China Finance Review International

Earnings management and institutional investor trading prior to earnings announcements

Shasha Liu,

Earnings management and institutional investor trading prior to earnings announcements

Shasha Liu
Jinan University, Guangzhou, China

Received 29 January 2018
Revised 13 March 2018
Accepted 13 March 2018

Abstract

Purpose – The purpose of this paper is to investigate if earnings management affects the trades of different investors prior to earnings announcements.

Design/methodology/approach – Using a unique account-level trading data set from the Chinese stock market, the author investigates the different investor trading patterns prior to earnings announcements.

Findings – The author obtains direct evidence to show that: first, institutional investors, particularly active ones, tend to sell (buy) stocks before negative (positive) earnings surprises; second, institutional investors buy stocks intensively with the lowest earnings management and the highest earnings surprises, and the trading patterns are primarily driven by active institutions. No significant trading pattern is observed on the stocks with negative earnings surprises; and third, the author uses a natural experiment in accordance with the Chinese accounting standards reform to address endogeneity, and the causality of the results still holds.

Originality/value – The findings provide clear evidence by emphasizing the importance of earnings management in the formulation of investor decisions.

Keywords Earnings management, Earnings announcements, Institutional investor, Investor trading

Paper type Research paper

1. Introduction

We examine whether earnings management affects investor trading prior to earnings announcements. Although market reactions to earnings announcements have attracted significant academic attention (Battalio and Mendenhall, 2005; Campbell *et al.*, 2009; Hirshleifer *et al.*, 2008; Kaniel *et al.*, 2008, 2012), the relationship between earnings management and the trading behaviors of investors has yet to be fully explored. Likewise, few studies have analyzed the influence of earnings management on investor trading prior to earnings announcements. Only Gao *et al.* (2017) directly examine how investors, especially institutional investors, react to pre-IPO earnings management during the IPO process

Many financial and accounting studies emphasize the long-term significance of the quality of earnings information in the decision-making process of investors and managers. McNichols and Stubben (2008) and Linck *et al.* (2013) report that earnings management significantly affects the financial and investment decisions of firms. However, the direct effects of earnings management on investor trading in a short window are worthy to be examined. We expand the existing literature by examining how earnings management affects the reactions of investors to financial reports.

The difficulty of overcoming the endogeneity hinders the collection of related evidence. The actions of firms (e.g. earnings management) affect the beliefs and expectations of investors, which in turn affect investor trading. However, given that management concentrate on stock prices and cater to shareholders, investor trading may influence the operation and management of firms as well. Therefore, even if we find a significant relationship between earnings management and stock return in the long term, we will not be able to exactly identify

JEL Classification — G14, G23

The author wishes to acknowledge financial support from the National Natural Science Foundation of China (NSFC Grant Nos 71602074, 71772178, 71372130).

China Finance Review International

2044-1398
DOI 10.1108/CFRI-01-2018-0010

the underlying causality. We thus introduce a natural experiment in China and employ an event study on the short window of investor trades to overcome the difficulty.

Second, Campbell *et al.* (2009) point out that numerous questions about institutional trading can only be answered if high-frequency changes in institutional ownership are tracked. In addition, prior studies find that earnings management can be prevented by monitoring institutional investors, which are considered as a homogeneous group as reported by Chung *et al.* (2002) and Mitra and Cready (2005). However, other studies suggest that institutional investors have monitoring incentives that vary depending on their investment horizons.

In particular, we attempt to investigate the effects of earnings management on investor trading prior to earnings announcements, and if so, is there any difference between the effects on institutions and individuals? Considering the importance of earnings management in the decision-making process of market participants and the mixed findings on the advantages of information for institutional investors, we believe in the need to further explore the investor reactions to earnings announcements as well as the role of earnings management in investor trading. Investor behaviors prior to earnings announcements are worthy to be studied from an academic perspective (to support the efficient market hypothesis and the information advantages of investors) as well as from the viewpoint of investors to aid in their decision making regarding asset allocation.

We investigate institutional investor trading and earnings management prior to earnings announcements using daily trading information based on account-level data. The daily changes in institutional ownership in the entire stock market before earnings announcements provide clear evidence for the aforementioned question. The use of daily data likewise prevents sample selection bias, and furthermore, the natural experiment and short window study facilitate the demonstration of causality.

The following predictions are made on the effect of earnings management on reaction of investors to earnings announcements. First, institutional and individual investors demonstrate different trading behaviors prior to earnings announcements. The trading behavior of institutional investors positively predicts forthcoming earnings surprises and subsequent abnormal returns, whereas individual investors lose money through their trades. Second, institutional investors tend to buy more stocks when firms have a lower earnings management level and a high magnitude of earnings surprise.

We begin the empirical study by investigating the different investor trading patterns prior to earnings announcements. Regression results reveal striking differences among the trading behaviors of different investors. Institutions, particularly active ones, sell stocks before the announcement of bad news and buy stocks before positive announcements. Following Han and Kong (2017), we use the terms "active" and "passive" to imply "potentially active" and "potentially passive," respectively. The active group includes institutions, specifically mutual funds and brokerages, with a large number of skilled employees, and thus, has a higher tendency to collect information and less potential to establish business relationships with different companies. The passive group comprises social insurance companies, insurance companies, and non-financial institutions (e.g. corporate shareholders).

Second, we examine if earnings management affects investor trading prior to earnings announcements. When investors can screen the management of firms over earnings, they may consider such information in their investment decisions, thereby influencing their trading according to the earnings management of firms. However, few studies have explored this subject. Our results show that institutions intensively buy stocks with the lowest earnings management and the highest standard unexpected earning (*SUE*) during the pre-event period. Differently, for firms with negative *SUE*, even with the lowest earnings management, institutions do not exhibit any significant stock trading patterns. Moreover, active institutions are the primary driving force behind these trading patterns.

Overall, the results describe institutions as sophisticated investors that can evaluate earnings management and integrate such information in their investment decisions.

Third, we address the endogeneity by introducing a natural experiment as an exogenous shock to earnings management. The Ministry of Finance issued new accounting standards on February 15, 2006 to improve the international convergence of the financial reporting system in the Chinese stock market. The new system required firms to adopt fair value accounting with regard to information disclosure starting on January 1, 2007. Given that the mandatory introduction of International Financial Reporting Standards (IFRS) significantly affects earnings management in Chinese markets (He *et al.* (2012), Zhang *et al.* (2013)), we construct the dummy variable *Reform* as an instrumental variable (IV) of earnings management to denote the exogenous shock with mandatory adoption of IFRS-convergent accounting standards. The IV regression results support our assumptions. In addition, we also employ seven alternative measures of earnings management to further show the robustness of our results.

This paper presents several contributions to extant literature. First, we provide direct evidence for the relationship between earnings management and investor trading behavior. Thus, we extend previous studies on the information content of earnings by examining if earnings management specifically affects investor trading behaviors prior to earnings announcements. By demonstrating that institutions can determine the earnings management of firms and incorporate such information in their trading decisions, we fill the literature gap and complement Gao *et al.* (2017). In other words, we complement the existing literature on the information advantage of institutional investors and on the role of earnings management in the decisions of investors regarding forthcoming earnings.

Second, we examine the trading behaviors of different institutional investors. Previous studies mostly consider these institutions as monitors and categorize them as a homogeneous group. This study proves that institutions exhibit information advantage over individuals and that the behaviors of institutional investors vary significantly. In general, active institutions, rather than passive ones, primarily drive the trading patterns of institutions.

Third, our study shows that individual investors are unlikely to identify earnings management of listed firms. These investors mostly trade in the direction opposite to that of institutions. These results challenge the governments, particularly in emerging markets, who are responsible for protecting minority investors. Furthermore, our results reveal that earnings announcements can generate different trading responses from various investors. Therefore, policy makers who evaluate the usefulness of disclosures (particularly to investors with limited abilities and resources) may opt to consider not only the average price and volume reactions, but the trading responses in different investor segments as well.

Fourth, based on the concept of heterogeneous investors, we may provide a solution to the widely debated issue on the pricing of discretionary accruals (DAs). As posited by Mashruwala and Mashruwala (2011), one important question is whether the accruals quality is a priced risk factor. Several researchers argue in favor of risk interpretation (Francis *et al.*, 2005; Aboody *et al.*, 2005), whereas others reject this view (Core *et al.*, 2008; Mashruwala and Mashruwala, 2011). By dividing investors into different groups, we find that institutional investors, particularly active ones, consider the DAs as a significant pricing factor.

This paper is structured as follows: Section 2 develops the testable hypotheses; Section 3 explains the data, variables, and the methodology; Section 4 presents the major empirical results; and Section 5 concludes the paper.

2. Literature review and hypothesis development

2.1 Investor trading

Previous studies assume that investors demonstrate varying degrees of sophistication. Compared with individuals, institutional investors have more resources for gathering and processing information in financial reports. This advantage encourages in-depth analyses of

earnings information. Thus, on average, institutional investors are more capable of interpreting financial information as compared with individual investors, which enables the former to mitigate market mispricing through informed trading activities. Bartov *et al.* (2000) argue that highly sophisticated investors are skilled at accumulating and evaluating public information, whereas less-sophisticated investors are not as capable of performing in-depth analyses of financial statements and merely rely on other information sources, such as the financial press. Shu (2013) investigates the impact of institutional trading volume on stock market anomalies and finds that institutional trading significantly improves stock price efficiency.

Research suggests that investor sophistication as an important determinant of the relationship between firm-specific information and returns. Walther (1997) shows that excess returns place additional weight on analyst forecasts of firms with high institutional holdings. Bartov *et al.* (2000) detect a negative association between investor sophistication and post-earnings abnormal returns. Jiambalvo *et al.* (2002) point out that the extent to which stock prices lead to earnings is positively related to the percentage of institutional ownership. Collins *et al.* (2003) report that firms with high level of institutional ownership have stock prices that accurately reflect the persistence of accruals. Griffin (2003) reports evidence of institutional investor trading in a manner consistent with the impending corrective disclosure in the months preceding the disclosures. Ke and Ramalingegowda (2005) find that the arbitrage trades of transient institutional investors accelerate the speed that stock prices reflect the implications of current earnings for future earnings. Ali, Klasa and Li (2008) argue that only institutions with medium stakes have incentives to develop private pre-disclosure information and trade on such information. By comparing the trading responses of small and large traders to earnings surprises, Shanthikumar (2012) finds that the relative intensity of the trading response of small traders to earnings surprises generally increases as a series progresses.

Other studies argue that small and large investors trade on different information sets, with the larger investors trading in the most proper manner. Bhattacharya (2001) shows that small traders increase their trading response prior to earnings announcements according to the magnitude of seasonal random-walk forecast errors. Ayers *et al.* (2011) predict and find that small (large) traders continue to trade in the direction of seasonal random-walk-based (analyst-based) earnings surprises after earnings announcements. Battalio *et al.* (2012) show that most investors ignore information on value-relevant accruals upon its release, and that investors who initiate trades of at least 5,000 shares tend to transact in the proper direction.

These pieces of evidence support the idea that individual investors cause or drive abnormal return patterns prior to earnings announcements, whereas institutional investors are more capable of inferring or detecting earnings-related information compared with individuals[1].

2.2 Earnings information and investor trading

Earnings information has a significant function in the decision-making process of investors and firm managements. By using the quarterly or yearly frequency data, Baber *et al.* (2006), Balsam *et al.* (2002), and Francis *et al.* (2005) report that poor earnings management results in a contemporaneous reduction in stock prices. Bradshaw *et al.* (2001), Sloan (1996), Subramanyam (1996), and Xie (2001) show that market participants overprice the discretionary component of income, which temporarily overinflates the stock prices. Therefore, previous studies show that market participants can identify earnings information signals, at least, in the long run.

Several empirical studies indirectly suggest that institutional investors are more adept evaluating accounting information compared with individual investors. Balsam *et al.* (2002) examine returns before 10-Q filing dates. Often, detailed information contained in the form 10-Q is not available when firms announce quarterly earnings and investors are unable to ascertain the discretionary and non-discretionary accrual (NDA) components of earnings until the 10-Q is filed with the Securities and Exchange Commission. Balsam *et al.* discover a

negative relationship between the level of unexpected DAs and cumulative abnormal returns (*CAR*) before the 10-Q filing date. The timing of this relationship, however, is dependent on the level of institutional ownership, which suggests that sophisticated investors incorporate earnings information more efficiently. Collins *et al.* (2003) reveal that firms with high levels of institutional ownership provide higher prices for the accrual component of earnings than firms with low institutional ownership. Ke and Petroni (2004) show that transient institutional investors predict the impending break of in a continuous string of consecutive earnings increases and sell their interests prior to the subsequent price decline. Ali, Chen, Yao and Yu (2008) show that a number of mutual funds tend to hold the stocks of firms with relatively low levels of accruals, and that these funds exhibit superior subsequent returns. Recently, Battalio *et al.* (2012) also show that a vast majority of investors ignore value-relevant accruals information when it is initially released. However, investors who initiate trades of at least 5,000 shares tend to transact in the proper direction. Investors who initiate the smallest trades appear to respond unconditionally to accruals in the wrong direction. By collecting Comment Letters issued by the SEC that question the application of US GAAP by US firms or the application of IFRS by European firms registered with the SEC, Gietzmann and Isidro (2013) find that the SEC's issuance of Comment Letters has a significant effect on the institutional holdings, which is consistent with the SEC's Comment Letters providing insights into the quality of reported financial statements. With a hand-collected sample of all blockholders of S&P 1,500 firms, Dou *et al.* (2016) document significant individual blockholder effects on earnings management and prove that this association is driven primarily by these large shareholders influencing rather than selecting firms' financial reporting practices. They also find that investors recognize the heterogeneity in blockholders' influence on earnings management.

However, most previous studies infer trading from the changes in institutional holdings (13f filing) using quarterly data. Therefore, these studies are unable to accurately measure the trading of institutions (e.g. missing short-term round-trip trading). Although institutions earn an abnormal return or behave related to earnings quality, the underlying cause remains unclear. This observation may be attributed to the superior information that these institutions possess, to the effect of their trading strategies on pricing (e.g. positive feedback), or to the catering behaviors of firms. Campbell *et al.* (2009) argue that many questions on institutional trading can only be addressed by tracking high-frequency changes in institutional ownership.

Our data set includes complete daily trade records of all individual and institutional investors in the Shanghai Stock Exchange (SSE). These daily data reveal the institutions' informed trading and price impact, and we are able to differentiate and classify institutional investors into active and passive institutions, as well as identify the buyer, seller, and initiator of each trade. As such, the present study has no need for classification algorithms, such as that of Lee and Ready (1991).

2.3 Hypothesis

Taken together, previous studies generally suggest that: institutional investors trade in the direction that is consistent with the earnings surprise prior to earnings announcement, whereas individual investors trade in the opposite direction; and investors may use information in accruals to price earnings management more accurately prior to earnings announcements.

Therefore, we expect that the relationship between investor trading and earnings management may be stronger for institutional investors. First, institutional investors may recognize earnings management prior to earnings announcements given their access to more timely sources of information (e.g. conversations with management, analysts, or other institutional investors). Second, sophisticated investors are more capable of decomposing earnings into their discretionary and non-discretionary components compared with

unsophisticated investors. In both cases, the trading behaviors of institutional investors can be expected to heavily depend on the level of earnings management prior to earnings announcements.

We thus develop the following hypothesis:

H1. *Ceteris paribus*, the relationship between institutional investor trading and earnings surprise prior to earnings announcement will be stronger for firms with low earnings management levels than for firms with high earnings management levels.

3. Data and variables

3.1 Data description

We obtain public and private data from different sources for the present study. As our primary data set, the unique account-level data set of institutions and individuals from SSE is used to examine daily institutional trading behaviors. This data set contains all transaction and order records for all investors with accounts in the SSE. By using the investor identity code, we can classify both sides of each trade as originating from either an individual or an institutional account. The order sequence number allows us to determine which party initiated the transaction. More than six billion records of executed transactions are included in the raw data.

Institutional investors in the capital markets of China include mutual funds, social security funds, qualified foreign institutional investors, corporate annuity funds, brokerage firms, companies, and organizations. Statistics from the China Securities Depository and Clearing Corporation show that individual investors hold 69.87 percent of all stock values by the end of 2005. In the past few years, individual investors have been the dominant force in the stock markets of China. However, by the end of 2008, institutional investors hold 54.62 percent of the market value of all tradable A shares, which is the first instance when the proportion of institutional investors has surpassed the landmark 50 percent level.

For each stock in the sample, we obtain the return, volume turnover, market capitalization, book value, return on asset (*ROA*), leverage, earnings per share (*EPS*), cash flow (*CF*), and analyst coverage from the China Stock Market and Accounting Research Database, a leading financial data provider in China.

The SSE data set cover all transactions made from January 1, 2005 to December 31, 2008. All continuous variables are winsorized at the 3rd and 97th percentiles, which is important in Chinese stock market (Shen *et al.,* 2015). The final sample includes 874 stocks with 12,580 earnings announcement events.

3.2 Variable definitions

3.2.1 Measuring the trading behavior of investors. To measure the trading behaviors of each group of investors, we consider an order imbalance method that captures the pressure to buy and sell. In particular, we adopt a trading measure similar to that used by Han and Kong (2017), and Kaniel *et al.* (2008). For each investor type, we derive the total purchases and sales of stocks on day t, subtract the selling volume from the buying volume, and divide it over the average daily trading volume in the previous year. We calculate the net buying (*NB*) for purchases and sales executed that day as follows:

$$NB_{k,i,t} = \frac{\sum_k Buy_{k,i,t} - \sum_k Sell_{k,i,t}}{Avg\ Daily\ Trading\ Volume_{i,[t-252,\ t-1]}} \quad (1)$$

where $NB_{k,i,t}$ is the *NB* of investors in type k for firm i on date t, $Buys_{k,i,t}$ is the buying volume of investors in type-k for firm i on date t, and $Sells_{k,i,t}$ is the sale volume of investors in type-k for firm i on date t. The denominator is the average daily trading volume in the

previous year from day $t-252$ to day $t-1$. In this paper, k represents individual investors, institutional investors, active investors, and passive investors. Our measure of NB only considered executed trades throughout the paper.

Similar to Kaniel *et al.* (2012), we use the abnormal *NB* (*ANB*) as a proxy for the trading patterns of investors before earnings announcements. However, when computing the normal *NB* level of each type of investor, we choose the entire market level of such investor type as the benchmark for eliminating market trend. Specifically:

$$ANB_{k,i,t} = NB_{k,i,t} - E\left[NB_{k,i,t}\right] = NB_{k,i,t} - MktNB_{k,t} \tag{2}$$

where $E\,[NB_{k,i,t}]$ is the expected $NB_{k,i,t}$ estimated as the market level of type-k on day t. $MktNB_{k,t}$ is the average weighted value of the entire NB of the stocks of type-k traded on day t.

Next, we define the cumulative abnormal net buying over the period $[t_1, t_2]$ as follows:

$$CANB_{k,i}^{[t_1,\ t_2]} = \sum_{t=t_1}^{t_2} ANB_{k,i,t} \tag{3}$$

For example, $CANB_{i,k}^{[T_0-3,\ T_0-1]}$ is the cumulative abnormal net buying of type-k for stock i estimated from three days to one day prior to an event.

3.2.2 Measuring CAR. To describe the reaction of investors during the announcement period, we compute for *CAR* over a particular period. In particular, we define the event day (T_0) as the announcement day. The estimation window, $[T_0-240,\ T_0-61]$, is a 180-day period within which we estimate how a stock normally relates to the market. The event window is the period within which we study the market value changes caused by the event. Event windows of different lengths were also used, and similar results are observed.

CAR for each firm is calculated as *CAR* for stock i over the event window, that is:

$$CAR_i^{[t_1,\ t_2]} = \sum_{t=t_1}^{t_2} AR_{i,t} \tag{4}$$

$AR_{i,t}$ is the daily abnormal return of stock i on date t. We use the market model, $R_{i,t} = \alpha_i + \beta_i MR_t + \varepsilon_{i,t}$, to estimate the expected stock returns for firm i at time t within the estimation window. Both $R_{i,t}$ and MR_t are the excess return in in excess of risk-free rate. This regression obtains the estimated coefficients $\hat{\alpha}_i$ and $\hat{\beta}_i$. Then, equation $AR_{i,t} = R_{i,t} - (\hat{a}_i + \hat{b}_i MR_t)$ estimates the $AR_{i,t}$ for stock i within the event window.

3.2.3 Estimation of earnings surprise. To measure earnings surprise, we use a naïve time-series model. Consistent with numerous prior studies, we define earnings surprise as actual earnings minus expected earnings, scaled by the stock price or standard deviation of unexpected earnings[2].

The naïve time-series estimation is typically based on a rolling random walk model, which is advocated by Foster *et al.* (1984), Bernard and Thomas (1989), and Livnat and Mendenhall (2006). In particular, we used a simple standardized measure of periodically adjusted earnings, given as $SUE_{j,T} = UE_{j,T}/Std(UE_{j,T})$, where $SUE_{j,T}$ is the SUE for firm j in period T. In this case, $UE_{j,T}$ represents unexpected earnings, and $Std(UE_{j,T})$ is the standard deviation of unexpected earnings during the former eight periods. We estimate $UE_{j,T}$ using the naïve model: $UE_{j,T} = (AE_{j,T} - AE_{j,T-4})/|AE_{j,T}|$, where $AE_{j,T}$ represents the actual earnings per share reported by the firm in T, and $|AE_{j,T-4}|$ is the absolute value of actual earnings per share in $T-4$. Foster *et al.* (1984) show that the naïve model provides the same conclusion compared with other more accurate models (such as the first-order auto-regressive model in seasonal differences used in Foster, 1977).

3.2.4 Estimating earnings management. As in other studies related to earnings management, we adopt DAs as the main proxy to estimate earnings management. Earnings have two major components, namely, cash flow and accounting adjustments. Accruals are highly vulnerable to management because the determination of the signs and sizes of accruals requires the judgment and estimation of managers. However, not all accruals result from earnings management. Given the industry and operational conditions, certain accrual adjustments must be applied on a regular basis. Therefore, total accruals can be further decomposed into two parts, namely, NDAs and DAs. The magnitude of DAs is expressed as a percentage of the lagged assets of the firm. Given our interest in the degree of earnings management, we use the absolute value of DAs in our study.

We employ a modified version of the Jones model (*MJones*) as our first proxy for earnings management (Jones (1991), Dechow *et al.* (1995)). *MJones* estimates DAs from cross-sectional regressions of total accruals on changes in sales and on property, plant, and equipment (PPE) across industries.

To determine DAs, we run the following cross-sectional OLS regression by the first two-digit standard industrial classification (SIC) code to estimate coefficients α_1, α_2, and α_3 as follows:

$$\frac{TA_{it}}{A_{it-1}} = \alpha_1 \frac{1}{A_{it-1}} + \alpha_2 \frac{\Delta REV_{it}}{A_{it-1}} + \alpha_3 \frac{PPE_{it}}{A_{it-1}} + \varepsilon_{it} \tag{5}$$

where i indexes firms, t indexes time, TA_{it} equals net income minus cash flow from operations, ΔREV_{it} denotes the changes in sales revenues, ΔAR_{it} denotes the changes in receivables, and PPE_{it} denotes the gross *PPE*. All variables are scaled by the total assets at the beginning of the period. We separately estimate the cross-sectional models for each combination of calendar year and two-digit SIC code with a minimum of 15 observations.

We use the estimated $\hat{\alpha}_1$, $\hat{\alpha}_2$, and $\hat{\alpha}_3$ to calculate NDAs as follows:

$$NDA_{it} = \hat{\alpha}_1 \frac{1}{A_{it-1}} + \hat{\alpha}_2 \frac{(\Delta REV_{it} - \Delta AR_{it})}{A_{it-1}} + \hat{\alpha}_3 \frac{PPE_{it}}{A_{it-1}} \tag{6}$$

Afterwards, we derive DA as follows:

$$DA_{it} = \varepsilon_{it} = \frac{TA_{it}}{A_{it-1}} - NDA_{it} \tag{7}$$

All the variables are scaled by the total assets at the beginning of the period. Hence, the magnitude of DAs is expressed as a percentage of the assets of the firm.

Our second measure of earnings management, *EM_ROA*, is the performance-adjusted DAs (Kothari *et al.* (2005)). We use Equation (5) to run the regression and to obtain the residuals (i.e. DAs), and then we rank the firms within each SIC industry into deciles based on their *ROA* during the corresponding period of the last year to adjust for the performance differences across firms. We compute *EM_ROA* as the absolute value of difference between the firm's DA and the median DA for its *ROA* decile.

3.2.5 Control variables. In accordance with prior literature, we also control the following variables. *Size* is the natural logarithm of the total assets. *BM* is the book-to-market value ratio. *TO* is the stock turnover measured over the fiscal quarter. *Leverage* is the ratio of total liabilities to total assets. *ROA* is calculated by dividing the annual earnings of a firm by its total assets.

3.3 Summary statistics

Table I exhibits the descriptive statistics of our sample. Given that the trading data cover the years from 2005 to 2008, we investigate the quarterly earnings announcements from 2004Q4 to 2008Q3. Panel A of Table I describes our sample selection process. The initial sample includes 874 firms with 13,340 earnings announcement events. We exclude 174 announcements of 20 firms in the financial industry. To estimate the earnings management, we further eliminate 586 firm-quarter observations with *SUE* that cannot be estimated and 372 firm quarters that lack data to estimate earnings management. Finally, we obtain 12,208 firm-quarter observations.

Panel B of Table I presents the summary statistics of our key variables. We include the different investors' net buying over the pre-announcement window, alternative earnings management, and other variables. All statistics are estimated at the firm-quarter level. Panel B indicates that individuals tend to become net buyers and that institutions become net sellers prior to earnings announcements. The *CAR* in $[T_0-3, T_0-1]$ is negative, which demonstrates that institutions sell stocks before the announcement of bad news and possess superior information as compared with individuals.

Notably, the measure of investor behavior (i.e. *NB* or *CNB*) is constructed based on the entire market and on all trades that occur between institutions and individuals in the

Panel A: sample selection

Total earnings announcements of 874 firms listed from 2004Q4 to 2008Q3	13,340
Less: earnings announcements of 20 firms in financial industry	−174
Less: firm quarters without necessary data to estimate quarterly *SUE* under random walk model	−586
Less: firm quarters without available earnings management	−372
Number of firm quarters used in main empirical tests (Number of firms)	12,208 (874)

Panel B: summary statistics

Variables	Obs.	Mean	SD	Min	Max
$CNB_{inst,[T0-3,\ T0-1]}$	12,580	−0.025	0.585	−3.870	3.641
$CNB_{active,[T0-3,\ T0-1]}$	12,580	−0.010	0.541	−3.553	3.584
$CNB_{passive,[T0-3,\ T0-1]}$	12,580	−0.009	0.196	−1.611	1.530
$CNB_{ind,[T0-3,\ T0-1]}$	12,580	0.025	0.585	−3.640	3.870
MJones	12,208	0.037	0.042	0.000	0.244
EMROA	12,208	0.023	0.032	0.000	0.235
$CAR_{[T0-10,T0-4]}$	12,580	−0.006	0.078	−0.401	0.382
$CAR_{[T0-3,T0-1]}$	12,580	−0.003	0.052	−0.231	0.287
$CAR_{[T0,T0+1]}$	12,580	−0.008	0.050	−0.154	0.194
$CAR_{[T0,T0+3]}$	12,580	−0.009	0.068	−0.308	0.382
$CAR_{[T0,T0+20]}$	12,580	0.004	0.144	−0.753	0.969
SUE	12,580	0.190	1.357	−2.519	3.881
LnSize	12,580	20.592	1.123	17.346	25.728
B/M	12,580	0.444	0.224	0.066	0.813
ROA	12,580	0.007	0.013	−0.023	0.039
Leverage	12,580	0.509	0.182	0.123	0.837
TO	12,580	0.024	0.016	0.000	0.094

Notes: All statistics are estimated at the firm quarter level. Panel A illustrates the sample selection process, and Panel B describes the summary statistics of the variables, including the net buying of investors over the pre-announcement window, alternative earnings quality or management, and other variables. $CANB_{inst,[j,\ k]}$, $CANB_{active,[j,\ k]}$, $CANB_{passive,[j,\ k]}$, and $CANB_{ind,\ [j,\ k]}$ denote the cumulative abnormal net buying of institutions, active institutions, passive institutions, and individuals over window $[j, k]$, respectively. *MJones* denotes the quarterly absolute discretionary accruals estimated by the modified Jones model. *EMROA* denotes the quarterly performance-adjusted DAs that are estimated based on Kothari *et al.* (2005). $CAR_{[j,\ k\ ]}$ denotes the cumulative abnormal return over window $[j, k]$. *SUE* denotes the standard earnings surprise based on the naïve time-series model, in which the earnings follow a rolling random walk distribution. *Ln(Size)* refers to the natural logarithm of the market value of outstanding shares, *B/M* refers to the ratio of book-to-market value, *TO* is the ratio of trading volume in shares over outstanding shares, *ROA* is the return on asset, and *Leverage* is the ratio of debt to asset

Table I. Summary statistics

market. The trading behavior of institutions (neither the active nor the passive institutions) provides a reversed reflection of that of individual investors, which explains why CNB_{inst} and CNB_{ind} are opposites.

4. Empirical results

4.1 Information content of investor trading

4.1.1 Investor trading prior to earnings announcements. We divide the entire event window into $[T_0-20, T_0-6]$, $[T_0-3, T_0-1]$, and $[T_0]$ to investigate the trading patterns of investors prior to earnings announcements.

For our empirical tests, we compute the *CANB*s of institutions, active institutions, passive institutions, and individuals with the highest (or lowest) positive earnings surprises (i.e. the top (or bottom) 30 percent of *SUE*). Panels A and B of Table II show the *CANB*s of different investors with the highest and lowest *SUE*, respectively.

Table II shows striking differences in the trading behaviors of investors. Institutions, particularly active ones, sell stocks before bad news and buy stocks before positive announcements, which indicate that institutions, rather than individuals, possess superior information about the Chinese stock market. Yan and Zhang (2007) find that the trading of short-term institutions positively forecasts the stock returns and relates to future earnings surprises. These scholars argue that short-term institutions are better informed than long-term institutions, and that short-term institutions actively trade to exploit their information advantage. Table II provides clear evidence on this subject.

4.1.2 Regressions on information content of investor trading. We demonstrate the trading predictability of institutions by using regression analysis to estimate the relationship between the pre-event *CANB*s of different investors and the earnings surprises of firms. The following specification is employed:

$$CANB_{k,i}^{[T_0-t_1,\ T_0-t_2]} = f(SUE_i, Control\_Variables) \tag{8}$$

where SUE_i denotes the *SUE* of firm i and $CANB_{k,i}^{[t1,\ t2]}$ denotes the cumulative abnormal net buying in firm i of investor type k on window $[T_0-t_1,\ T_0-t_2]$. For brevity, we suppress the

	Event windows		
	$[T_0-20, T_0-6]$	$[T_0-3, T_0-1]$	$[T_0]$
Panel A: Good news – the top 30% of earnings surprises			
$CANB_{Inst}$	0.151*** (5.142)	0.032** (2.232)	0.007 (1.475)
$CANB_{Active}$	0.140*** (4.951)	0.032** (2.365)	0.015*** (3.367)
$CANB_{Passive}$	0.009 (0.943)	−0.004 (−0.785)	−0.007*** (−3.817)
$CANB_{Ind}$	−0.152*** (−5.184)	−0.031** (−2.192)	−0.007 (−1.483)
Panel B: Bad news – the bottom 30% of earnings surprises			
$CANB_{Inst}$	−0.100*** (−3.859)	−0.053*** (−4.526)	−0.003 (−0.646)
$CANB_{Active}$	−0.101*** (−4.243)	−0.044*** (−4.216)	−0.005 (−1.471)
$CANB_{Passive}$	0.002 (0.198)	−0.005 (−1.266)	0.002 (1.366)
$CANB_{Ind}$	0.099*** (3.857)	0.053*** (4.541)	0.003 (0.686)

Notes: Cumulative abnormal net buying (*CANB*) is used as a proxy for investor trading behavior. The windows $[T_0-20, T_0-6]$, $[T_0-3, T_0-1]$, and $[T_0]$ are investigated. Panel A (Panel B) presents the *CANB*s of institutions, active institutions, passive institutions, and individuals in the group with positive (negative) announcements. We define the positive (negative) announcement group as those with stocks at the top (bottom) 30 percent of earnings surprises. The robust *t*-values are enclosed in parentheses. **,***Significant at the 5 and 1 percent levels, respectively

Table II. Investor trading patterns prior to earnings announcements

subscripts indicating time periods for all variables. *Control_Variables* include *CAR* on window [T_0−10, T_0−4], the logarithm market capitalization of the firm, *B/M*, *TO*, *ROA*, and leverage ratio, as well as the fixed effects of the year and the industry. The control variable $CAR_{[T0-10,\ T0-4]}$ denotes the movement of the stock price before trading to control for the possibility that investors may follow the price momentum or contrarian strategy to trade.

Panel A of Table III shows that the independent variable *SUE* functions as the proxy for the earnings surprise in the announcement. A statistically significant and positive coefficient of *SUE* indicates that a higher earnings surprise increases the net buying of investors prior to earnings announcements. Therefore, institutions, rather than individuals, must demonstrate the predictability of earnings information. As such, we expect that the

	Dep. Var.: *CANB* over [T_0−3,T_0−1]			
Variables	*Reg-1* $CANB_{Inst}$	*Reg-2* $CANB_{Active}$	*Reg-3* $CANB_{Passive}$	*Reg-4* $CANB_{Ind}$
Panel A: results using SUE as a proxy for earnings surprises				
SUE	0.009*** (3.215)	0.008*** (3.328)	0.001 (0.851)	−0.009*** (−3.211)
$CAR_{[T0-10,T0-4]}$	0.474*** (10.257)	0.450*** (10.835)	0.044** (2.478)	−0.473*** (−10.252)
LnSize	−0.012*** (−2.687)	−0.018*** (−4.098)	−0.004** (−2.406)	0.012*** (2.685)
B/M	0.023 (1.228)	0.026 (1.546)	0.017** (2.454)	−0.023 (−1.225)
ROA	−0.541* (−1.778)	−0.111 (−0.397)	−0.176 (−1.423)	0.541* (1.777)
Leverage	−0.060*** (−2.643)	−0.033 (−1.572)	−0.006 (−0.693)	0.060*** (2.642)
TO	1.289*** (5.482)	0.959*** (4.473)	−0.185* (−1.935)	−1.288*** (−5.482)
Cons	0.233** (2.535)	0.333*** (3.792)	0.096*** (2.773)	−0.232** (−2.534)
Industry	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
Obs.	12,580	12,580	12,580	12,580
Adj. R^2	0.022	0.017	0.113	0.022
Panel B: results of using Bad and Good as proxies for earnings surprises				
Bad	−0.015** (−2.013)	−0.012* (−1.741)	−0.001 (−0.204)	0.015** (2.064)
Good	0.014* (1.667)	0.013* (1.699)	0.002 (0.770)	−0.014 (−1.616)
$CAR_{[T0-10,T0-4]}$	0.466*** (10.417)	0.405*** (10.653)	0.037** (2.294)	−0.432*** (−10.251)
LnSize	−0.017*** (−3.651)	−0.016*** (−4.044)	−0.004** (−2.501)	0.011*** (2.715)
B/M	0.025 (1.383)	0.019 (1.277)	0.016** (2.488)	−0.019 (−1.082)
ROA	−0.293 (−1.012)	−0.079 (−0.308)	−0.172 (−1.512)	0.404 (1.413)
Leverage	−0.055*** (−2.591)	−0.024 (−1.259)	−0.003 (−0.337)	0.057*** (2.718)
TO	0.674*** (2.677)	0.851*** (4.276)	−0.148* (−1.652)	−1.246*** (−5.627)
Cons	0.333*** (3.551)	0.300*** (3.795)	0.086*** (2.781)	−0.221** (−2.555)
Industry	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
Obs.	12,580	12,580	12,580	12,580
Adj. R^2	0.028	0.014	0.128	0.023

Notes: This table reports the OLS regression results on the investor trading behaviors prior to earnings announcements. These behaviors are used as the dependent variables. We use the cumulative abnormal net buying on window [T_0−3, T_0−1] (i.e. *CANB*) as a proxy for investor trading behavior. Panel A shows the results of using *SUE* as a proxy for earnings surprises, and Panel B shows the results of using *Bad* and *Good* as proxies for earnings surprises. *SUE* is a standard earnings surprise that is based on the naïve time-series model, in which the earnings follow a rolling random walk distribution. *Bad* and *Good* are dummy variables that denote the bottom and top 30 percent, of the earnings surprise sample in each quarter, respectively. $CAR_{[T0-10,\ T0-4]}$ is the cumulative abnormal return on window [T_0−10, T_0−4]. *Ln(Size)* is the natural logarithm of the market value of outstanding shares, *B/M* is the ratio of book-to-market value, *TO* is the ratio of trading volume in shares over outstanding shares, *ROA* is the return on asset, and *Leverage* is the ratio of debt to asset. The fixed effects of industry and year are controlled. Adj. R^2 refers to the adjusted R^2. The robust *t*-values are enclosed in parentheses. *,**,***Significant at the 10, 5, and 1 percent levels, respectively

Table III. Investor trading behaviors prior to earnings announcements

SUE coefficient in the regression of the trading of institutions to be significantly positive and that of individuals to be negative. Panel A of Table III shows that the trading pattern of institutions on $[T_0-3, T_0-1]$ accurately predict the extent of earnings information, which is opposite to that of individuals.

Given that the trading behavior of institutions represents a mirror image of that of individual investors, the coefficients are opposites, as shown in Columns 1 and 4.

Panel B of Table III introduces two dummy variables, *Bad* and *Good*, to serve as proxies for large positive and negative earnings surprises, respectively. *Bad* takes the value of 1 if the *SUE* of the stock belongs to the bottom 30 percent of stocks as ranked by this measure in that quarter; *Good* takes the value of 1 to denote those in the top 30 percent. A significantly negative coefficient of *Bad* indicates that investors reduce their net buying prior to bad earnings announcements, whereas a significantly positive coefficient of *Good* indicates that these investors increase their net buying prior to positive earnings reports. Panel B of Table III shows a negative relationship between the net buying of institutional investors and unfavorable earnings reports as well as a positive relationship between the net buying of institutional investors and favorable earnings reports prior to the announcement. Meanwhile, individuals exhibit a contrary trading pattern prior to earnings reports. The trading pattern of institutions primarily reflects that of active institutions rather than that of passive institutions.

Table III shows that the trading of institutions, particularly active ones, has superior information regarding the earnings of firms.

Regression models are further used to determine if the institutions gain from an increase in post-event stock price. We examine the relationship between the pre-event trading of investors and *CAR* in the post-event window $[T_0, T_0+1]$, $[T_0, T_0+3]$, and $[T_0, T_0+20]$ using the following regression:

$$CAR_i^{[T_0+t_1,\ T_0+t_2]} = f\left(CANB_{k,i}^{[T_0-3,\ T_0-1]}, Control\_Variables\right) \tag{9}$$

where $CAR_i^{[T_0+t_1,\ T_0+t_2]}$ denotes the *CAR* of firm i on $[T_0+t_1,\ T_0+t_2]$. For brevity, we suppress the subscripts indicating the time periods for all variables. In addition to the control variables included in Equation (8), we include $CAR_{[T0-3,\ T0-1]}$ in this regression to control for the effect of stock price reversal or persistence.

We expect that the market price of a firm increases when that firm has a positive earnings surprise. Following Christophe *et al.* (2004), we examine the relationship between investors trading and *CAR* on event window $[T_0, T_0+1]$, which reveals the reaction of the market to the announcement. Institutions adopt a trading strategy that will exploit their information advantages and awareness of the situation, thus gradually driving the price toward the appropriate level after the announcement. Therefore, the net buying behavior of institutions prior to earnings announcement positively indicates the future performance of stocks.

Table IV shows that despite the length of period after the earnings announcement, the buying behavior of institutions, particularly active ones, has a significantly positive correlation with future stock returns, argument that institutions have information advantages.

In summary, the predictability of investor trading behavior prior to earnings announcements clearly supports the argument that institutional investors trade in the direction that is consistent with the earnings surprise prior to earnings announcement, whereas individual investors trade in the opposite direction.

4.2 Earnings management and information content of investor trading

Based on the findings in Section 4.1, we examine if earnings management influences investor trading behavior prior to earnings announcements. Several studies suggest that

Table IV. Predictability of investor trading behaviors on the post-earnings announcement abnormal return

	Dep. Var.: $CAR_{[T0,T0+1]}$			Dep. Var.: $CAR_{[T0,T0+3]}$			Dep. Var.: $CAR_{[T0,T0+20]}$		
Variables	*Reg-1* $CANB_{Inst}$	*Reg-2* $CANB_{Active}$	*Reg-3* $CANB_{Passive}$	*Reg-4* $CANB_{Inst}$	*Reg-5* $CANB_{Active}$	*Reg-6* $CANB_{Passive}$	*Reg-7* $CANB_{Inst}$	*Reg-8* $CANB_{Active}$	*Reg-9* $CANB_{Passive}$
CANB	0.221*** (3.403)	0.175*** (2.920)	0.089*** (3.594)	0.204*** (4.333)	0.161*** (3.697)	0.089*** (4.889)	0.109*** (5.062)	0.081*** (4.066)	0.017** (2.074)
$CAR_{[T0-3,T0-1]}$	1.242*** (17.532)	1.069*** (17.122)	0.013 (0.501)	1.242*** (17.524)	1.068*** (17.116)	0.013 (0.487)	1.258*** (17.751)	1.080*** (17.279)	0.016 (0.587)
$CAR_{[T0-10,T0-4]}$	0.436*** (10.411)	0.414*** (10.903)	0.037** (2.306)	0.433*** (10.338)	0.411*** (10.832)	0.036** (2.206)	0.439*** (10.478)	0.415*** (10.957)	0.038** (2.360)
LnSize	−0.011*** (−2.788)	−0.017*** (−4.411)	−0.004** (−2.502)	−0.011*** (−2.791)	−0.017*** (−4.413)	−0.004** (−2.510)	−0.011*** (−2.640)	−0.017*** (−4.288)	−0.004** (−2.398)
B/M	0.013 (0.785)	0.018 (1.131)	0.016** (2.420)	0.012 (0.723)	0.017 (1.077)	0.015** (2.345)	0.012 (0.728)	0.017 (1.086)	0.016** (2.416)
ROA	−0.668** (−2.421)	−0.242 (−0.963)	−0.199* (−1.783)	−0.670** (−2.430)	−0.244 (−0.970)	−0.201* (−1.801)	−0.616** (−2.233)	−0.202 (−0.802)	−0.183 (−1.636)
Leverage	−0.052** (−2.525)	−0.027 (−1.445)	−0.002 (−0.309)	−0.053** (−2.568)	−0.028 (−1.482)	−0.003 (−0.352)	−0.052** (−2.527)	−0.027 (−1.449)	−0.003 (−0.351)
TO	1.543*** (7.045)	1.170*** (5.859)	−0.142 (−1.589)	1.534*** (7.016)	1.163*** (5.835)	−0.146 (−1.628)	1.449*** (6.607)	1.100*** (5.507)	−0.161* (−1.786)
Cons	0.226*** (2.681)	0.325*** (4.120)	0.087*** (2.820)	0.227*** (2.702)	0.326*** (4.138)	0.088*** (2.850)	0.213** (2.538)	0.316*** (4.001)	0.084*** (2.706)
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	12,580	12,580	12,580	12,580	12,580	12,580	12,580	12,580	12,580
Adj. R^2	0.054	0.044	0.129	0.055	0.044	0.129	0.055	0.044	0.128

Notes: The different investor trading behaviors prior to the earnings announcement are used as independent variables. We use the cumulative abnormal net buying on window $[T_0-3, T_0-1]$ (i.e. *CANB*) as a proxy for investor trading behavior. We examine the trading predictability of investors on $CAR_{[T0,T0+1]}$ from *Reg-1* to *Reg-3*, on $CAR_{[T0,T0+3]}$ from *Reg-4* to *Reg-6*, and on $CAR_{[T0,T0+20]}$ from *Reg-7* to *Reg-9*. All other variables are described in Table III. The fixed effects of industry and year are controlled. Adj. R^2 refers to the adjusted R^2. The robust *t*-values are enclosed in parentheses. *,**,***Significant at the 10, 5, and 1 percent levels, respectively

firms may adopt accounting methods to manipulate their financial earnings for different reasons. Investors can identify or screen how firms manipulate their earnings, incorporate such information in their investment decisions, and subsequently adjust their trading behavior according to the earnings management of firms.

Only few studies have investigated how earnings management alleviates or aggravates investor trading prior to earnings announcements. Therefore, we consider the empirical results in this subsection as the most important findings of this study.

4.2.1 Marginal effect of earnings management. To test our hypothesis, we use the following regression to investigate the marginal effect of earnings management on investor trading behaviors:

$$CANB_{k,i}^{[T_0-3,\ T_0-1]} = f(SUE_i, EM_i, EM_i \times SUE_i, Controls\_Variables) \tag{10}$$

where EM_i denotes the earnings management of firm i, and other variables are defined as the variables presented in previous sections. For brevity, we suppress the subscripts indicating time for all variables. Likewise, we control for the year and industry effects in Equation (8).

The interaction item of *EM* and *SUE* in empirical model (10) determines if investors use earnings management information to filter their trading behavior on the marginal of earnings surprise. A significant interaction item suggests that a particular investor concentrates on the earnings information quality when making trading decisions.

Table V shows the regression results. For brevity, we only present the results on the trading behavior of institutions, active institutions, and passive institutions. The patterns of individuals can be inferred by the coefficients of institutions considering that the trading behavior of institutions provides a mirror image of the individual investors.

Panel A of Table V shows the *MJones*-based results. The coefficients of interaction item *SUE*×*EM* are significantly negative when we run the model separately for institutional, active institutional, and passive institutional investors. These results support our hypothesis (i.e. a higher level of earnings management influence the net selling behaviors of institutions with similar levels of earnings surprise). Although institutional investors tend to buy firms with high *SUE*, severe earnings management significantly reduces their net-buy positions.

Likewise, our results support that institutions have information advantages, which is reflected by the positively significant coefficients of *SUE*. Individuals can only provide liquidity to institutions and cannot accurately evaluate the earnings information underneath public reports.

We adopt performance-adjusted DAs in Panel B to measure earnings management (*EMROA*), as suggested by Kothari *et al.* (2005). We replicate the estimating model separately for each type of investor, and we obtain highly consistent results.

The results in Table V support our hypothesis, thus showing that sophisticated institutions are more capable of identifying earnings management information than individuals. Therefore, institutional investors can analyze financial statements more proficiently than individual investors. Our results complement those findings in previous studies based on quarterly or yearly data. For example, Hand (1990) reports that sophisticated investors can interpret information in earnings announcements more accurately as compared with individual investors. Bartov *et al.* (2000) find that the post-earnings announcement pattern is reduced as the level of institutional investment increases.

4.2.2 Asymmetrically marginal effect. We have collected consistent evidence for our hypothesis, which proves that earnings management significantly affects the investors' trading behavior, particularly institutions, on the condition of earnings surprise. A low earnings quality causes professional investors to cast doubt the earnings information of a

Table V.
Effects of earnings management on investor trading prior to earnings announcement

Variables	Dep. Var.: *CANB* over $[T_0-3, T_0-1]$					
	Reg-1 $CANB_{Inst}$	*Reg-2* $CANB_{Active}$	*Reg-3* $CANB_{Passive}$	*Reg-4* $CANB_{Inst}$	*Reg-5* $CANB_{Active}$	*Reg-6* $CANB_{Passive}$
	Panel A: modified Jones model (MJones)			*Panel B: matched with ROA (EMROA)*		
SUE	0.013*** (3.811)	0.010** (3.950)	0.003** (2.177)	0.013*** (3.961)	0.010*** (3.401)	0.002* (1.795)
EM	−0.047 (−0.599)	−0.162 (−1.579)	0.092*** (2.923)	−0.050 (−0.664)	−0.130** (−1.963)	0.075** (2.448)
SUE × *EM*	−0.130*** (−2.619)	−0.060* (−2.334)	−0.055*** (−2.858)	−0.141*** (−2.929)	−0.075* (−1.750)	−0.043** (−2.196)
$CAR_{[T0\text{-}10, T0\text{-}4]}$	0.434*** (9.999)	0.412*** (4.898)	0.036** (2.150)	0.435*** (10.014)	0.413*** (10.535)	0.036** (2.147)
LnSize	−0.011*** (−2.603)	−0.017** (−4.210)	−0.003** (−2.019)	−0.011*** (−2.597)	−0.017*** (−4.318)	−0.003** (−1.987)
B/M	0.013 (0.748)	0.014** (3.094)	0.020*** (2.940)	0.013 (0.733)	0.014 (0.884)	0.019*** (2.888)
ROA	−0.562* (−1.930)	−0.091 (−0.759)	−0.216* (−1.870)	−0.591** (−2.033)	−0.115 (−0.436)	−0.218* (−1.882)
Leverage	−0.064*** (−2.976)	−0.037 (−1.600)	−0.005 (−0.646)	−0.064*** (−2.979)	−0.037* (−1.893)	−0.005 (−0.626)
TO	1.164*** (5.157)	0.841*** (8.732)	−0.151* (−1.666)	1.167*** (5.174)	0.838*** (4.109)	−0.149 (−1.636)
Cons	0.221** (2.505)	0.339** (3.111)	0.069** (2.162)	0.221** (2.505)	0.339*** (4.098)	0.068** (2.155)
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	12,208	12,208	12,208	12,208	12,208	12,208
Adj. R^2	0.024	0.017	0.130	0.024	0.017	0.129

Notes: The different investor trading behaviors prior to earnings announcements are used as dependent variables. We use the cumulative abnormal net buying over window $[T_0-3, T_0-1]$ (i.e. *CANB*) as a proxy for investor trading behavior. Panel A shows the quarterly absolute discretionary accruals as computed by *MJones* to measure earnings management. Panel B shows the quarterly performance-adjusted DAs that are proposed by Kothari *et al.* (2005), which are used to determine earnings management (*EMROA)*. *SUE* is the standard earnings surprise that is based on the naïve time-series model, in which the earnings follow a rolling random walk distribution. All other variables are described as those that are presented in Table III. The fixed effects of industry and year are controlled. Adj. R^2 refers to the adjusted R^2. The robust *t*-values are enclosed in parentheses. *,**,***Significant at the 10, 5, and 1 percent levels, respectively

firm. Thus, a natural follow-up question is do investors react asymmetrically to earnings management for firms with positive and negative earnings surprises?

To examine this issue, we perform additional comparisons to resolve this question through the following empirical model:

$$CANB_{k,i}^{[T_0-3,\ T_0-1]} = f\left(Bad_{i,Q}, Good_{i,Q}, EM_{i,Q}, EM_{i,Q} \times Bad_{i,Q}, EM_{i,Q} \times Good_{i,Q}, Controls\_Variables\right) \quad (11)$$

where *Bad* is a dummy variable that is equivalent to 1 when the *SUE* of a firm is on the bottom 30 percent of the *SUE* of all firms during a specific quarter *Q*, *Good* is a similar dummy variable that is equivalent to 1 when the *SUE* of a firm is among the top 30 percent of the *SUE* of all firms, and *EM* denotes the earnings management of a stock. The control variables are presented as above. To evaluate the asymmetric effect of *EM* on the trading behavior of investors, we focus on the coefficients of the items of interaction (i.e. $EM \times Bad$ and $EM \times Good$).

Table VI shows the results of our estimation. Given the limited space, we suppress the regression results on the behavior of individual investors. The results on Panel A are based on the *EM* measure of *MJones*.

Reg-1 examines the trading behavior of institutions for both good and bad news. The coefficients of *Bad* (*Good*) are significantly negative (positive), which indicates that institutional investors tend to sell (buy) firms with negative (positive) earnings announcements. This finding is consistent with our hypothesis. After controlling for earnings management, our results exhibit significantly asymmetric trading behaviors of institutional investors. The coefficient of *Bad* is equivalent to –0.017 that is significant at the 10 percent level, whereas the coefficient of *Good* is equivalent to 0.029 that is significant at the 5 percent level. Such asymmetry reflects that institutional investors tend to buy firms with positive announcements but are reluctant to sell firms with negative announcements, thus indicating that to a certain extent, institutional investors may suffer from disposition effect as well.

With regard to the items of $EM \times Bad$ and $EM \times Good$, earnings management results in different effects on the trading decisions of investors based on the extreme earnings surprise. The interaction of *EM* and *Bad* is not significant, which means that institutions are unlikely to sell firms with bad news and high earnings management prior to the announcement. This may be attributed to the limitation to short-selling in the Chinese stock market during our sample period. In contrast, the interaction of *EM* and *Good* is negative and significant, indicating that the opaque or false earnings information significantly prevents institutions from buying the shares of a firm even if that particular firm discloses highly positive announcements.

We conduct similar analyses for active and passive institutions. The results that are based on active institutions (*Reg-2*) are similar to *Reg-1*, but the interaction items of passive institutions are not significant. This result indicates that the trading patterns of institutional investors are primarily driven by active institutions rather than passive institutions.

We use *EMROA* in Panel B of Table VI to assess the asymmetric effect of *EM* on the trading behavior of investors. The results have the same magnitude and significance as the results presented in Panel A.

Overall, we evaluate the asymmetric effect of earnings management on the trading behavior of investors for firms with positive and negative announcements. Institutions buy stocks intensively with lower earnings management and extremely positive *SUE* during the pre-event period. Firms with extremely negative *SUE* tend to sell their stocks prior to earnings announcements. However, for firms with low *SUE* and high *EM*, *EM* does not

Table VI.
Asymmetric effects of earnings management on investor trading prior to earnings announcements

Variables	Dep. Var.: *CANB* over $[T_0-3, T_0-1]$					
	Reg-1 $CANB_{Inst}$	*Reg-2* $CANB_{Active}$	*Reg-3* $CANB_{Passive}$	*Reg-4* $CANB_{Inst}$	*Reg-5* $CANB_{Active}$	*Reg-6* $CANB_{Passive}$
	Panel A: modified Jones Model (MJones)			*Panel B: matched with ROA (EMROA)*		
EM	0.019 (0.172)	−0.065 (−0.660)	0.082* (1.701)	0.014 (0.131)	−0.027 (−0.281)	0.061 (1.344)
Bad	−0.017* (−1.689)	−0.009 (−1.047)	−0.001 (−0.221)	−0.017* (−1.766)	−0.009 (−1.061)	−0.001 (−0.177)
Good	0.029** (2.510)	0.025** (2.330)	0.003 (0.711)	0.030*** (2.597)	0.026** (2.491)	0.002 (0.421)
EM × *Bad*	0.012 (0.071)	−0.097 (−0.646)	0.007 (0.101)	0.033 (0.197)	−0.095 (−0.654)	0.000 (0.005)
EM × *Good*	−0.377* (−1.943)	−0.294* (−1.658)	−0.031 (−0.396)	−0.403** (−2.148)	−0.338** (−1.978)	0.004 (0.049)
$CAR_{[T0\text{-}10,T0\text{-}4]}$	0.433*** (9.959)	0.411*** (10.492)	0.035** (2.123)	0.433*** (9.945)	0.412*** (10.477)	0.035** (2.112)
LnSize	−0.011*** (−2.622)	−0.017*** (−4.306)	−0.003** (−2.078)	−0.011*** (−2.617)	−0.018*** (−4.323)	−0.003** (−2.050)
B/M	0.015 (0.832)	0.015 (0.915)	0.020*** (2.985)	0.014 (0.805)	0.015 (0.949)	0.020*** (2.919)
ROA	−0.504* (−1.708)	−0.056 (−0.209)	−0.211* (−1.808)	−0.527* (−1.783)	−0.070 (−0.259)	−0.206* (−1.755)
Leverage	−0.063*** (−2.930)	−0.036* (−1.848)	−0.005 (−0.575)	−0.063*** (−2.925)	−0.036* (−1.849)	−0.005 (−0.564)
TO	1.213*** (5.374)	0.879*** (4.310)	−0.143 (−1.569)	1.214*** (5.382)	0.874*** (4.290)	−0.141 (−1.550)
Cons	0.222** (2.510)	0.336*** (4.067)	0.071** (2.230)	0.222** (2.511)	0.336*** (4.059)	0.071** (2.235)
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	12,208	12,208	12,208	12,208	12,208	12,208
Adj. R^2	0.024	0.017	0.129	0.024	0.017	0.129

Notes: This table reports the effect of earnings management on investor trading behavior prior to negative and positive earnings announcements. The investor trading behaviors prior to earnings announcements are used as the dependent variables. We use the cumulative abnormal net buying on window $[T_0-3, T_0-1]$ (i.e. *CANB*) as a proxy for investor trading behavior. Panel A shows the quarterly absolute discretionary accruals as computed by *MJones* to measure earnings management. Panel B uses the quarterly performance-adjusted DAs that are proposed by Kothari *et al.* (2005) to measure earnings management (*EMROA)*. *Bad* and *Good* are dummy variables that denote the bottom and top 30 percent, respectively, of earnings surprise sample in each quarter. All other variables are described as in Table III. The fixed effects of industry and year are controlled. Adj. R^2 refers to the adjusted R^2. The robust *t*-values are enclosed in parentheses. *,**,***Significant at the 10, 5, and 1 percent levels, respectively

significantly affect the relationship between the trading behaviors of institutional investors and *SUE*, which may be attributed to the limitation to short-selling in the Chinese stock market during that period.

4.3 Endogeneity: evidence based on the Chinese Accounting Standards Reform

Our primary finding is that earnings management significantly affects the trading behaviors of institutional investors prior to earnings announcements. Given that earnings management can be driven by institutional ownership (Bange and De Bondt, 1998; Bushee, 1998), our main finding may suffer from endogeneity issues[3].

We address the potential endogeneity by introducing the Chinese Accounting Standards Reform in 2007, which presents an exogenous shock to the earnings management in China. The Ministry of Finance issued new accounting standards in February 15, 2006 to improve the international convergence of the financial reporting system in the Chinese stock market. Since January 1, 2007, this system has required firms to adopt fair value accounting with regard to disclosure information. These new practices are primarily based on the IFRS, a standard adopted by many developed and emerging markets.

In China, since that IFRS provides more opportunities for managers to use accruals to manipulate earnings, where a rule-based accounting system had been used before the introduction of IFRS. This mandatory introduction of IFRS produces unexpected results, such as the earnings management of opportunistic managers. Indeed, studies find that more managers have manipulated their earnings after the introduction of IFRS in Chinese markets (He *et al.* (2012), Zhang *et al.* (2013)).

On the one hand, the accounting standards reform influences the degrees of earnings management of listed firms in China. On the other hand, the new accounting standards system is less likely determined or affected by the trading behavior of institutional investors. Therefore, we design a dummy variable that denotes the time when the reform is implemented as an IV to determine the exogenous change in the degree of earnings management.

In particular, we construct the dummy variable *Reform* to indicate the mandatory adoption of *IFRS*-convergent accounting standards. *Reform* takes the value of 1 after the implementation of the new standards, and is equivalent to 0 otherwise. Noting that we use the year dummy as IV, accordingly, we suppress the year fixed effects in the regression.

Panel A of Table VII shows the results of the first stage of IV regressions. In *Reg-1*, *MJones* is instrumented by *Reform*. The coefficient of *Reform* is equivalent to 0.019 that is significant at the 1 percent level, which indicates that the level of quarterly DAs increases by 0.019 after the accounting reform. Firms with a lower pre-announcement market performance, lower book-to-market value, higher leverage ratio, and higher *ROA* in the previous fourth quarter have higher degrees of earnings management. *EMROA* is used as the instrumented variable in *Reg-2*, and *Reform* consistently takes a positive value.

Panel B shows the results of the second stage of IV regressions based on the estimation model of Equation (10). The cumulative abnormal net buying on window $[T_0-3, T_0-1]$ of each investor (i.e. $CANB_{[T0-3,\ T0-1]}$ is used as the dependent variable. We use *MJones* to measure the earnings management from *Reg-1* to *Reg-3*. The interaction between *EM* and *SUE* in *Reg-1* is negative (–3.982), which is larger than the obtained coefficient (–0.130) from the OLS test (Table V). The interactions remain significantly negative in *Reg-2* and *Reg-3* when the institutions are divided into active and passive institutions. These results support those that are presented in the previous section, which state that institutions can discern earnings management and consequently adjust their trading behaviors for their private earnings information prior to the announcement. The results remain consistent across *Reg-4*, *Reg-5*, and *Reg-6* when the measure of earnings management is adjusted by the stock performance.

Moreover, we present OLS results by using an IV to directly interact with the earnings surprise in Panel *B*. *Reg*-7, *Reg-8*, and *Reg-9* show the results for institutions, active

Table VII.
Effects of earnings management on investor trading prior to earnings announcements: 2SLS

Panel A: the first stage

	Dep. Var.: EM (instrumented variable)	
	EM (modified Jones model)	*EM* (matched with *ROA)*
Variables	*Reg-1*	*Reg-2*
Reform	0.019*** (9.884)	0.022*** (11.181)
SUE	0.001 (1.525)	0.000 (0.747)
$CAR_{[T0\text{-}10,T0\text{-}4]}$	−0.011** (−2.060)	−0.010** (−1.993)
LnSize	−0.000 (−1.003)	−0.001** (−2.143)
B/M	−0.024*** (−11.496)	−0.024*** (−11.434)
ROA	0.089** (2.166)	0.018 (0.410)
Leverage	0.006*** (2.617)	0.006** (2.286)
TO	0.055 (1.586)	0.045 (1.287)
Cons	0.072*** (7.157)	0.087*** (8.582)
Industry	Yes	Yes
Obs.	12,208	12,208
Adj. R^2	0.068	0.073

Panel B: the second stage of IV regression: results of using SUE as proxy for earnings surprises

	Dep. Var.: *CANB* over $[T_0-3,T_0-1]$								
	Instrumented *EM (*modified Jones model)			Instrumented *EM* (matched with *ROA*)			OLS		
	Reg-1	*Reg-2*	*Reg-3*	*Reg-4*	*Reg-5*	*Reg-6*	*Reg-7*	*Reg-8*	*Reg-9*
Variables	$CANB_{Inst}$	$CANB_{Active}$	$CANB_{Passive}$	$CANB_{Inst}$	$CANB_{Active}$	$CANB_{Passive}$	$CANB_{Inst}$	$CANB_{Active}$	$CANB_{Passive}$
SUE	0.172** (2.377)	0.106* (1.908)	0.053** (2.379)	0.150*** (2.603)	0.092** (2.013)	0.047** (2.555)	0.020*** (4.692)	0.013*** (3.514)	0.004*** (2.914)
EM	−1.849* (−1.742)	−1.692* (−1.892)	0.664* (1.787)	−1.334 (−1.521)	−1.312* (−1.732)	0.668** (2.089)			
SUE × *EM*	−3.982** (−2.245)	−2.350* (−1.740)	−1.299** (−2.382)	−3.485** (−2.447)	−2.039* (−1.821)	−1.163** (−2.543)			
Reform							−0.028* (−1.735)	−0.027* (−1.870)	0.016*** (2.687)
SUE × *Reform*							−0.021*** (−4.096)	−0.011** (−2.306)	−0.006*** (−3.248)
$CAR_{[T0\text{-}10,T0\text{-}4]}$	0.432*** (7.801)	0.449*** (9.397)	0.041** (2.088)	0.452*** (8.529)	0.462*** (9.831)	0.045** (2.365)	0.437*** (10.187)	0.416*** (10.724)	0.031* (1.901)
LnSize	−0.006 (−1.119)	−0.015*** (−2.962)	−0.002 (−0.960)	−0.006 (−1.201)	−0.015*** (−3.114)	−0.001 (−0.690)	−0.010** (−2.341)	−0.016*** (−3.989)	−0.004*** (−2.697)
B/M	−0.077* (−1.893)	−0.049 (−1.429)	0.019 (1.362)	−0.058* (−1.750)	−0.035 (−1.213)	0.020* (1.736)	0.018 (1.064)	0.022 (1.384)	0.017** (2.540)
ROA	−0.424 (−1.133)	−0.038 (−0.115)	−0.238* (−1.740)	−1.196*** (−2.860)	−0.533 (−1.489)	−0.402*** (−2.613)	−0.488* (−1.718)	−0.09 (−0.351)	−0.148 (−1.311)
Leverage	−0.076*** (−2.604)	−0.042* (−1.681)	−0.016 (−1.635)	−0.075*** (−2.800)	−0.043* (−1.789)	−0.015 (−1.535)	−0.055*** (−2.629)	−0.03 (−1.583)	−0.003 (−0.330)
TO	1.051*** (2.956)	0.890*** (3.094)	−0.311** (−2.545)	1.067*** (3.311)	0.891*** (3.321)	−0.288** (−2.497)	1.286*** (5.782)	0.957*** (4.755)	−0.194** (−2.160)
Cons	0.238* (1.844)	0.388*** (3.435)	0.007 (0.155)	0.220* (1.741)	0.380*** (3.362)	−0.004 (−0.093)	0.189** (2.165)	0.298*** (3.646)	0.094*** (2.998)
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	12,208	12,208	12,208	12,208	12,208	12,208	12,580	12,580	12,580
Ad. R^2	−0.484	−0.188	−0.141	−0.338	−0.126	−0.089	0.025	0.017	0.129

(*continued*)

Panel C: the second stage of IV regression: results of using Bad and Good as proxies for earnings surprises

	Dep. Var.: *CANB* over $[T_0-3,T_0-1]$								
	Instrumented *EM* (modified Jones model)			Instrumented *EM* (matched with *ROA*)			OLS		
	Reg-1	*Reg-2*	*Reg-3*	*Reg-4*	*Reg-5*	*Reg-6*	*Reg-7*	*Reg-8*	*Reg-9*
Variables	$CANB_{Inst}$	$CANB_{Active}$	$CANB_{Passivet}$	$CANB_{Inst}$	$CANB_{Active}$	$CANB_{Passive}$	$CANB_{Inst}$	$CANB_{Active}$	$CANB_{Passive}$
Bad	−0.161 (−1.537)	−0.086 (−0.931)	−0.107** (−2.365)	−0.16 (−1.452)	−0.08 (−0.828)	−0.119** (−2.432)	−0.026** (−2.197)	−0.020* (−1.694)	−0.008** (−1.994)
Good	0.318** (2.548)	0.189* (1.844)	0.035 (0.971)	0.282*** (2.691)	0.169* (1.919)	0.03 (0.954)	0.039*** (2.750)	0.029** (1.992)	0.006 (1.272)
EM	−1.642 (−1.247)	−1.28 (−1.126)	−0.154 (−0.292)	−1.368 (−1.276)	−1.041 (−1.118)	−0.184 (−0.414)			
EM × *Bad*	4.087 (1.418)	2.06 (0.815)	2.987** (2.361)	4.138 (1.352)	1.938 (0.726)	3.355** (2.424)			
EM × *Good*	−7.671** (−2.417)	−4.406* (−1.703)	−0.86 (−0.927)	−6.887** (−2.569)	−3.979* (−1.782)	−0.751 (−0.919)			
Reform							−0.024 (−1.363)	−0.027 (−1.541)	0.012* (1.842)
Reform × *Bad*							0.021 (1.384)	0.013 (0.868)	0.015*** (2.580)
Reform × *Good*							−0.047*** (−2.768)	−0.029* (−1.683)	−0.006 (−0.925)
$CAR_{[T0-10,T0-4]}$	0.420*** (8.249)	0.402*** (9.514)	0.042** (2.220)	0.434*** (8.313)	0.410*** (9.321)	0.052*** (2.588)	0.439*** (10.214)	0.459*** (10.781)	0.031* (1.923)
LnSize	−0.009 (−1.628)	−0.016*** (−3.453)	−0.002 (−0.878)	−0.007 (−1.227)	−0.015*** (−3.020)	0 (0.165)	−0.010** (−2.324)	−0.016*** (−3.674)	−0.004*** (−2.694)
B/M	−0.056* (−1.702)	−0.032 (−1.169)	0.020* (1.660)	−0.047 (−1.641)	−0.026 (−1.054)	0.020* (1.824)	0.018 (1.072)	0.026 (1.532)	0.016** (2.504)
ROA	−0.416 (−1.177)	0.013 (0.045)	−0.255* (−1.856)	−1.209*** (−2.723)	−0.432 (−1.136)	−0.556*** (−2.927)	−0.461 (−1.604)	−0.135 (−0.472)	−0.153 (−1.341)
Leverage	−0.063** (−2.452)	−0.034 (−1.560)	−0.013 (−1.408)	−0.068** (−2.564)	−0.036 (−1.612)	−0.018* (−1.691)	−0.056*** (−2.649)	−0.032 (−1.521)	−0.003 (−0.337)
TO	1.309*** (4.278)	0.971*** (3.968)	−0.248** (−2.157)	1.265*** (4.303)	0.940*** (3.962)	−0.246** (−2.127)	1.287*** (5.767)	1.053*** (4.883)	−0.203** (−2.257)
Cons	0.258** (2.259)	0.375*** (3.844)	0.029 (0.704)	0.225* (1.862)	0.362*** (3.453)	−0.009 (−0.185)	0.189** (2.164)	0.301*** (3.393)	0.096*** (3.057)
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	12,208	12,208	12,208	12,208	12,208	12,208	12,580	12,580	12,580
Adj. R^2	−0.304	−0.121	−0.083	−0.235	−0.088	−0.118	0.025	0.017	0.129

Notes: This table reports the IV regression results on the effects of earnings management on investor trading behaviors prior to earnings announcements. The earnings management is employed as the endogenous variable, and *Reform* is used as the dummy variable that indicates the mandatory adoption of *IFRS*-convergent new accounting standards. Panel A presents the results of the first stage of the IV regressions. The earnings management as computed by *MJones* and the performance-adjusted earnings management (*EMROA*) are used as the IVs in *Reg-1* and *Reg-2*, respectively. Panel B presents the results of the second stage of the IV regressions that use *SUE* as a proxy for earnings surprises. Panel C presents the results of the second stage IV regressions that use *Bad* and *Good* dummies as proxies for earnings announcements. *Bad* and *Good* are dummy variables that denote the bottom and top 30 percent, respectively, of earnings surprise sample in each quarter. The dependent variables in Panel B and Panel C are the investor trading behaviors prior to earnings announcements are used as the dependent variables. We use the cumulative abnormal net buying on window $[T_0-3, T_0-1]$ (i.e. *CANB*) as a proxy for investor trading behavior. All other variables are described as Table III. The fixed effects of industry are controlled. Adj. R^2 refers to the adjusted R^2. The robust *t*-values are enclosed in parentheses. *,**,***Significant at the 10, 5, and 1 percent levels, respectively

institutions, and passive institutions, respectively. All interaction items are significantly negative, thus indicating that institutions react less positively for their private information prior to earnings announcements.

Panel C shows the results of the second stage IV regressions based on the estimation model of Equation (11). *Bad* and *Good* are used to proxy the bottom 30 percent and the top 30 percent earnings surprises, respectively. When the trading of institutions is investigated in *Reg-1* and *Reg-4*, the interactions between *Bad* and *EM* remain insignificant regardless of which *EM* measure adopted. At the same time, the interactions between *Good* and *EM* remain significantly negative under both *EM* measures. However, passive institutions fail to recognize the effect of earnings management on earnings prior to earnings announcements. The IV estimation is consistent with the OLS estimations reported in Table VI.

Meanwhile, we examine how the relationship between investor trading and extreme announcements is affected by the introduction of fair value accounting principles. We introduce two interaction items, namely, *Reform* × *Bad* and *Reform* × *Good*, which results are presented in *Reg-7*, *Reg-8*, and *Reg-9*. Active institutions are less likely to buy the subset of stocks with good news after the reform was implemented.

Jointly, the IV regression estimations support our hypothesis, which argues that active institutions possess the professional knowledge to discern the influence of earnings management on earnings, and incorporate such information in their trading strategies.

4.4 Robust tests

In this section, alternative measures of earnings management are used to conduct sensitivity tests.

We use the accrual model of Dechow and Dichev (2002), Francis *et al.* (2005), and Rajgopal and Venkatachalam (2011) as our first alternative measure of *EM*. Accounting accruals either anticipate future operating cash flows or reflect the current cash flows or the reversals of past cash flows. The model proposed by Dechow and Dichev (2002) shows the relationship between accruals and cash flows as follows:

$$\frac{TA_{it}}{A_{it-1}} = \alpha + \beta_1 \frac{CF_{it-1}}{A_{it-1}} + \beta_2 \frac{CF_{it}}{A_{it-1}} + \beta_3 \frac{CF_{it+1}}{A_{it-1}} + \varepsilon_{it} \tag{12}$$

where $CF_{i,t}$ denotes the operating cash flow for firm i in year t. All other variables share the same definitions presented in Section 3.5. DA (*DD*) refers to the absolute value of the residual.

The model by McNichols (2002) is used as the second alternative measure of *EM*, which adds cash flows into the model of Jones (1991) to reduce the extent to which the model omits fundamental economic variables. The model is shown in Equation (13). The absolute value of the residual is denoted as DAs (*EMCN)*:

$$\frac{TA_{it}}{A_{it-1}} = \alpha + \beta_1 \frac{CF_{it-1}}{A_{it-1}} + \beta_2 \frac{CF_{it}}{A_{it-1}} + \beta_3 \frac{CF_{it+1}}{A_{it-1}} + \beta_4 \frac{\Delta REV_{it}}{A_{it-1}} + \beta_5 \frac{PPE_{it}}{A_{it-1}} + \varepsilon_{it} \tag{13}$$

Following Ball and Shivakumar (2006) and Wang (2006), we use an improved piecewise measure (*EQPW*) as the third alternative measure of *EM*. This model is a revised version of that designed by Dechow and Dichev (2002), which is given by the following equation:

$$\frac{TA_{it}}{A_{it-1}} = \alpha + \beta_1 \frac{CF_{it-1}}{A_{it-1}} + \beta_2 \frac{CF_{it}}{A_{it-1}} + \beta_3 \frac{CF_{it+1}}{A_{it-1}} + \beta_4 DCF_{it} + \beta_5 DCF_{it} \times \frac{CF_{it}}{A_{it-1}} + \varepsilon_{it} \tag{14}$$

where all variables share the same definition as those presented in Equation (13), and the absolute value of the residual is described as DAs (i.e. *EQPW*).

These measurements decompose accruals into normal and abnormal components, which may have combined test concerns. Following Sloan (1996), we use the magnitude of total accruals (*TAccrual*) as our fourth alternative measure of *EM*, which is the net difference between accounting earnings and operating cash flows.

We use timely loss recognition (*TLR*), a measure of accounting conservatism, as our fifth alternative measure of *EM*. *TLR* reflects the timely recognition of incurred loss in earnings, which affects how the influence of managers' optimism on earnings quality. Assuming that market performance can reflect the stocks' fundamental information, Basu (1997) constructs the following conservatism measure:

$$Earnings_i = a + \beta_1 D_i + \beta_2 Ret_i + \beta_3 D_i \times \mathrm{Re}t_i + \varepsilon_i \tag{15}$$

where Ret_i denotes a stock return on quarter t, D_i is a dummy variable takes the value of 1 when $Ret_i < 0$ and is equivalent to 0 otherwise, and β_3 represents the better timeliness of bad news over that of positive announcements. Khan and Watts (2009) propose a new conservatism that reflects both the cross-sectional and time serial variations. The researchers argue that the timely recognition of announcements is related with the firm characteristics. Therefore, β_2 and β_3 can be expressed as follows:

$$\beta_2 = \mu_1 + \mu_2 LnSize_i + \mu_3 B/M_i + \mu_4 Leverage_i \tag{16}$$

$$\beta_3 = \lambda_1 + \lambda_2 LnSize_i + \lambda_3 B/M_i + \lambda_4 Leverage_i \tag{17}$$

We substitute these two equations into Equation (15) and estimate the new regression model for each quarter. We obtain the parameter estimation of μ and λ, which we then multiply by the firm characteristics to obtain the firm-specific conservatism. A higher conservatism represents a higher earnings quality.

Earnings volatility (*EarnVol*) is used as our sixth alternative measure of *EM* to describe earnings smoothness. We calculate the volatility of quarterly earnings in the previous eight quarters.

Finally, we use the trading between listed firms and their related parties (*RPT*) as our last alternative measure of *EM*. Berkman *et al.* (2010) argue that *RPT* reflects the adverse effect of poor corporate governance on the interests of small shareholders. To eliminate the scale effect, we adjust *RPT* by the revenue of firms. A higher *RPT* reflects a poorer earnings quality.

Table VIII re-estimates the empirical model of Equation (10) and Table IX reiterates the empirical model (11) by using the seven alternative *EM* measures. Panels A, B, and C of each table provide the trading of institutions, active institutions, and passive institutions, respectively.

Overall, we reveal a salient pre-event trading pattern after considering the earnings management of firms. This study finds that institutions can distinguish firms with high earnings management from those with low earnings management when making trading decisions. When the earnings management level of a specific firm is relatively high, institutions tend to reduce their buying volume prior to the announcement. In contrast, individuals neither screen opaque earnings management nor discern the operating risk behind the management of financial statements. Therefore, individual investors tend to buy additional stocks with worse earnings management because of their inferior information and lack of professional knowledge. Tables VIII and IX suggest that our results are insensitive to different estimation methods for earnings management.

5. Conclusion

This study addresses the following questions: does earnings management influence the trading behaviors of investors prior to earnings announcements? If so, is there any

Table VIII. Effects of earnings management on investor trading prior to earnings announcements: alternative earnings management measures

Variables	Dep. Var.: *CANB* over $[T_0-3, T_0-1]$						
	Reg-1 *EQDD*	*Reg-2* *EMCN*	*Reg-3* *PWDD*	*Reg-4* *TAccrual*	*Reg-5* *TLR*	*Reg-6* *EarnVol*	*Reg-7* *RPT*
Panel A: results based on institutional investors							
SUE	0.015*** (4.687)	0.016*** (4.755)	0.015*** (4.452)	0.015*** (4.285)	0.008*** (3.190)	0.013*** (4.022)	0.009 (1.804)
EM	0.281** (1.988)	0.331** (2.196)	0.337** (2.392)	0.046 (0.532)	0.115* (1.798)	0.363* (1.840)	0.01 (0.900)
SUE × *EM*	−0.341*** (−4.096)	−0.391*** (−4.311)	−0.309*** (−3.724)	−0.199*** (−3.469)	0.055* (1.699)	−0.411*** (−3.047)	−0.004 (−0.947)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	12,164	12,164	12,164	12,502	12,544	12,516	12,578
Adj. R^2	0.024	0.024	0.024	0.024	0.023	0.023	0.022
Panel B: results based on active institutional investors							
SUE	0.012*** (3.963)	0.012*** (4.095)	0.011*** (3.676)	0.011*** (3.486)	0.008*** (3.346)	0.010*** (3.729)	0.010** (3.059)
EM	0.131 (1.027)	0.128 (0.941)	0.164 (1.287)	−0.1 (−1.322)	0.123* (1.920)	0.195 (1.179)	−0.003 (−0.364)
SUE × *EM*	−0.195*** (−2.626)	−0.241*** (−2.933)	−0.161** (−2.116)	−0.108** (−2.114)	0.054* (1.657)	−0.275** (−2.394)	−0.008** (−3.443)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	12,164	12,164	12,164	12,502	12,544	12,516	12,578
Adj. R^2	0.017	0.017	0.017	0.017	0.017	0.016	0.017
Panel C: results based on passive institutional investors							
SUE	0.015*** (4.687)	0.016*** (4.755)	0.015*** (4.452)	0.015*** (4.285)	0.008*** (3.190)	0.013*** (4.022)	0.009 (1.804)
EM	0.281** (1.988)	0.331** (2.196)	0.337** (2.392)	0.046 (0.532)	0.115* (1.798)	0.363* (1.840)	0.01 (0.900)
SUE × *EM*	−0.341*** (−4.096)	−0.391*** (−4.311)	−0.309*** (−3.724)	−0.199*** (−3.469)	0.055* (1.699)	−0.411*** (−3.047)	−0.004 (−0.947)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	12,164	12,164	12,164	12,502	12,544	12,516	12,578
Adj. R^2	0.024	0.024	0.024	0.024	0.023	0.023	0.022

Notes: This table reports the effect of earnings management on investor trading behavior prior to negative and positive earnings announcements. The investor trading behaviors prior to earnings announcements are used as the dependent variables. We use the cumulative abnormal net buying on window $[T_0-3, T_0-1]$ (i.e. *CANB*) as a proxy for investor trading behavior. Panels A, B and C show trading behaviors of institutional investors, active institutional investors, and passive institutional investors, respectively. *SUE* is the standard earnings surprise that is based on the naïve time-series model, in which the earnings follow a rolling random walk distribution. For each Panel, *Reg-1* presents the result based on *EQDD* advocated by Dechow and Dichev (2002) as earnings management. *Reg-2* is based on *EMCN* estimated by McNichols (2002). *Reg-3* is based on *PWDD* estimated by Ball and Shivakumar (2005) and Wang (2006). *Reg-4* is based on the total accrual (*TAccrual*). *Reg-5* is based on the timely recognition of the incurred losses in earnings (*TLR*) proposed by Khan and Watts (2009). *Reg-6* is based on earnings volatility (*EarnVol*). *Reg-7* is based on related partners' trading adjusted by firm's revenue (*RPT*). All other variables are described as Table III. The fixed effects of industry and year are controlled. Adj. R^2 refers to the adjusted R^2. The robust *t*-values are enclosed in parentheses. *,**,***Significant at the 10, 5, and 1 percent levels, respectively

Table IX. Asymmetric effects of earnings management on investor trading prior to earnings announcements: alternative earnings management measures

Variables	Dep. Var.: *CANB* over $[T_0-3, T_0-1]$						
	Reg-1 *EQDD*	*Reg-2* *EMCN*	*Reg-3* *PWDD*	*Reg-4* *TAccrual*	*Reg-5* *TLR*	*Reg-6* *EarnVol*	*Reg-7* *RPT*
Panel A: results based on institutional investors							
Bad	−0.025*** (−2.578)	−0.023** (−2.490)	−0.026*** (−2.797)	−0.020** (−1.965)	−0.015** (−2.023)	−0.020** (−1.992)	−0.013 (−1.516)
Good	0.027** (2.505)	0.028*** (2.586)	0.026** (2.418)	0.024** (2.094)	0.012 (1.481)	0.023** (2.126)	0.014 (1.334)
EM	0.359 (1.636)	0.454** (2.115)	0.371* (1.664)	0.083 (0.675)	0.117 (1.589)	0.396 (1.625)	0.014 (1.144)
BAD × EM	0.383 (1.280)	0.355 (1.145)	0.472 (1.577)	0.127 (0.671)	−0.099 (−1.172)	0.474 (1.171)	−0.015 (−1.260)
Good × EM	−0.856** (−2.277)	−1.013** (−2.435)	−0.823** (−2.157)	−0.416* (−1.830)	0.169* (1.659)	−0.957** (−2.209)	−0.022** (−2.317)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	12,164	12,164	12,164	12,502	12,544	12,516	12,578
Adj. R^2	0.024	0.024	0.024	0.023	0.023	0.023	0.028
Panel B: results based on active institutional investors							
Bad	−0.015* (−1.723)	−0.015* (−1.824)	−0.016* (−1.875)	−0.01 (−1.098)	−0.013 (−1.560)	−0.014 (−1.530)	−0.012 (−1.591)
Good	0.021** (2.196)	0.022** (2.231)	0.022** (2.219)	0.020* (1.901)	0.012*** (5.448)	0.020** (2.010)	0.014** (2.781)
EM	0.27 (1.327)	0.273 (1.353)	0.29 (1.429)	0.002 (0.016)	0.121 (1.043)	0.286 (1.406)	0.008 (0.564)
BAD × EM	0.053 (0.201)	0.098 (0.364)	0.105 (0.404)	−0.058 (−0.361)	−0.062 (−0.627)	0.213 (0.679)	−0.013 (−0.789)
Good × EM	−0.613* (−1.729)	−0.724* (−1.840)	−0.646* (−1.769)	−0.346* (−1.682)	0.126* (2.254)	−0.823** (−2.148)	−0.031** (−3.080)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	12,164	12,164	12,164	12,502	12,544	12,516	12,578
Adj. R^2	0.016	0.016	0.016	0.018	0.017	0.016	0.016
Panel C: results based on passive institutional investors							
Bad	0 (−0.077)	−0.001 (−0.322)	−0.001 (−0.198)	0.003 (0.864)	−0.001 (−0.297)	−0.002 (−0.511)	0.000 (0.006)
Good	0.002 (0.584)	0.001 (0.346)	0.002 (0.417)	0.005 (1.287)	0.002 (0.721)	−0.002 (−0.424)	0.002 (0.652)
EM	0.037 (0.408)	−0.038 (−0.388)	0.014 (0.153)	0.129** (2.381)	0.019 (0.684)	0.039 (0.341)	−0.012 (−1.636)
BAD × EM	−0.017 (−0.135)	0.041 (0.300)	0.01 (0.076)	−0.117 (−1.474)	−0.067** (−1.974)	0.122 (0.607)	−0.004 (−0.299)
Good × EM	−0.033 (−0.234)	0.022 (0.132)	0.003 (0.021)	−0.102 (−1.139)	−0.005 (−0.147)	0.353* (1.800)	0.004 (1.277)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes

(*continued*)

Table IX.

	Dep. Var.: *CANB* over $[T_0-3, T_0-1]$						
Variables	*Reg-1* *EQDD*	*Reg-2* *EMCN*	*Reg-3* *PWDD*	*Reg-4* *TAccrual*	*Reg-5* *TLR*	*Reg-6* *EarnVol*	*Reg-7* *RPT*
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	12,164	12,164	12,164	12,502	12,544	12,516	12,578
Adj. R^2	0.129	0.129	0.129	0.128	0.127	0.128	0.114

Notes: This table reports asymmetric effects of earnings management on investor trading behavior prior to negative and positive earnings announcements. The investor trading behaviors prior to earnings announcements are used as the dependent variables. We use the cumulative abnormal net buying on window $[T_0-3, T_0-1]$ (i.e. *CANB*) as a proxy for investor trading behavior. Panels A, B and C show trading behaviors of institutional investors, active institutional investors, and passive institutional investors, respectively. We use *Bad* and *Good* dummies as proxies for earnings announcements. *Bad* and *Good* are dummy variables that denote the bottom and top 30 percent, respectively, of earnings surprise sample in each quarter. For each Panel, *Reg-1* presents the result based on *EQDD* advocated by Dechow and Dichev (2002) as earnings management. *Reg-2* is based on *EMCN* estimated by McNichols (2002). *Reg-3* is based on *PWDD* estimated by Ball and Shivakumar (2005) and Wang (2006). *Reg-4* is based on the total accrual (*TAccrual*). *Reg-5* is based on the timely recognition of the incurred losses in earnings (*TLR*) proposed by Khan and Watts (2009). *Reg-6* is based on earnings volatility (*EarnVol*). *Reg-7* is based on related partners' trading adjusted by firm's revenue (*RPT*). All other variables are described as Table III. The fixed effects of industry and year are controlled. Adj. R^2 refers to the adjusted R^2. The robust *t*-values are enclosed in parentheses. *,**,***Significant at the 10, 5, and 1 percent levels, respectively

difference between institutional and individual investors? The importance of earnings management in the decision-making process of market participants and the mixed results on the information advantages of institutional investors must be further explored.

We address these issues by using a unique account-level trading data set from the Chinese stock market. First, the results show that institutions, particularly active ones, sell stocks before negative news and buy stocks before good news. Second, institutions intensively buy stocks with the lowest earnings management and highest earnings surprises during the pre-event period, and the trading patterns of institutions are primarily driven by active institutions. Third, our natural experiment validates the robustness of the causality in our findings.

To the best of our knowledge, this study is the first to directly investigate the aforementioned issues. Our findings present clear implications that emphasize the significance of earnings management in investment decisions, particularly those of institutional investors. These implications may be of interest to regulators who aim to strengthen the earnings management of listed firms and to protect the interests of individual shareholders.

Notes

1. Recently, several studies provide opposite evidence to the findings mentioned above. Hirshleifer *et al.* (2008) find that individual investor trading fail to subsume any of the power of extreme earnings surprises to predict future abnormal returns. Griffin *et al.* (2011) find that institutional investors fail to trade against bubbles. Griffin *et al.* (2012) find no evidence on institutional investors that utilize information advantages. Kaniel *et al.* (2008) find that individuals, rather than institutions, make money in the short term. Kaniel *et al.* (2012) provide further evidence of informed trading by individual investors before earnings announcements. They show that intense aggregate individual investor buying (selling) predicts large positive (negative) abnormal returns on and after earnings announcement dates.
2. In the Chinese stock market, analysts always forecast earnings information for the entire fiscal year rather than quarterly or semiannually, and most firms have no analyst coverage.
3. A related concern is that the purpose of considerable trading before the earnings announcements may chase the profit in short-term, therefore, these investors are less likely pay much attention to the earnings quality. However, the effect of this issue is driving us against finding any results. Considering an extreme situation that all investors do not pay attention to earnings management, if we find any significant results, it means that the real effect of earnings management on the trading behaviors should be more significant than what we show.

References

Aboody, D., Hughes, J. and Liu, J. (2005), "Earnings quality, insider trading, and cost of capital", *Journal of Accounting Research*, Vol. 43 No. 5, pp. 651-673.

Ali, A., Klasa, S. and Li, O.Z. (2008), "Institutional stakeholdings and better-informed traders at earnings announcements", *Journal of Accounting and Economics*, Vol. 46 No. 1, pp. 47-61.

Ali, A., Chen, X., Yao, T. and Yu, T. (2008), "Do mutual funds profit from the accruals anomaly?", *Journal of Accounting Research*, Vol. 46 No. 1, pp. 1-26.

Ayers, B.C., Li, O.Z. and Yeung, P.E. (2011), "Investor trading and the post-earnings-announcement drift", *The Accounting Review*, Vol. 86 No. 2, pp. 385-416.

Baber, W.R., Chen, S. and Kang, S.-H. (2006), "Stock price reaction to evidence of earnings management: implications for supplementary financial disclosure", *Review of Accounting Studies*, Vol. 11 No. 1, pp. 5-19.

Ball, R. and Shivakumar, L. (2005), "Earnings quality in UK private firms: Comparative loss recognition timeliness", *Journal of Accounting and Economics*, Vol. 39 No. 1, pp. 83-128.

Ball, R. and Shivakumar, L. (2006), "The role of accruals in asymmetrically timely gain and loss recognition", *Journal of Accounting Research*, Vol. 44 No. 2, pp. 207-242.

Balsam, S., Bartov, E. and Marquardt, C. (2002), "Accruals management, investor sophistication, and equity valuation: evidence from 10-Q filings", *Journal of Accounting Research*, Vol. 40 No. 4, pp. 987-1012.

Bange, M.M. and De Bondt, W.F. (1998), "R&d budgets and corporate earnings targets", *Journal of Corporate Finance*, Vol. 4 No. 2, pp. 153-184.

Bartov, E., Radhakrishnan, S. and Krinsky, I. (2000), "Investor sophistication and patterns in stock returns after earnings announcements", *The Accounting Review*, Vol. 75 No. 1, pp. 43-63.

Basu, S. (1997), "The conservatism principle and the asymmetric timeliness of earnings1", *Journal of Accounting and Economics*, Vol. 24 No. 1, pp. 3-37.

Battalio, R.H. and Mendenhall, R.R. (2005), "Earnings expectations, investor trade size, and anomalous returns around earnings announcements", *Journal of Financial Economics*, Vol. 77 No. 2, pp. 289-319.

Battalio, R.H., Lerman, A., Livnat, J. and Mendenhall, R.R. (2012), "Who, if anyone, reacts to accrual information?", *Journal of Accounting and Economics*, Vol. 53 Nos 1/2, pp. 205-224.

Berkman, H., Cole, R.A. and Fu, L.J. (2010), "Political connections and minority-shareholder protection: evidence from securities-market regulation in China", *Journal of Financial and Quantitative Analysis*, Vol. 45 No. 6, pp. 1391-1417.

Bernard, V.L. and Thomas, J.K. (1989), "Post-earnings-announcement drift: delayed price response or risk premium?", *Journal of Accounting Research*, Vol. 27 No. 3, pp. 1-36.

Bhattacharya, N. (2001), "Investors' trade size and trading responses around earnings announcements: an empirical investigation", *The Accounting Review*, Vol. 76 No. 2, pp. 221-244.

Bradshaw, M.T., Richardson, S.A. and Sloan, R.G. (2001), "Do analysts and auditors use information in accruals?", *Journal of Accounting Research*, Vol. 39 No. 1, pp. 45-74.

Bushee, B.J. (1998), "The influence of institutional investors on myopic R&D investment behavior", *The Accounting Review*, Vol. 73 No. 3, pp. 305-333.

Campbell, J.Y., Ramadorai, T. and Schwartz, A. (2009), "Caught on tape: institutional trading, stock returns, and earnings announcements", *Journal of Financial Economics*, Vol. 92 No. 1, pp. 66-91.

Christophe, S.E., Ferri, M.G. and Angel, J.J. (2004), "Short-selling prior to earnings announcements", *The Journal of Finance*, Vol. 59 No. 4, pp. 1845-1876.

Chung, R., Firth, M. and Kim, J.-B. (2002), "Institutional monitoring and opportunistic earnings management", *Journal of Corporate Finance*, Vol. 8 No. 1, pp. 29-48.

Collins, D.W., Gong, G. and Hribar, P. (2003), "Investor sophistication and the mispricing of accruals", *Review of Accounting Studies*, Vol. 8 Nos 2/3, pp. 251-276.

Core, J.E., Guay, W.R. and Verdi, R. (2008), "Is accruals quality a priced risk factor?", *Journal of Accounting and Economics*, Vol. 46 No. 1, pp. 2-22.

Dechow, P.M. and Dichev, I.D. (2002), "The quality of accruals and earnings: the role of accrual estimation errors", *The Accounting Review*, Vol. 77 No. S1, pp. 35-59.

Dechow, P.M., Sloan, R.G. and Sweeney, A.P. (1995), "Detecting earnings management", *The Accounting Review*, Vol. 70 No. 2, pp. 193-225.

Dou, Y., Hope, O.K., Thomas, W.B. and Zou, Y. (2016), "Individual large shareholders, earnings management, and capital-market consequences", *Journal of Business Finance & Accounting*, Vol. 43 Nos 7/8, pp. 872-902.

Foster, G. (1977), "Quarterly accounting data: time-series properties and predictive-ability results", *Accounting Review*, Vol. 52 No. 1, pp. 1-21.

Foster, G., Olsen, C. and Shevlin, T. (1984), "Earnings releases, anomalies, and the behavior of security returns", *The Accounting Review*, Vol. 59 No. 4, pp. 574-603.

Francis, J., Lafond, R., Olsson, P. and Schipper, K. (2005), "The market pricing of accruals quality", *Journal of Accounting and Economics*, Vol. 39 No. 2 No. 1, pp. 295-327.

Gao, S., Meng, Q., Chan, K.C. and Wu, W. (2017), "Earnings management before ipos: are institutional investors misled?", *Journal of Empirical Finance*, Vol. 42 No. 1, pp. 90-108.

Gietzmann, M.B. and Isidro, H. (2013), "Institutional investors' reaction to sec concerns about ifrs and us gaap reporting", *Journal of Business Finance & Accounting*, Vol. 40 Nos 7/8, pp. 796-841.

Griffin, J.M., Shu, T. and Topaloglu, S. (2012), "Examining the dark side of financial markets: do institutions trade on information from investment bank connections?", *Review of Financial Studies*, Vol. 25 No. 7, pp. 2155-2188.

Griffin, J.M., Harris, J.H., Shu, T. and Topaloglu, S. (2011), "Who drove and burst the tech bubble?", *The Journal of Finance*, Vol. 66 No. 4, pp. 1251-1290.

Griffin, P.A. (2003), "A league of their own? Financial analysts' responses to restatements and corrective disclosures", *Journal of Accounting, Auditing & Finance*, Vol. 18 No. 4, pp. 479-517.

Han, B. and Kong, D.M. (2017), "Institutional investors and equity prices: information, behavioral bias, and arbitrage", available at: https://ssrn.com/abstract=2926401

Hand, J.R.M. (1990), "A test of the extended functional fixation hypothesis", *The Accounting Review*, Vol. 65 No. 4, pp. 740-763.

He, X., Wong, T. and Young, D. (2012), "Challenges for implementation of fair value accounting in emerging markets: evidence from China", *Contemporary Accounting Research*, Vol. 29 No. 2, pp. 538-562.

Hirshleifer, D.A., Myers, J.N., Myers, L.A. and Teoh, S.H. (2008), "Do individual investors cause post-earnings announcement drift? Direct evidence from personal trades", *The Accounting Review*, Vol. 83 No. 6, pp. 1521-1550.

Jiambalvo, J., Rajgopal, S. and Venkatachalam, M. (2002), "Institutional ownership and the extent to which stock prices reflect future earnings", *Contemporary Accounting Research*, Vol. 19 No. 1, pp. 117-145.

Jones, J.J. (1991), "Earnings management during import relief investigations", *Journal of Accounting Research*, Vol. 29 No. 2, pp. 193-228.

Kaniel, R., Saar, G. and Titman, S. (2008), "Individual investor trading and stock returns", *The Journal of Finance*, Vol. 63 No. 1, pp. 273-310.

Kaniel, R.O.N., Liu, S., Saar, G. and Titman, S. (2012), "Individual investor trading and return patterns around earnings announcements", *The Journal of Finance*, Vol. 67 No. 2, pp. 639-680.

Ke, B. and Petroni, K. (2004), "How informed are actively trading institutional investors? Evidence from their trading behavior before a break in a string of consecutive earnings increases", *Journal of Accounting Research*, Vol. 42 No. 5, pp. 895-927.

Ke, B. and Ramalingegowda, S. (2005), "Do institutional investors exploit the post-earnings announcement drift?", *Journal of Accounting and Economics*, Vol. 39 No. 1, pp. 25-53.

Khan, M. and Watts, R.L. (2009), "Estimation and empirical properties of a firm-year measure of accounting conservatism", *Journal of Accounting and Economics*, Vol. 48 Nos 2/3, pp. 132-150.

Kothari, S.P., Leone, A.J. and Wasley, C.E. (2005), "Performance matched discretionary accrual measures", *Journal of Accounting and Economics*, Vol. 39 No. 1, pp. 163-197.

Lee, C.M.C. and Ready, M.J. (1991), "Inferring trade direction from intraday data", *The Journal of Finance*, Vol. 46 No. 2, pp. 733-746.

Linck, J.S., Netter, J. and Shu, T. (2013), "Can managers use discretionary accruals to ease financial constraints? Evidence from discretionary accruals prior to investment", *The Accounting Review*, Vol. 88 No. 6, pp. 2117-2143.

Livnat, J. and Mendenhall, R.R. (2006), "Comparing the post-earnings announcement drift for surprises calculated from analyst and time series forecasts", *Journal of Accounting Research*, Vol. 44 No. 1, pp. 177-205.

McNichols, M.F. (2002), "The quality of accruals and earnings: the role of accrual estimation errors: discussion", *The Accounting Review*, Vol. 77 No. S1, pp. 61-69.

McNichols, M.F. and Stubben, S.R. (2008), "Does earnings management affect firms' investment decisions?", *The Accounting Review*, Vol. 83 No. 6, pp. 1571-1603.

Mashruwala, C.A. and Mashruwala, S.D. (2011), "The pricing of accruals quality: January versus the rest of the year", *The Accounting Review*, Vol. 86 No. 4, pp. 1349-1381.

Mitra, S. and Cready, W.M. (2005), "Institutional stock ownership, accrual management, and information environment", *Journal of Accounting, Auditing & Finance*, Vol. 20 No. 3, pp. 257-286.

Rajgopal, S. and Venkatachalam, M. (2011), "Financial reporting quality and idiosyncratic return volatility", *Journal of Accounting and Economics*, Vol. 51 Nos 1/2, pp. 1-20.

Shanthikumar, D.M. (2012), "Consecutive earnings surprises: small and large trader reactions", *The Accounting Review*, Vol. 87 No. 5, pp. 1709-1736.

Shen, C.-H., Luo, F. and Huang, D. (2015), "Analysis of earnings management influence on the investment efficiency of listed chinese companies", *Journal of Empirical Finance*, Vol. 34 No. 1, pp. 60-78.

Shu, T. (2013), "Institutional investor participation and stock market anomalies", *Journal of Business Finance & Accounting*, Vol. 40 Nos 5/6, pp. 695-718.

Sloan, R. (1996), "Do stock prices fully reflect information in accruals and cash flows about future earnings?(digest summary)", *The Accounting Review*, Vol. 71 No. 3, pp. 289-315.

Subramanyam, K. (1996), "The pricing of discretionary accruals", *Journal of Accounting and Economics*, Vol. 22 Nos 1/3, pp. 249-281.

Walther, B.R. (1997), "Investor sophistication and market earnings expectations", *Journal of Accounting Research*, Vol. 35 No. 2, pp. 157-179.

Wang, D. (2006), "Founding family ownership and earnings quality", *Journal of Accounting Research*, Vol. 44 No. 3, pp. 619-656.

Xie, H. (2001), "The mispricing of abnormal accruals", *The Accounting Review*, Vol. 76 No. 3, pp. 357-373.

Yan, X. and Zhang, Z. (2007), "Institutional investors and equity returns: are short-term institutions better informed?", *Review of Financial Studies*, Vol. 22 No. 2, pp. 893-924.

Zhang, Y., Uchida, K. and Bu, H. (2013), "How do accounting standards and insiders' incentives affect earnings management? Evidence from China", *Emerging Markets Review*, Vol. 16 No. 1, pp. 78-99.

Further reading

Barber, B.M., Odean, T. and Zhu, N. (2008), "Do retail trades move markets?", *Review of Financial Studies*, Vol. 22 No. 1, pp. 151-186.

Linck, J.S., Netter, J. and Shu, T. (2010), "Can earnings management ease financial constraints? Evidence from earnings management prior to investment", available at: https://ssrn.com/abstract=1573147

Corresponding author

Shasha Liu can be contacted at: sarahliu@jnu.edu.cn