. We also delete firms not covered by CRSP, since we need the stock price and return data of each firm to calculate size adjusted returns and other control variables. In addition, we delete any firm quarters without actual earnings or analyst earnings forecasts in the I/B/E/S Detail

[8] The correlation between VOLUME and LOGSIZE is 0.672 and the correlation between PRICE and LOGSIZE is 0.679. To mitigate any potential multicollinearity, we orthogonalize VOLUME and LOGSIZE, PRICE and LOGSIZE, and use our orthogonalized values of VOLUME and PRICE in all regressions in which LOGSIZE, VOLUME and PRICE are independent variables. Our results without using orthogonalized values are similar.

[9] However, the evidence on this asymmetric market reaction is mixed. While Hong et al. (2000) find that bad news travels more slowly than good news in the market, Kothari et al. (2009) find a greater market reaction to bad news compared to good news.

[10] We use the ranked continuous variables for the portfolio test in the drift model. For consistency, we use the same ranked continuous variables in the ERC model. However, using unranked continuous variables in ERC tests yields qualitatively similar results.

[11] We start our sample period in 2000 because the Computat Preliminary database is less reliable in its coverage of firms prior to 2000 (D'Souza et al. 2010).

History file since we need these data to calculate unexpected earnings. Finally, we delete any observations with an earnings announcement date more than 90 days after the corresponding fiscal period-end, a filing date within 5 days after earnings announcement date, unexpected earnings that fall in the extreme 1 percent at both tails for each quarter, or without sufficient data to estimate our first stage disclosure model. Our final sample includes 66,345 firm-quarter observations. We outline our sampling procedure in Table 1.

TABLE 1

Sampling Procedure

Steps	Observations after each step
2000Q1-2012Q4 from Compustat Preliminary History file	452,789
Delete firms in SIC 4900-4949 & 6000-6999	348,248
Merge with CRSP database	256,384
Merge with I/B/E/S database	150,530
Delete firms with no earnings announcement within 90 days after fiscal quarter end	148,375
Delete filing date within 5 days after earnings announcement	101,723
Delete observations without sufficient data to estimate the disclosure model	67,697
Delete extreme 1% unexpected earnings	66,345

Table 2 presents the descriptive statistics for our variables conditional on whether a firm discloses its balance sheet information at its quarterly earnings announcement. This table also presents the results for our corresponding two-sample tests for the mean and median differences across our disclosure and non-disclosure subsamples. From Table 2, we see that, of our full sample of firms from 2000 to 2012, 87 percent disclose balance sheet information (BSD=1) while 33 percent disclose cash flow information (CFD=1) at the time of their quarterly earnings announcement. For those that disclose balance sheet information (57,560 firm quarter observations), 37.36 percent also disclose cash flow information. However, for those that do not disclose balance sheet information (8,785 firm quarter observations), only 4.69 percent disclose cash flow information. Our t-tests for mean differences and Wilcoxon tests for median differences for BSD determinants indicate that our balance sheet disclosure subsample differs systematically from the subsample of firms that do not disclose balance sheet information. We discuss details next when we estimate the probit model, since the univariate comparison yields similar results to those from the probit estimation.

Table 3 presents the results from our probit estimation of balance sheet disclosure, the first stage of our Heckman (1979) procedure. Column 1 of Table 3 presents the results for the full sample while Column 2 presents the results for the no-cash-flow-disclosure subsample. Consistent with the findings of Chen et al. (2002), our results indicate that firms are more likely to disclose balance sheet information if they are (1) in high technology industries, (2) reporting losses, (3) younger, and (4) with more volatile stock returns. However, we find no significant coefficient for M&A in our tests with the extended model and expanded sample period. Consistent with the findings in Baber et al. (2006), we find that the coefficient on EFE is negative and marginally significant.12 Furthermore, consistent with the findings of Louis et al. (2008), our results show a positive association between balance sheet disclosure and analyst coverage, percentage of institutional holdings, and cash flow volatility, but a negative association between balance sheet disclosure and a firm's book to market ratio, size and degree of

[12] Prior literature documents mixed results for the association between EFE and balance sheet disclosure. Chen et al. (2002) find a positive association, while Baber et al. (2006) find an insignificant and sometimes negative association.

TABLE 2

Descriptive Statistics

	BS=1 (N=57,560)			BS=0 (N=8,785)			Difference	
	Mean	Median	Std Dev	Mean	Median	Std Dev	Mean	Median
CFD	0.3736	0.0000	0.4838	0.0469	0.0000	0.2114	0.3267 ***	0.0000 ***
TECH	0.4087	0.0000	0.4916	0.2073	0.0000	0.4054	0.2014 ***	0.0000 ***
LOSS	0.2591	0.0000	0.4382	0.1768	0.0000	0.3815	0.0823 ***	0.0000 ***
EFE	0.7281	1.0000	0.4449	0.7209	1.0000	0.4486	0.0072	0.0000
M&A	0.0741	0.0000	0.2620	0.0565	0.0000	0.2308	0.0176 ***	0.0000 ***
AGE	18.7101	14.0000	14.8076	23.4489	17.0000	17.4022	-4.7388 ***	-3.0000 ***
RETVOL	0.0329	0.0280	0.0183	0.0298	0.0257	0.0168	0.0031 ***	0.0023 ***
OCFVOL	0.0607	0.0487	0.0480	0.0509	0.0436	0.0364	0.0098 ***	0.0051 ***
EVOL	0.0266	0.0117	0.0459	0.0179	0.0090	0.0329	0.0087 ***	0.0027 ***
INST	0.6017	0.6837	0.3160	0.5455	0.6336	0.3190	0.0562 ***	0.0501 ***
COVER	1.6086	1.6094	0.9307	1.5812	1.6094	0.9926	0.0274 **	0.0000
CAP	0.4527	0.3523	0.3438	0.5870	0.5136	0.3842	-0.1343 ***	-0.1613***
OCF_RD	0.0477	0.0000	0.2132	0.0171	0.0000	0.1296	0.0306 ***	0.0000 ***
OC	4.6307	4.6967	0.7091	4.4790	4.5846	0.8510	0.1517 ***	0.1121 ***
ABSTACC	0.0325	0.0218	0.0365	0.0279	0.0189	0.0313	0.0046 ***	0.0029 ***
LOGSIZE	6.6984	6.5809	1.6784	7.1638	6.9895	1.9850	-0.4654 ***	-0.4086 ***
BTM	0.5213	0.4216	0.4456	0.5672	0.4387	0.5039	-0.0459 ***	-0.0171 ***
LEV	0.2242	0.1706	0.2179	0.3320	0.3147	0.2239	-0.1078 ***	-0.1441 ***
QTR4	0.2919	0.0000	0.4546	0.2742	0.0000	0.4461	0.0177 ***	0.0000 ***
RATIO_IS	0.8518	0.8571	0.1164	0.7720	0.8333	0.2039	0.0798 ***	0.0238 ***

All variables are defined in Appendix A.

leverage. The findings in Table 3 also show that cash-strapped development stage firms are more likely to disclose balance sheet information, consistent with the findings of D'Souza et al. (2010). Finally, the statistics in Table 3 show that firms are more likely to disclose balance sheet information at their fourth quarter earnings announcement. In addition, we find that firms that disclose more income statement items in their earnings announcements are more likely to disclose balance sheet information.

TABLE 3

Determinants of Balance Sheet Disclosure at Earnings Announcement

	Full Sample	CFD=0 Sample
	BSD	BSD
Variables	(1)	(2)
TECH	0.391***	0.395***
	(4.36)	(3.96)
LOSS	0.108**	0.120**
	(2.31)	(2.43)
EFE	-0.038*	-0.035
	(-1.66)	(-1.49)
M&A	0.006	-0.056
	(0.10)	(-0.70)
AGE	-0.004*	-0.003
	(-1.93)	(-1.27)
RETVOL	5.908***	6.386***
	(4.71)	(5.36)
OCFVOL	2.071***	1.897***
	(4.52)	(4.36)
EVOL	-0.022	0.020
	(-0.05)	(0.05)
INST	0.201**	0.313***
	(2.49)	(3.52)
COVER	0.105***	0.127***
	(5.51)	(6.22)
CAP	0.097	-0.019
	(1.10)	(-0.20)
OCF_RD	0.148*	0.142*
	(1.87)	(1.68)
OC	-0.022	-0.029
	(-0.56)	(-0.70)
ABSTACC	-0.286	-0.292
	(-0.94)	(-0.84)
LOGSIZE	-0.057***	-0.114***
	(-2.99)	(-3.80)
BTM	-0.189***	-0.228***
	(-3.58)	(-3.65)
LEV	-0.696***	-0.784***
	(-6.39)	(-6.62)
QTR4	0.144***	0.086**
	(4.87)	(2.28)
RATIO_IS	2.353***	1.900***
	(17.94)	(12.09)
Year Fixed Effect	Yes	Yes
Industry Fixed Effect	Yes	Yes
Observations	66,345	44,426
pseudo R^2	22.99%	24.25%

All variables are defined in Appendix A. Column 1 reports the results for the full sample and column 2 reports the results for the CFD=0 subsample, where the CFD=0 subsample consists of firm quarter observations without cash flow disclosure. For brevity, industry and year fixed effects are included but not reported. We base z-statistics on robust standard errors corrected for heteroscedasticity and clustering of observations by both firm and year. *, **, and *** denote significance at 10%, 5%, and 1% levels (two-tailed), respectively.

IV. MAIN RESULTS

Market Reaction around an Earnings Announcement

In Table 4, we present our results from estimating the effect of balance sheet disclosure on the earnings response coefficient (ERC) around a firm's earnings announcement (i.e., Model (2)). We present the full sample results in Columns 1 and 2 (without and with controls, respectively) and the no-cash-flow-disclosure subsample results in Columns 3 and 4 (without and with controls, respectively). From the results in Column 2, we see that the coefficient for UE is 0.073 (z statistic of 8.15) and the coefficient for the interaction of BSD and UE is 0.012 (z statistic of 3.74), suggesting that the ERC for firms that disclose balance sheet information is 16 percent larger than the ERC for firms that do not. The findings in Columns 1, 3, and 4 show similar results. Thus we conclude that our results support H1.

Examining the results for our control variables, we find that the magnitude of ERC increases with the percentage of institutional shareholdings (INST) and level of analyst responsiveness (RESPONSE) (Zhang 2008), but decreases with firm size (LOGSIZE) and trading volume (VOLUME) (Mendenhall 2002). We also find a larger ERC for firms reporting bad news (BADNEWS) (Kothari et al. 2009) but a smaller ERC for loss making firms (LOSS) (Hayn 1995). Finally, consistent with Collins and Kothari (1989), we find a positive association between ERC and growth (the inverse of BTM). The coefficients on the inverse Mills ratios (IMR) are statistically significant, justifying our use of a control for endogeneity.

TABLE 4

Balance Sheet Disclosure and Earnings Announcement Returns

	Full Sample		CFD=0 Sample	
	CAR3	CAR3	CAR3	CAR3
Variables	(1)	(2)	(3)	(4)
UE	0.069***	0.073***	0.068***	0.077***
	(12.04)	(8.15)	(11.98)	(7.08)
BSD	-0.009***	-0.006***	-0.009***	-0.007***
	(-4.48)	(-4.13)	(-4.53)	(-4.14)
BSD*UE	**0.013*** **	**0.012*** **	**0.010** **	**0.012*** **
	(2.75)	**(3.74)**	**(2.19)**	**(4.07)**
LOGSIZE		0.014***		0.015***
		(3.48)		(3.19)
BTM		0.016***		0.018***
		(3.76)		(3.91)
PRICE		-0.007*		-0.008*
		(-1.67)		(-1.73)
VOLUME		0.009***		0.014***
		(3.12)		(4.29)
INST		-0.006**		-0.004
		(-2.29)		(-1.21)
COVER		-0.000		-0.000
		(-0.02)		(-0.09)
LOSS		0.009***		0.008*
		(2.61)		(1.87)
BADNEWS		-0.019***		-0.019***
		(-5.84)		(-5.35)
STREET		-0.006***		-0.005***
		(-3.64)		(-2.63)
RESPONSE		-0.014***		-0.014***
		(-7.62)		(-5.37)
QTR4		0.008***		0.006***
		(3.60)		(2.97)

LOGSIZE*UE		-0.032***		-0.036***
		(-4.54)		(-4.14)
BTM*UE		-0.019***		-0.017**
		(-3.52)		(-2.32)
PRICE*UE		0.012**		0.017***
		(2.37)		(2.96)
VOLUME*UE		-0.025***		-0.033***
		(-3.95)		(-4.80)
INST*UE		0.025***		0.021***
		(5.47)		(3.39)
COVER*UE		0.001		0.004
		(0.31)		(0.74)
LOSS*UE		-0.037***		-0.040***
		(-9.07)		(-6.50)
BADNEWS*UE		0.047***		0.049***
		(4.71)		(3.94)
STREET*UE		0.004		0.003
		(1.52)		(0.67)
RESPONSE*UE		0.027***		0.026***
		(7.38)		(5.73)
QTR4*UE		-0.015***		-0.015***
		(-4.50)		(-3.83)
IMR		0.008**		0.010**
		(2.16)		(2.25)
Year Fixed Effect	Yes	Yes	Yes	Yes
Industry Fixed Effect	Yes	Yes	Yes	Yes
Observations	64,800	64,792	43,486	43,478
Adj. R^2	8.94%	10.60%	8.11%	9.95%

All variables are defined in Appendix A. All continuous independent variables (UE, LOGSIZE, BTM, COVER, INST, VOLUME, and PRICE) are ranked from 0 to 9 and then scaled by 9 to range from 0 to 1. Columns 1 and 2 report the results (without and with controls, respectively) for the full sample and Columns 3 and 4 report the results (without and with controls, respectively) for the CFD=0 subsample, where the CFD=0 subsample consists of firm quarter observations without cash flow disclosure. IMR (the inverse Mills ratio) for the full sample and the CFD=0 sample, is calculated using the parameter estimates from the first-stage probit regression in Model (1) for the full sample and the CFD=0 sample respectively. To prevent any undue influence by outliers, we estimate the regression after deleting observations with an extreme 1% value of the dependent variable (CAR3). For brevity, industry and year fixed effects are included but not reported. We base z-statistics on robust standard errors corrected for heteroscedasticity and clustering of observations by both firm and year. *, **, and *** denote significance at 10%, 5%, and 1% levels (two-tailed), respectively.

Effect of Balance Sheet Disclosure on PEAD

Table 5 reports the results from estimating the effect of voluntary balance sheet disclosure on PEAD (i.e., Model (3)). Again, Columns 1 and 2 present the results for our full sample (without and with controls, respectively), while Columns 3 and 4 present the results for our no-cash-flow-disclosure subsample (without and with controls, respectively). The results in Column 2 show that the coefficient for UE is 0.069 (z-statistic of 3.02) and the coefficient for the interaction of BSD and UE is -0.017 (z-statistic of -2.33), suggesting that BSD reduces the abnormal return in the drift window by approximately 25 percent (0.017/0.069). The results without our control variables (Column 1) as well as the results for the subsample without cash flow disclosure (Columns 3 and 4) are similar, confirming that balance sheet disclosure mitigates PEAD in the absence of cash flow disclosure. Thus we conclude that our Table 5 results support H2.

TABLE 5

Balance Sheet Disclosure and the Post Earnings Announcement Drift

	Full Sample		CFD=0 Sample	
	CARQ1	CARQ1	CARQ1	CARQ1
Variables	(1)	(2)	(3)	(4)
UE	0.029***	0.069***	0.033***	0.081***
	(3.74)	(3.02)	(4.63)	(2.82)
BSD	-0.001	0.008	-0.002	0.009
	(-0.21)	(1.33)	(-0.36)	(1.37)
BSD*UE	**-0.017***	**-0.017****	**-0.020****	**-0.022*****
	(-1.85)	**(-2.33)**	**(-2.24)**	**(-3.04)**
LOGSIZE		-0.008		-0.021**
		(-0.98)		(-2.23)
BTM		0.008		0.011
		(1.12)		(1.49)
PRICE		-0.014		-0.012
		(-1.49)		(-1.11)
VOLUME		-0.018**		-0.020**
		(-2.49)		(-2.25)
INST		0.018*		0.023*
		(1.82)		(1.72)
COVER		0.007		0.008
		(0.87)		(0.82)
LOSS		-0.006		-0.007
		(-0.67)		(-0.66)
BADNEWS		-0.002		-0.006
		(-0.37)		(-0.94)
STREET		0.006		0.006
		(1.54)		(1.34)
RESPONSE		0.026***		0.029***
		(6.25)		(5.74)
QTR4		0.032***		0.036***
		(5.21)		(4.12)
LOGSIZE*UE		-0.062***		-0.075***
		(-2.87)		(-2.67)
BTM*UE		0.015		0.019
		(1.50)		(1.33)
PRICE*UE		0.004		0.009
		(0.37)		(0.63)
VOLUME*UE		0.012		0.008

		(1.07)		(0.34)
INST*UE		-0.013		-0.015
		(-1.24)		(-1.14)
COVER*UE		-0.011		-0.013
		(-1.11)		(-0.96)
LOSS*UE		-0.025**		-0.031***
		(-2.17)		(-2.63)
BADNEWS*UE		0.030		0.039
		(0.98)		(1.21)
STREET*UE		-0.005		-0.009
		(-0.62)		(-0.77)
RESPONSE*UE		-0.012***		-0.016***
		(-2.81)		(-2.99)
QTR4*UE		-0.027***		-0.037***
		(-3.50)		(-3.66)
IMR		0.063***		0.073***
		(4.18)		(4.81)
Year Fixed Effect	Yes	Yes	Yes	Yes
Industry Fixed Effect	Yes	Yes	Yes	Yes
Observations	64,274	64,265	43,137	43,128
Adj. R^2	0.80%	1.75%	1.02%	2.21%

All variables are defined in Appendix A. All continuous independent variables (UE, LOGSIZE, BTM, COVER, INST, VOLUME, and PRICE) are ranked from 0 to 9 and then scaled by 9 to range from 0 to 1. Columns 1 and 2 report the results (without and with controls, respectively) for the full sample and Columns 3 and 4 report the results (without and with controls, respectively) for the CFD=0 subsample, where the CFD=0 subsample consists of firm quarter observations without cash flow disclosure. IMR (the inverse Mills ratio) for the full sample and the CFD=0 sample, is calculated using the parameter estimates from the first-stage probit regression in Model (1) for the full sample and the CFD=0 sample respectively. To prevent any undue influence by outliers, we estimate the regression after deleting observations with an extreme 1% value of the dependent variable (CARQ1). For brevity, industry and year fixed effects are included but not reported. We base z-statistics on robust standard errors corrected for heteroscedasticity and clustering of observations by both firm and year. *, **, and *** denote significance at 10%, 5%, and 1% levels (two-tailed), respectively.

Turning next to the control variables, we find a number of results that are consistent with those found in prior studies. First, consistent with Zhang (2008), we find that PEAD is lower for firms that are larger, announce fourth fiscal quarter earnings, or have at least one analyst forecast revision within two trading days after the announcement. We further find that PEAD is lower for firms that report a loss, consistent with the notion that losses are less informative than profits about the firm's future prospects (Hayn 1995). Finally, the coefficients on the inverse Mills ratios (IMR) are statistically significant, justifying our use of a control for endogeneity.

Regarding multicollinearity, we find similar results when we do not include our control variables and their interaction terms in our analyses, suggesting multicollinearity is not an issue for our tests. Furthermore, a calculation of the variance inflation factors (VIFs) yields an average VIF under the standard cutoff of 10 (Kennedy 1998), which suggests that multicollinearity is likely not a serious issue in our full model.

Our untabulated results indicate that our main results in Tables 4 and 5 are robust to controlling for bundled managerial guidance (Zhang 2012) or earnings persistence (Mendenhall 2002). As in Zhang (2012), bundled guidance is an indicator variable equal to 1 if the management forecast of next quarter's earnings is issued within one trading day around the earnings announcement date of current quarter, and 0 otherwise. We do not include bundled guidance in our main analyses for two reasons. First, Zhang (2012) shows that bundled guidance on

average does not affect PEAD.13 We confirm that this is indeed the case. Second, the managerial guidance data in the First Call database ends in 2010 while our sample ends in 2012. We do not include earnings persistence in our baseline models for two similar reasons. First, earnings persistence is not significantly associated with the magnitude of PEAD, consistent with the finding in the prior literature (Mendenhall 2002; Zhang 2012). Second, including earnings persistence in our model will cause a sample loss of over 10,000 observations (about 16 percent of the sample). 14

Milian (2015) finds that unsophisticated arbitrageurs take excessive action to exploit PEAD for firms with actively traded stock options (ATSO) immediately prior to the next earnings announcement. Such arbitrage activity causes a reversal of the PEAD pattern (related to the current earnings news) for these easy-to-arbitrage firms at the next earnings announcement. To control for the potential impact of arbitrage activities on PEAD, we include ATSO and its interaction with UE in Model (3). Consistent with the definition in Milian (2015), ATSO equals 1 if a firm has positive open interest (in the options necessary to calculate an at-the-money option spread and option skew) and positive option volume on the day before the next earnings announcement, and 0 otherwise. Our untabulated results regarding the effect of BSD on PEAD continue to hold.15 We do not include ATSO in our baseline models because we include the same set of control variables in our ERC and PEAD models, however, ATSO, which measures active options trading immediately before the next quarter earnings announcement, is not expected to affect the current quarter ERC.

Finally, as a robustness check, we include firm fixed effects in Models (2) and (3) to control for other firm characteristics and re-run our analyses. The results, untabulated, are qualitatively similar to those of our main tests.

V. ADDITIONAL ANALYSES

Ruling out the Effect of Balance Sheet Disclosure on Accrual Anomaly

While Collins and Hribar (2000) find that PEAD and accrual anomaly (Sloan 1996) are two distinct anomalies, they suggest that these two anomalies nevertheless can offset or reinforce each other. Indeed, previous studies find that disclosing accrual information at the time of an earnings announcement can mitigate accrual anomaly (e.g., Levi 2008; Louis et al. 2008). Consequently, we conduct several additional analyses to ensure that our documented effect of balance sheet disclosure on PEAD is distinct from its effect on accrual anomaly.16

First, to phase out any accrual anomaly, we re-estimate our baseline models by removing those observations with extreme discretionary or total accruals.17 Table 6 reports the results from our re-estimations of

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[13] While Zhang (2012) finds that bundled guidance *in general* does not have an effect, she finds that bundled guidance mitigates PEAD when the bundled guidance has high perceived accuracy.

[14] Earning persistence is obtained from a time-series estimation. Following Mendenhall (2002), we define earnings persistence as the first order serial correlation of seasonally differenced earnings estimated over a maximum of 28 and a minimum of 20 consecutive quarters ending the quarter prior to current quarter.

[15] Consistent with the finding of Milian (2015), the coefficient on the interaction term of ATSO and UE is significantly negative.

[16] Cash flow information is required to accurately calculate accruals at the time of the earnings announcement. However, accruals can be estimated based on the changes in a balance sheet's current assets and current liabilities items—an estimation known as the "balance sheet method." For further discussion of the difference between the balance sheet method and cash-flow-based calculations of accruals, see Collins and Hribar (2002).

[17] We follow Louis and Robinson (2005) in estimating discretionary accruals as the residual from the following regression estimated with quarterly data for all Compustat firms in each industry year:

$$TACC_{ij} = \sum_{j=1}^{4} \mu_j Q_{ji} + \pi_1(\Delta SALES_{ij} - \Delta AR_{ij}) + \pi_2 PPE_{ij} + \varepsilon_{ij},$$

Models (2) and (3). In Columns 1 and 2, we report the ERC and PEAD results respectively, after excluding the top and bottom 10 percent total accruals. In Columns 3 and 4, we report the ERC and PEAD results respectively, after excluding the top and bottom 10 percent discretionary accruals. Our results remain qualitatively similar to those reported in Tables 4 and 5, suggesting that our findings are robust to the absence of accrual anomaly. For brevity, we report the results for only the full sample, but the results for the CFD=0 subsample, untabulated, are qualitatively similar.

TABLE 6

The Effect of Balance Sheet Disclosure on PEAD in the Absence of Accrual Anomaly

	Excluding Extreme Accruals		Excluding Extreme Discretionary Accruals	
	CAR3	CARQ1	CAR3	CARQ1
Variables	(1)	(2)	(3)	(4)
UE	0.081***	0.082***	0.079***	0.083***
	(9.16)	(3.19)	(8.04)	(3.72)
BSD	-0.006***	0.009*	-0.006***	0.008*
	(-3.53)	(1.73)	(-3.85)	(1.85)
BSD*UE	**0.011*** **	**-0.019***	**0.012*** **	**-0.015****
	(3.46)	**(-1.76)**	**(3.78)**	**(-2.21)**
Controls	Yes	Yes	Yes	Yes
IMR	Yes	Yes	Yes	Yes
Year Fixed Effect	Yes	Yes	Yes	Yes
Industry Fixed Effect	Yes	Yes	Yes	Yes
Observations	51,870	51,470	51,719	51,371
Adj. R^2	11.00%	1.75%	10.70%	1.85%

All variables are defined in Appendix A. Columns 1 and 2 report the ERC test and PEAD test results, respectively, after excluding top and bottom 10% total accruals. Columns 3 and 4 report the ERC test and PEAD test results, respectively, after excluding top and bottom 10% discretionary accruals. For brevity, industry and year fixed effects, control variables (including interaction terms), and IMR are included but not reported. IMR (the inverse Mills ratio) is calculated using the parameter estimates from the first-stage probit regression in Model (1). We base z-statistics on robust standard errors corrected for heteroscedasticity and clustering of observations by both firm and year. *, **, and *** denote significance at 10%, 5%, and 1% levels (two-tailed), respectively.

We next re-estimate our baseline models after removing observations with extreme accruals and earnings surprises in the same direction to ensure that the effect of balance sheet disclosure on PEAD is not caused by PEAD being offset by accrual anomaly (Collins and Hribar 2000). We also re-estimate our baseline models after removing observations with extreme accruals and earnings surprises in the opposite direction to avoid any difficulties in identifying the effect of balance sheet disclosure on PEAD from its effect on accrual anomaly (Collins and Hribar 2000). Our main results hold in both of these additional analyses (untabulated). In sum, results from this sub-section confirm that our observed effect of balance sheet disclosure on PEAD is distinct from its effect on accrual anomaly.

Price Correction around 10Q/10K Filing Date and Post Filing Date Drift

To further confirm the unique role of balance sheet disclosures made at the time of an earnings announcement in mitigating PEAD, we test the market reaction to the earnings news around and after a firm's

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where TACC is total quarterly accruals; Q is a binary variable taking the value of 1 in quarter *j*, and 0 otherwise; ΔSALES is the quarterly change in sales; ΔAR is the quarterly change in accounts receivable; and PPE is property, plant, and equipment of a firm. All variables, including the indicator variables, are scaled by total assets at the beginning of the quarter.

10Q/10K filings. If the mandatory balance sheet disclosure in the 10Q/10K filings plays a similar role in correcting PEAD, we would expect a positive reaction to earnings news around the 10Q/K filing dates for those firms that do not disclose their balance sheet information at the time of an earnings announcement and an insignificant difference in the post filing date return between voluntary balance sheet disclosers and non-disclosers. However, if the 10Q/10K disclosure does not play a similar mitigating role, we would expect an insignificant market reaction to earnings news around the 10Q/K filing dates and a greater magnitude of drift after the 10Q/10K filing dates for those firms that do not provide voluntary balance sheet disclosures.

To test for the effect of mandatory disclosures on drift, we define our filing date event window as the period from trading day -1 to trading day +1 around a given 10Q/10K filing date (day 0) of quarter j. We define our filing drift window as beginning two trading days after the filing date of quarter j and ending on the first trading day after the earnings announcement date of quarter j+1. We modify Models (2) and (3) by replacing the dependent variables CAR3 and CARQ1 with the cumulative abnormal returns over the quarterly filing event window (CAR3_filing) and the cumulative abnormal returns over the post filing drift window (CARQ1_filing), respectively.

The results of our ERC tests, presented in Table 7 Columns 1 and 3, show that the interaction of BSD and UE is positive but statistically insignificant. Thus we conclude that 10Q/10K disclosures do not correct the under-reaction to earnings news around filing dates for non-disclosing firms. The results of our drift tests in Columns 2 and 4 show that the coefficient on UE remains significantly positive and the interaction of BSD and UE remains significantly negative, suggesting that the effect of the voluntary disclosure of a firm's balance sheet on PEAD persists even after the 10Q/10K filing dates.

TABLE 7

Balance Sheet Disclosure, 10Q/10K Filing Date Returns, and Post Filing Date Drift

	Full Sample		CFD=0 Sample	
	Around Filing Date	Post Filing Date	Around Filing Date	Post Filing Date
Variables	CAR3_filing	CARQ1_filing	CAR3_filing	CARQ1_filing
	(1)	(2)	(3)	(4)
UE	-0.002	0.056***	-0.002	0.058***
	(-0.54)	(3.03)	(-0.27)	(2.87)
BSD	-0.000	0.013**	-0.000	0.013**
	(-0.42)	(2.50)	(-0.22)	(2.45)
BSD*UE	**0.001**	**-0.023*** **	**0.001**	**-0.025*** **
	(0.81)	**(-4.18)**	**(0.54)**	**(-4.35)**
Controls	Yes	Yes	Yes	Yes
IMR	Yes	Yes	Yes	Yes
Year Fixed Effect	Yes	Yes	Yes	Yes
Industry Fixed Effect	Yes	Yes	Yes	Yes
Observations	59,867	59,667	40,402	40,216
Adj. R^2	0.15%	1.12%	0.16%	1.37%

All variables are defined in Appendix A. Columns 1 and 2 report the 10Q/10K filing date return (CAR3_filing) and post filing date return (CARQ1_filing) results, respectively, for the full sample. Columns 3 and 4 report the 10Q/10K filing date return (CAR3_filing) and post filing date return (CARQ1_filing) results, respectively, for the CFD=0 subsample, where the CFD=0 subsample consists of firm quarter observations without cash flow disclosure. To prevent any undue influence by outliers, we estimate the regression after deleting observations with an extreme 1% value of the dependent variable, CAR3_filing and CARQ1_filing, respectively. For brevity, industry and year fixed effects, control variables (including interaction terms), and IMR are included but not reported. IMR (the inverse Mills ratio) for the full sample and the CFD=0 sample, is calculated using the parameter estimates from the first-stage probit regression in Model (1) for the full sample and the CFD=0 sample respectively. We base z-statistics on robust standard errors corrected for heteroscedasticity and clustering of observations by both firm and year. *, **, and *** denote significance at 10%, 5%, and 1% levels (two-tailed), respectively.

Balance Sheet Disclosure and Earnings Quality

Prior research suggests that firms with low quality of earnings experience greater PEAD (Francis et al. 2007) and that supplementary balance sheet and/or cash flow disclosures are useful in helping investors detect the presence of earnings management (Baber et al. 2006). If accrual manipulation can be detected by the market, then management may incur higher costs and have less of an incentive to engage in this activity. To examine the possibility that voluntary balance sheet disclosure is associated with higher quality of earnings, we estimate the following model:

$$ABSDA_{ij} = \tau_0 + \tau_1 BSD_{ij} + \tau_2 LOGSIZE_{ij} + \tau_3 LEV_{ij} + \tau_4 BTM_{ij} + \tau_5 LOSS_{ij} + \tau_6 INST_{ij} + \tau_7 EVOL_{ij} + \tau_8 OCFVOL_{ij} + \tau_9 OC_{ij} + \tau_{10} QTR4_{ij} + \tau_{11} IMR_{ij} + \varepsilon_{ij}, \quad (4)$$

where ABSDA is the absolute value of discretionary accruals (defined earlier in this section). In the above estimation, we include the following firm characteristics associated with earnings management: firm size (LOGSIZE), book to market ratio (BTM), firm leverage (LEV), and a loss indicator (LOSS) (Dechow, Ge and Schrand 2010). We also include institutional investors (INST) to control for the potential effect of an external monitoring mechanism (Chung, Firth and Kim 2002). In addition, we include earnings volatility (EVOL), cash flow volatility (OCFVOL) and operating cycle (OC) as proxies for operating uncertainty, a factor negatively associated with accrual quality (Dechow and Dichev 2002). We also include a fourth quarter (QTR4) indicator because prior research suggests that the quality of fourth quarter earnings is different from that of interim quarter earnings (Kerstein and Rai 2007; Brown and Pinello 2007). Finally, we include IMR, the inverse Mills ratio using the parameter estimates from the probit regression in Model (1) to control for any potential balance sheet disclosure endogeneity. All variables are defined in detail in Appendix A.

The results in Table 8 Columns 1 for the full sample and Column 2 for the subsample of firms without cash flow disclosure show no evidence of improved quality of earnings in the presence of balance sheet disclosure. This finding is consistent with the discussion in Baber et al. (2006, 17): "firms that—for whatever reason—establish a policy to disclose BS/CF information along with quarterly earnings may be reluctant to alter the policy in specific quarters when earnings are managed. Moreover, BS/CF disclosure does not permit investors to unravel EM [earnings management] perfectly, so managers can benefit from EM even when a supplementary disclosure policy is in place."

TABLE 8

Balance Sheet Disclosure and Discretionary Accruals

	Full Sample	CFD=0 Sample
	ABSDA	ABSDA
Variables	(1)	(2)
BSD	**-0.001**	**-0.001**
	(-1.40)	**(-1.04)**
LOGSIZE	-0.002***	-0.002***
	(-12.14)	(-7.41)
LEV	-0.001	0.001
	(-0.99)	(0.77)
BTM	-0.004***	-0.004***
	(-4.26)	(-3.93)
LOSS	0.010***	0.009***
	(6.74)	(6.38)
INST	-0.004***	-0.006***
	(-2.65)	(-3.38)
EVOL	0.043***	0.048***
	(4.90)	(4.73)
OCFVOL	0.119***	0.101***
	(5.70)	(4.71)

OC	0.000	0.001*
	(0.06)	(1.74)
QTR4	0.007***	0.007***
	(8.12)	(8.10)
IMR	-0.001	-0.004***
	(-0.96)	(-2.77)
Year Fixed Effect	Yes	Yes
Industry Fixed Effect	Yes	Yes
Observations	66,140	44,291
Adj. R^2	7.94%	7.31%

All variables are defined in Appendix A. Column 1 reports the results for the full sample and column 2 reports the results for the CFD=0 subsample, where the CFD=0 subsample consists of firm quarter observations without cash flow disclosure. IMR (the inverse Mills ratio) for the full sample and the CFD=0 sample, is calculated using the parameter estimates from the first-stage probit regression in Model (1) for the full sample and the CFD=0 sample respectively. For brevity, industry and year fixed effects are included but not reported. We base z-statistics on robust standard errors corrected for heteroscedasticity and clustering of observations by both firm and year. *, **, and *** denote significance at 10%, 5%, and 1% levels (two-tailed), respectively.

Incremental Effect of Voluntary Cash Flow Disclosure

As reported in Table 2, around 40 percent of the firms that disclose balance sheet information also disclose cash flow information at earnings announcements. Miao et al. (2015) show that cash flow disclosure has an incremental effect over that of balance sheet disclosure on mitigating accrual anomaly because cash flow disclosure helps investors, who have limited attention, better distinguish cash flows and accruals. We next examine whether supplementary disclosures mitigate accrual anomaly and PEAD in different ways by testing whether cash flow information has an incremental effect on the magnitude of ERC and PEAD. To this end, we re-run our analyses restricting our firm quarter observations to those with balance sheet disclosures and conditional on whether firms disclose cash flow information at the time of an earnings announcement. To control for cash flow disclosure endogeneity, we run the following probit model for cash flow disclosure as the first-stage of the Heckman (1979) procedure and calculate the inverse Mills ratio (IMR) using the estimated coefficients:

$$Prob(CFD_{ij}) = \theta_0 + \theta_1 TECH_{ij} + \theta_2 LOSS_{ij} + \theta_3 EFE + \theta_4 M\&A_{ij} + \theta_5 AGE_{ij} + \theta_6 RETVOL_{ij} + \theta_7 OCFVOL_{ij} + \theta_8 EVOL_{ij} + \theta_9 INST_{ij} + \theta_{10} COVER_{ij} + \theta_{11} CAP_{ij} + \theta_{12} OC_{ij} + \theta_{13} ABSTACC_{ij} + \theta_{14} LOGSIZE_{ij} + \theta_{15} BTM_{ij} + \theta_{16} LEV_{ij} + \theta_{17} QTR4_{ij} + \theta_{18} RATIO\_IS_{ij} + \theta_{19} RATIO\_BS_{ij} + \theta_{20} ACC\_DIFF_{ij} + \theta_{21} ACH_{ij} + \theta_{22} CFFD_{ij} + \varepsilon_{ij}. \quad (5)$$

Our model largely follows the balance sheet disclosure model discussed in the previous section with the following adjustments. We drop the proxy for cash-strapped development-stage firms (OCF_RD) since it is only hypothesized to be related to balance sheet disclosure (D'Souza et al. 2010). We add a proxy for the firm's balance sheet disclosure level (RATIO_BS). Both RATIO_BS and RATIO_IS (the income statement disclosure level) control for a firm's tendency to disclose detailed financial statement information in press releases. Following D'Souza et al. (2010), we define RATIO_BS as the number of non-missing balance sheet data items disclosed in earnings releases divided by the corresponding number of items disclosed in 10Q/10K filings.18 We also include a proxy for balance sheet-based accrual measurement error (ACC_DIFF) since this may impact the likelihood of cash flow disclosure (D'Souza et al. 2010). Following D'Souza et al., we define ACC_DIFF as the average accrual difference over rolling five-quarter windows, where the accrual difference in each quarter is measured as the absolute value of the difference between balance sheet-based and cash flow statement-based

[18] The balance sheet items included for calculating this ratio are as follows: CHEQ, RECTQ, INVTQ, ACOQ, ACTQ, DPACTQ, PPENTQ, AOQ, ATQ, DLCQ, APQ, TXPQ, LCOQ, LCTQ, LOQ, DLTTQ, TXDITCQ, MIBQ, LTQ, PSTKQ, CSTKQ, CAPSQ, REQ, CEQQ, SEQQ, PSTKRQ, TSTKQ, PPEGTQ, TEQQ, and MIBNQ.

accruals.19 Furthermore, we add accounting choice heterogeneity (ACH) since analysts may be more likely to forecast cash flows for firms with more heterogeneous accounting choices relative to their industry peers (DeFond and Hung 2003).20 Finally, we add analyst cash flow forecasts (CFFD) as the decision to disclose cash flow information may be prompted by analyst demand. CFFD is an indicator variable which equals 1 if there is an analyst cash flow forecast for the current quarter in the I/B/E/S database, and 0 otherwise. All other variables in the estimation are as defined in Appendix A.

Panel A of Table 9 reports the results from estimating our probit model for cash flow disclosure. These results show that firms disclosing more income statement items (RATIO_IS) and more balance sheet items (RATIO_BS) are also more likely to disclose cash flow information at the time of their earnings announcement, consistent with the finding in Miao et al. (2015). We also find that firms with analyst cash flow forecasts (CFFD) are more likely to disclose cash flow information. We further find that firms with higher operational uncertainty (OCFVOL and RETVOL) are less likely to disclose cash flow information.21

TABLE 9

The Effect of Cash Flow Disclosure on the Post Earnings Announcement Drift

Panel A Determinants of Cash Flow Disclosure at Earnings Announcements

Variables	CFD
TECH	-0.099
	(-0.97)
LOSS	-0.060*
	(-1.72)
EFE	-0.027
	(-1.13)
M&A	0.101*
	(1.76)
AGE	-0.002
	(-0.80)
RETVOL	-6.085***
	(-3.27)
OCFVOL	-0.850*
	(-1.88)

[19] Balance sheet based accruals = ΔCurrent assets - ΔCash - (ΔCurrent liabilities - ΔShort-term debt), and Cash flow statement based accruals = -(CHGAR + CHGINV + CHGAP + CHGTAX+ CHGOTH), where CHGAR is the decrease (increase) in accounts receivable, CHGINV is the decrease (increase) in inventory, CHGAP is the increase (decrease) in accounts payable, CHGTAX is the increase (decrease) in accrued income tax, and CHGOTH is the net change in other current assets/liabilities. We adjust Compustat cash flow statement items (CHGAR, CHGINV, CHGAP, CHGTAX, and CHGOTH) from year-to-date values to current quarter values. All variables in the calculation are deflated by the firm's beginning total assets. We rank the accrual difference within each industry (2-digit SIC) and quarter and then divide the rankings by the number of observations in each industry-quarter group.

[20] Following DeFond and Hung (2003), we compute the index by assigning a value of 1 to each firm whose accounting choice differs from the most frequently used method in that firm's industry for five accounting choices: (1) inventory flow; (2) investment tax credit; (3) depreciation; (4) successful-efforts versus full cost in extractive industries and (5) purchase versus pooling. The score for each firm is summed and then scaled by the number of accounting choices in the industry: five for the extractive industries, three for the banking, insurance, real estate, and trading industries, and four for the remaining industries.

[21] However, we find the opposite sign on these two variables for balance sheet disclosure, suggesting firms have different disclosure incentives for balance sheet versus cash flow disclosures.

EVOL	0.024
	(0.07)
INST	-0.087
	(-1.07)
COVER	-0.005
	(-0.28)
CAP	0.383***
	(4.20)
OC	-0.066
	(-1.37)
ABSTACC	0.403
	(1.12)
LOGSIZE	0.187***
	(7.20)
BTM	0.162***
	(3.49)
LEV	0.504***
	(4.60)
QTR4	0.350***
	(9.61)
RATIO_IS	4.099***
	(15.58)
RATIO_BS	1.399***
	(11.22)
ACC_DIFF	0.013
	(0.13)
ACH	0.146
	(1.00)
CFFD	0.095**
	(2.29)
Year Fixed Effect	Yes
Industry Fixed Effect	Yes
Observations	57,560
pseudo R^2	29.59%

All variables are defined in Appendix A. We run this regression for BSD=1 subsample, where the BSD=1 subsample consists of firm quarter observations with balance sheet disclosure. For brevity, industry and year fixed effects are included but not reported. We base z-statistics on robust standard errors corrected for heteroscedasticity and clustering of observations by both firm and year. *, **, and *** denote significance at 10%, 5%, and 1% levels (two-tailed), respectively.

Panel B Cash Flow Disclosure and Stock Returns Around and After Earnings Announcements

	Announcement Period Returns		Post Announcement Returns	
	CAR3	CAR3	CARQ1	CARQ1
Variables	(1)	(2)	(3)	(4)
UE	0.078***	0.086***	0.012**	0.047**
	(12.79)	(8.14)	(2.19)	(2.12)
CFD	-0.004*	-0.001	0.007	0.002
	(-1.76)	(-0.40)	(1.44)	(0.28)
CFD*UE	**0.011*** **	**0.003**	**0.001**	**0.011**
	(2.75)	**(1.07)**	**(0.13)**	**(1.23)**
Controls	No	Yes	No	Yes
IMR	No	Yes	No	Yes
Year Fixed Effect	Yes	Yes	Yes	Yes
Industry Fixed Effect	Yes	Yes	Yes	Yes
Observations	56,276	56,269	55,776	55,768
Adj. R^2	9.01%	10.60%	0.78%	1.51%

All variables are defined in Appendix A. All continuous independent variables are ranked from 0 to 9 and then scaled by 9 to range from 0 to 1. We run this regression for the BSD=1 subsample, where BSD=1

subsample consists of firm quarter observations with balance sheet disclosure. Columns 1 and 2 report the ERC results and Columns 3 and 4 report the PEAD results. IMR (the inverse Mills ratio) is calculated using the parameter estimates from the first-stage probit regression in Model (4). To prevent any undue influence by outliers, we estimate the regression after deleting observations with an extreme 1% value of the dependent variable, CAR3 and CARQ1, respectively. Industry and year fixed effects are included but not reported in all columns. Control variables (including interaction terms) and IMR are included in Columns 2 and 4 but not reported for brevity. We base *z*-statistics on robust standard errors corrected for heteroscedasticity and clustering of observations by both firm and year. *, **, and *** denote significance at 10%, 5%, and 1% levels (two-tailed), respectively.

To test whether cash flow disclosure has an incremental effect on ERC and PEAD, we modify Models (2) and (3) as follows:

$$CAR3_{ij} = \delta_0 + \delta_1 UE_{ij} + \delta_2 CFD_{ij} + \delta_3 CFD_{ij} \times UE_{ij} + \delta_4 CONTROL_{ij} + \delta_5 CONTROL_{ij} \times UEij + \delta 6 IMRij + \varepsilon ij \quad (6)$$

$$CARQ1_{ij} = \alpha_0 + \alpha_1 UE_{ij} + \alpha_2 CFD_{ij} + \alpha_3 CFD_{ij} \times UE_{ij} + \alpha_4 CONTROL_{ij} + \alpha 5 CONTROLij \times UEij + \alpha 6 IMRij + \varepsilon ij. \quad (7)$$

All variables are previously defined. The results in Panel B Column 1 of Table 9 show that the disclosure of cash flow information significantly increases the magnitude of ERC in the model without control variables. However, the results in Column 2 show that when the control variables are included, cash flow disclosure no longer has a significant impact on ERC. The results in Columns 3 and 4 show no effect of cash flow disclosure on the magnitude of PEAD.

These results regarding cash flow disclosure and PEAD can be interpreted by examining how investors use cash flow and balance sheet information. Cash flow information allows investors to better understand accruals (Miao et al. 2015) and thus has an impact in reducing accrual anomaly. By contrast, balance sheet information allows investors to assess a firm's current profitability, infer investment growth, and predict future performance. Our findings are also consistent with the notion that PEAD and accrual anomaly are two distinct phenomena (Collins and Hribar 2000).

VI. SUMMARY AND CONCLUSION

In this paper, we examine the effect of a firm's voluntary disclosure of balance sheet items at the time of quarterly earnings announcement on post-earnings-announcement drift, or PEAD. Our findings show that those firms that disclose balance sheet information at the time of the announcement experience a lower PEAD. These results hold after we control for other concurrent information (pro forma earnings, managerial guidance, cash flows, and analyst response immediately after earnings announcement) as well as a number of other factors (such as analyst coverage, trading volume, institutional ownership, price, and arbitrage difficulty) that may play a role in explaining security pricing anomalies. Our results are robust to using a Heckman (1979) two-stage approach to control for the endogeneity of voluntary balance sheet disclosure. They are further robust to using firm fixed effects to control for omitted firm fixed characteristics. Finally, they are robust to removing extreme total accruals or discretionary accruals, suggesting that the impact of voluntary balance sheet disclosure on PEAD is distinct from its potential impact on accrual mispricing. In additional analyses, we find that the disclosure of balance sheet information at the time of a 10Q/10K filing does not impact PEAD. We also find no effect of the incremental disclosure of cash flow information on PEAD. This finding serves as additional evidence that balance sheet disclosure mitigates PEAD through mechanisms that are distinct from how balance sheet or cash flow disclosure mitigates accrual pricing anomaly.

Taken together, our results suggest that the voluntary disclosure of balance sheet at the time of an earnings announcements helps investors price earnings news less costly and more efficiently. Our study extends the

literature on the usefulness of balance sheet information to investors. Our study also contributes to the PEAD literature by providing new evidence in support of the under-reaction explanation for this phenomenon.

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APPENDIX A
VARIABLE DEFINITIONS

Variable	Definition
ABSDA	the absolute value of discretionary accruals (DA) which is defined below.
ABSTACC	the absolute value of total quarterly accruals (TACC) which is defined as earnings before extraordinary items minus operating cash flow, deflated by total assets at the beginning of the quarter.
ACC_DIFF	the average accrual difference over rolling five-quarter windows, where the accrual difference is defined as the absolute value of the difference between balance sheet-based and cash flow statement-based accruals. Balance sheet based accruals = ΔCurrent assets - ΔCash - [ΔCurrent liabilities - ΔShort-term debt], and cash flow statement based accruals = -(CHGAR + CHGINV + CHGAP + CHGTAX+ CHGOTH), where CHGAR is the decrease (increase) in accounts receivable, CHGINV is the decrease (increase) in inventory, CHGAP is the increase (decrease) in accounts payable, CHGTAX is the increase (decrease) in accrued income tax, and CHGOTH is the net change in other current assets/liabilities. We adjust Compustat cash flow statement items (CHGAR, CHGINV, CHGAP, CHGTAX, and CHGOTH) from year-to-date values to current quarter values. All variables in the calculation are deflated by beginning total assets. We rank the accrual difference within each industry (2-digit SIC) and quarter and then divide the rankings by the number of observations in each industry-quarter group.
ACH	accounting choice heterogeneity index ranging from 0 to 1. Following DeFond and Hung (2003), we compute the index by assigning a value of 1 to each firm whose accounting choice differs from the most frequently used method in that firm's industry for five accounting choices: 1) inventory flow; 2) investment tax credit; 3) depreciation; 4) successful-efforts v. full cost in the extractive industries and 5) purchase v. pooling. The score for each firm is summed and then scaled by the number of accounting choices in the industry: five for the extractive industries, three for the banking, insurance, real estate, and trading industries, and four for the remaining industries.
AGE	the year of the current quarterly announcement minus the first year the firm appears at the Compustat database.
BADNEWS	an indicator variable which equals 1 if the unexpected earnings (UE) is negative, and 0 otherwise.
BSD	an indicator variable that equals 1 if the firm discloses all three key balance sheet variables: total asset (ATQ_P), total liability (LTQ_P), and total equity (SEQQ_P) in quarterly earnings announcement, and 0 otherwise.
BTM	the book-to-market ratio at the end of the current quarter.
CAP	the ratio of property, plant and equipment to total assets at the end of current quarter.
CAR3	the 3-day size-adjusted cumulative abnormal returns over the quarterly earnings announcement event window from trading day -1 to trading day +1 around earnings announcement date (day 0) of quarter *j*.
CAR3_filing	the 3-day size-adjusted cumulative abnormal returns over the quarterly filing event window from trading day -1 to trading day +1 around 10Q/10K filing date (day 0) of quarter *j*.
CARQ1	the size-adjusted cumulative abnormal return over the period from 2 trading days after the earnings announcement for quarter *j* to 1 trading day after the earnings announcement for quarter *j*+1.
CARQ1_filing	the size-adjusted cumulative abnormal return over the period from two trading days after the filing date of quarter *j* to the first trading day after the earnings announcement date of quarter *j*+1.
CFD	an indicator variable that equals 1 if the firm discloses operating cash flow (OANCFQ_P) in quarterly earnings announcement, and 0 otherwise.
CFFD	an indicator variable that equals 1 if there is analyst cash flow forecast for the current quarter in the I/B/E/S database, and 0 otherwise.
COVER	the natural log of the number of analysts who issue the forecast for the current quarter.
DA	discretionary accruals defined as the residuals from the following regression estimated for each industry year (Louis and Robinson 2005): $TACC_{ij} = \sum_{j=1}^{4} \mu_j Q_{ji} + \pi_1(\Delta SALES_{ij} - \Delta AR_{ij}) + \pi_2 PPE_{ij} + \varepsilon_{ij}$, where TACC is total quarterly accruals; Q is a binary variable taking the value of 1 in quarter *j*, and 0 otherwise; ΔSALES is the quarterly change in sales; ΔAR is the quarterly

	change in accounts receivable; and PPE is property, plant, and equipment. All variables, including the indicator variables, are scaled by total assets at the beginning of the quarter.
EFE	an indicator variable that equals 1 if the absolute value of the analyst forecast error is greater than one cent, and 0 otherwise.
EVOL	the standard of deviation of quarterly earnings before extraordinary items deflated by total assets over at least six of the preceding eight quarters.
IMR	the inverse Mills ratio calculated using the parameter estimates from the first-stage probit regression.
INST	the number of shares held by institutional investors deflated by the number of common shares outstanding.
LEV	the long-term debt, deflated by total assets at the end of the current quarter.
LOGSIZE	the natural log of market value of equity at the end of the current quarter.
LOSS	an indicator variable that equals 1 if earnings before extraordinary items in the current quarter are negative, and 0 otherwise.
M&A	an indicator variable that equals 1 if the firm reports mergers and acquisitions activities during the current quarter, and 0 otherwise.
OC	the natural log of operating cycle which is defined as receivable days (total receivables multiplied by 90 and divided by net sales) plus inventory days (inventory multiplied by 90 and divided by cost of goods sold).
OCF_RD	an indicator variable that equals 1 if operating cash flow is negative while the operating cash flow adding R&D expenses is positive, and 0 otherwise
OCFVOL	the standard of deviation of operating cash flow deflated by total assets over at least six of the preceding eight quarters.
PRICE	the average stock price within one week before the earnings announcement (Mendenhall 2002).
QTR4	an indicator variable that equals to 1 if the current quarter is the fourth quarter, and 0 otherwise.
RATIO_BS	the disclosure ratio of balance sheet items, which is defined as the number of non-missing balance sheet data items disclosed in earnings releases divided by the corresponding number of items disclosed in 10Q/10K filings. The balance sheet items included for calculating this ratio are: CHEQ, RECTQ, INVTQ, ACOQ, ACTQ, DPACTQ, PPENTQ, AOQ, ATQ, DLCQ, APQ, TXPQ, LCOQ, LCTQ, LOQ, DLTTQ, TXDITCQ, MIBQ, LTQ, PSTKQ, CSTKQ, CAPSQ, REQ, CEQQ, SEQQ, PSTKRQ, TSTKQ, PPEGTQ, TEQQ, and MIBNQ.
RATIO_IS	the disclosure ratio of income statement items, defined as the number of non-missing income statement data items disclosed in earnings releases divided by the corresponding number of items disclosed in 10Q/10K filings. The income statement items included for calculating this ratio are: ACCHGQ, COGSQ, CSTKEQ, DOQ, DPQ, DVPQ, IBADJQ, IBCOMQ, IBQ, MIIQ, NIQ, NOPIQ, OIBDPQ, PIQ, SALEQ, SPIQ, TXDIQ, TXTQ, XIDOQ, XINTQ, XIQ, XRDQ, XSGAQ, and IBMIIQ.
RESPONSE	an indicator variable that 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 (Zhang 2008).
RETVOL	the standard deviation of stock returns over 150 days before the earnings announcement.
STREET	an indicator variable that equals 1 if Street earnings (i.e., I/B/E/S actual earnings) differ from GAAP earnings in the quarter, and 0 otherwise.
TACC	earnings before extraordinary items minus operating cash flow, deflated by total assets at the beginning of the quarter.
TECH	an indicator variable that equals 1 if the firm is a high technology firm belonging to SIC codes: 2833–2836 (drugs), 3570–3577 (computer and office equipment), 3600–3674 (electronic and other electrical equipment and components, except computer equipment), 3812–3845 (measuring, analyzing, and controlling instruments), 7371–7379 (computer programming and data processing), or 8731–8734 (research, development, and testing services), and 0 otherwise.
UE	the I/B/E/S actual earnings per share for the current quarter minus mean of the most recent analysts' forecasts of the current quarter, scaled by stock price at the beginning of current quarter.
VOLUME	trading volume estimated by multiplying the closing price and shares traded from day -272 to day -21 relative to the earnings announcement day (Mendenhall 2002).