# Earnings management before IPOs: Are institutional investors misled?

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## Abstract

Leveraging the unique detailed bid data of institutional investors during the IPO process in China, we investigate how investors, especially institutional investors, react to the issuing firm' pre-IPO earnings management. Our findings suggest that institutional investor bid prices are negatively correlated with pre-IPO accrual-based and real earnings management. The findings are robust to a battery of different bid prices and accrual-based and real earnings management specifications. In contrast, we document that individual investors' oversubscription ratio is positively correlated with pre-IPO real earnings management. Additional results show that IPO offer prices (relative to the proposed IPO price range) are negatively correlated with pre-IPO earnings management, suggesting that institutional investors' ability to recognize earnings management pressures IPO issuing firms into setting a lower offer price. Lastly, we find that, although long-term IPO performance is negatively related to earnings management, the relation is not as strong as the literature depicts.

Key words: earnings management; IPO; China

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**Earnings management before IPOs: Are institutional investors misled?**

## 1. Introduction

Aharony et al. (1993) and Liu et al. (2014) suggest that an initial public offering (IPO) is a significant event for a firm and its founding shareholders. A firm can leverage the IPO opportunity to raise additional capital, improve capital structure, and allows founding shareholders to capitalize on their initial investments. When a firm goes public, its accounting statements carry a great amount of weight due to a general lack of information about the firm (Titman and Trueman, 1986; Brau and Fawcett, 2006). One of the widespread belief is that an IPO firm has incentives to engage in earnings management to window-dress its performance and boost the IPO offer price. The literature seems to support this claim. For instance, Aharony et al. (1993), using US IPOs, report that earnings management is more pronounced among small firms and firms with large financial leverage due to their need to look good in the IPO process to obtain a high offer price. Teoh et al. (1998a) report US IPO firms engage in earnings management the year they go public, resulting in higher IPO offer prices and better short-term IPO performance. They document that the long-term stock returns of IPO firms, on average, are lower than those of comparable seasoned firms because IPO firms engaging in earnings management underperform in the long term due to the initial overvaluation. The implicit assumption in the IPO earnings management literature is that IPO investors are unable to fully recognize earnings management in IPO firms in the short term. However, to the best of our knowledge, there is no empirical literature examining directly how investors, especially institutional investors, react to pre-IPO earnings management during the IPO process. It

may arise from that there is a lack of public data regarding investor behavior during the IPO process.

Leveraging the detailed bid data of institutional investors during the IPO process in China, we examine whether institutional IPO investors are able to adjust their IPO bidding prices in the auction process of IPO when facing pre-IPO earnings management. If institutional IPO investors can "see through" the earnings management of an IPO firm, we would expect their bidding prices to be negatively correlated with the firm's pre-IPO earnings management. If not, the bidding price should not be correlated with the IPO firm's earnings management. Whether institutional IPO investors can "discount" the proposed price range of the IPO shares in the presence of earnings management is a research question. In addition, it would be interesting to learn if individual investors respond to an IPO firm's earnings management in the context of their subscription and how the IPO's long-term performance relates to earnings management in the presence of institutional investors in a auction process. We use a sample of 472 Chinese IPOs during 2010–2012 to examine the research questions.

Our paper is interesting for three reasons. First, China underwent an IPO regulatory reform in 2005, switching the IPO pricing mechanism from a highly regulated price–earnings (P/E) multiple pricing method to an auction-like book-building system (hereafter, auction system). Before the regulation change, an IPO firm's offer price was a strict multiple of its earnings per share, which naturally led to opportunistic earnings management for the IPO firm (Aharony et al., 1993 and 2000). The newly adopted auction system allows only institutional IPO investors to submit their bids (including both the

bidding price and desired quantity) after an underwriter proposes an IPO price range.[2] Subsequently, the underwriters set the offer price according to the bid prices of institutional investors during auction process in consultation with the issuing firm.[3] During the study period, the China Securities Regulatory Commission (CSRC) mandated the disclosure of institutional investors' bid prices and quantities for IPO auction. Hence, we have information to examine whether institutional investors can see through issuers' pre-IPO earnings management. Hence, the Chinese sample offers a unique opportunity to investigate the research questions.

Second, China used a hybrid IPO process in the sample period. In the hybrid process, there are two IPO phases. In the first phase, underwriters carry out auctions to gather subscription information from institutional investors and set the IPO offer price based on the information in the order book. Only institutional investors can participate in this phase. In the second phase, individual investors subscribe for IPO shares online according to the offer price set in the first phase; if the IPO issue is over-subscribed; underwriters allocate shares to individual investors by lottery. This hybrid mechanism separates institutional and individual investors in the IPO subscription[4] and provides an opportunity to examine

[2] The 2012 Reform relaxed this regulation. Individual investors with experience and adequate funding can since participate in the offline book-building process through underwriter recommendations. However, the participation of individual investors is very limited. In addition, underwriters usually recommend experienced individual investors, whose behaviors are more similar to those of institutional investors than to those of normal individual investors.

[3] The offer price is not necessary the market clearing price. Underwriters have considerable discretion over the offer price and set the offer price in consultation with the issuing firm referring to the bid prices of institutional investors during the auction process.

[4] Conceptually institutional investors can still take part in the online subscription. It is, however, unlikely because: (1) the online subscription quantity is limited to 0.1% of the available shares; and (2) it is usually over-subscribed and thus IPO shares are allocated via a lottery system with only a small chance to get share allotment. Therefore, almost all the subscription in the online stage is from individual investors.

potentially different responses to pre-IPO earnings management between institutional and individual investors.

Third, as an emerging market, China suffers from typical capital market impediments so that information asymmetry is high. Hence, it poses a challenge to any investors making IPO investment decisions. The new IPO pricing system in China provides an opportunity to study how institutional investors use their bid prices to respond to the information asymmetry arising from IPO firms' earnings management. To the best of our knowledge, few studies directly examine the impact of IPO firms' earnings management on institutional investors' bidding behavior. Our study fills this gap.

We document that institutional IPO investor bid prices are negatively correlated with pre-IPO earnings management. The finding is robust to different measures of bid price and accrual-based and real earnings management. In contrast, we report that individual investors' oversubscription ratio is positively correlated with pre-IPO real earnings management. In addition, we find that the impact of institutional bid prices in response to pre-IPO earnings management leads to a lower IPO offer price available to individual investors. Finally, we document that long-term IPO performance is negatively correlated with only two of six measures of earnings management. Overall, the new auction system in China reduces the information asymmetry in the IPO process and mitigates the adverse impact of earnings management on institutional investors' IPO subscription and long-term IPO performance.

We make several contributions to the literature. First, we document that institutional investors can recognize pre-IPO earnings management and react accordingly by submitting a lower IPO bidding price. This is a new finding in the IPO earnings

management literature. The majority of literature focuses on whether the issuing firm conducts pre-IPO earnings management (e.g. Friedlan, 1994, Aharony et al., 2010) and the impact of IPO year earnings management on the long-run stock returns (e.g. Teoh et al., 1998a). A few studies, such as DuCharme et al. (2001) and Armstrong et al. (2015), examine the relation between pre-IPO earnings management and the IPO issuing price and report no correlation between the two. Few studies examine how investors, especially institutional investors, react *directly* to pre-IPO earnings management during the IPO process. Using IPO regulations in China that separate the different responses of institutional and individual investors to pre-IPO earnings management, we fill the gap in the literature.

Second, we show that IPO investors are not homogeneous. Specifically, institutional investors can recognize pre-IPO accrual-based and real earnings management but individual investors are unable to do so and continue to oversubscribe for shares from IPO firms with high pre-IPO real earnings management. Our findings echo the literature on institutional investors' superior ability relative to individual investors in trading on earnings news (Park et al. 2014) and bankruptcy events (Ramalingegowda, 2014).

Third, our results compliment some recent findings in the literature (Ball and Shivakumar, 2008; Venkataraman, et al, 2008; Armstrong, et al. 2015). For instance, Armstrong et al. (2015) show that US IPO offer price is uncorrelated with pre-IPO accrual-based earnings management; suggesting that investors recognize pre-IPO earnings management by not reacting to it. The literature, in general, did not use: (1) pre-IPO auction data because such data are not available in the UK or US; (2) did not separate institutional and individual investors due to the limitation of the data; and (3) they did not

use real earnings management. We offer *direct* evidence on institutional and individual investors' reaction to pre-IPO earnings management to supplement the findings in in the literature in terms of accrual-based and real earnings management. Mostly importantly, we document that institutional investor bid price is *negatively correlated* to pre-IPO earnings management; a finding very different from the recent literature of no correlation. We attribute our different findings from the recent literature (e.g., Armstrong et al. 2015) due to the availability of detailed bid data in China to allow a detailed examination of the research issue.

## 2. Background

In the course of its economic development, China has recognized the need to establish stock market exchanges, promote stock trading, and facilitate new shares issuance. Since 1990, the Chinese stock market has flourished, with many firms conducting IPOs. To preserve an orderly market, the CSRC set guidelines and rules for IPOs. Before 2005, the IPO offer price had to follow a strict multiple of the firm's earnings per share. Liu et al. (2014) report that the P/E multiples for the periods before 1999, from 1999 to 2001, and from 2002 to 2004 were 15, 50, and 20, respectively. For instance, if the regulated P/E multiple is 15 and a firm's earnings per share is RMB 5, then the IPO new share offering price would be RMB 75. Unsurprisingly, IPO firms opportunistically engage in earnings management to boost their reported earnings to obtain a high IPO offer price.

In 2005, the CSRC switched the P/E multiple pricing to an auction system[5]. The specific auction rules, however, were not implemented until September 19, 2006, when the

[5] In China, CSRC and the media frequently calls this new IPO mechanism "book-building". However, it is actually an auction mechanism in the sense that underwriters do not have allocation discretion. We thank the referee for clarifying this point.

CSRC issued "Measures for the Administrations of Securities Issuance and Underwriting." The new system has two phases. In the first, offline phase, the investment bank underwriting the IPO shares provides an indicative price range for institutional investors to subscribe offline. Only institutional investors can submit their bids and in quantities for a maximum of 50% of an IPO's shares.[6] Then, the IPO firm sets the offer price for the public after the institutional investors' bid in consultation with the issuing firm without any pre-specified rule. In the second online phase, individual (retail) investors then submit their subscription quantity based on the set offer price via an online system. Institutional investors' allotted shares are subject to a three-month lock-up period. The participations of institutional and individual investors are generally separated in the Chinese IPO process, which allow us to examine the specific response of both types of investors to pre-IPO earnings management.

On November 1, 2010, the CSRC issued "Guiding Opinions on Further Reforming the System of Issue of New Shares" to mandate that underwriters and IPO firms disclose institutional investors' bidding prices and quantities to the public in the auction process. On April 28, 2012, the CSRC refined the 2006 rules by issuing "Guidance for the Further Deepening of Reform of the IPO System" to remove the three-month lock-up period for institutional investors' allotted shares.

The Chinese environment offers interesting aspects for examining the relation between institutional investors' bidding behavior and IPO earnings management. Most importantly, the bidding behavior of institutional investors is generally not masked by the participation of individual investors. Data on bidding prices and quantities have been

[6] This quantity drops to 20% if there are fewer than 400 million issuing shares.

available since 2010, but few studies use them to examine the relation between institutional investor bidding and earnings management in the pre-IPO. Our study fills this void.

## 3. Literature review and testable hypotheses

We have two strands of literature. The first strand focuses on earnings management around IPOs, while the second strand is related to the general ability of institutional investors.

### *3.1 IPO and earnings management*

Aharony et al. (1993) and Friedlan (1994) provide early studies on US IPO firms engaging in pre-IPO accrual-based earnings management. While Aharony et al. find only small and highly leverage firms engage in earnings management before their IPOs, Friedlan provides evidence to show that IPO firms use pre-IPO accrual-based earnings management to boost their earnings. The different results of Aharony et al. (1993) and Friedlan (1994) are likely due to different sample years and earnings management measures.

Teoh et al. (1998a) study the relation between long-term IPO performance and earnings management in IPO year. They document a general increase in discretionary total current accruals (*DTCA*) for IPO firms in IPO year and it is negatively correlated with long-term IPO performance. These findings suggest that IPO firms mislead individual investors using earnings management so that the shares are overvalued. Over the long term, the genuine firm value prevails, so that the IPO's long-term performance is poor. In a related study, Teoh et al. (1998b) further document various opportunistic earnings management practices in the issue year of IPOs. These practices include income-increasing depreciation policies and significantly less uncollectible accounts receivables. More recent studies by

Ball and Shivakumar (2008) and Armstrong et al. (2009) do not find US or UK IPO firms inflate their earnings through earnings management in pre-IPO, however. Ball and Shivakumar (2008) attribute the difference in their findings from the early literature to improved monitoring by internal and external parties, such as auditors, analysts, and the media. Armstrong et al. (2015) show that US IPO offer price is uncorrelated with pre-IPO accrual-based earnings management in the book-building process, suggesting that investor bids and the offer price are not influenced by the issuing firm's pre-IPO earnings management. Although we do not observe the detailed investor bids due to data unavailability, the offer price can be viewed as a summary of the information. It is because, in the US book-building IPOs, underwriters set the final offer price after observing the bids from investors.

There is also a body of literature related to IPO earnings management in China. Aharony et al. (2000) study Chinese IPOs and report that, among B- and H-share IPO firms, unprotected industrial firms experience a statistically significant post-issue earnings decline. The authors also document that state-owned enterprises (SOEs) in unprotected industries manage discretionary accruals to boost earnings in pre-IPOs. Aharony et al. (2010) examine a sample of Chinese IPOs during 1999–2001 and document that IPO firms use related party transactions of goods and services to manage earnings upward in the pre-IPO period. Cheng et al. (2015) find that Chinese firms generally inflated their earnings around IPOs during 2003–2009, especially non–SOEs, and the extent of earnings management depends on state ownership and bank loan availability. We note that the IPO sample period of Aharony et al. (2000, 2010) precedes the 2006 regulation change and the study of Cheng et al. (2015) did not explicitly consider the change in IPO regulation. Liu et

al. (2014) find that the extent of earnings management in IPO year among IPO firms in China since the adoption of the auction system is significantly lower than in the P/E pricing period.

Taking the literature together, we draw two conclusions. First, the evidence that investors are fooled by earnings management (disputed by recent studies such as Armstrong et al., 2015) mainly refers to the negative correlation between current year accrual-based earnings management and post-IPO long-run stock returns, which suggests that IPO firms with current year accrual-based earnings management are overvalued. This overvaluation, however, is on the open market, not during the IPO process. Hence, the early evidence does not speak to how IPO investors *directly* react to earnings management. The recent evidence (e.g., Armstrong et al., 2015) reports that US IPO offer price is uncorrelated with pre-IPO accrual-based earnings management. However, it only shows that investors do not *react* to pre-IPO accrual-based earnings management; it did not show IPO investors are able to *discount* the proposed IPO price by submitting lower bids. It is still unclear if: (1) investors are able to submit lower bids when facing higher pre-IPO earnings management, (2) different types of earnings management, i.e., real earnings management, would lead to different conclusions.

Second, the Chinese IPO studies suggest that it is common for Chinese IPO firms to engage in earnings management but less so since the auction system was implemented. The implicit assumption in these studies is that IPO investors are unable to fully recognize earnings management in IPO firms in the short term. However, to the best of our knowledge, few studies examine how investors, especially institutional investors, react to

pre-IPO earnings management during the IPO process directly.[7] The evidence that IPO year discretional accruals are negatively associated with the post-IPO long-run stock returns (e.g. Teoh et al., 1998a) suggests that IPO firms with higher discretionary accruals are overvalued on the secondary market in the short run, not during the IPO process. Two notable studies, DuCharme et al. (2001) and Armstrong et al. (2015)[8], examine the relation between pre-IPO earnings management and the issuing price, but the issuing price is set by the underwriters in consultation with the issuer, not by institutional investors; even though such relation may be influenced by institutional investors' response to pre-IPO earnings management during the IPO process. Overall, it is unclear if institutional investors are able to recognize pre-IPO earnings management. Leveraging detailed bid data of institutional investors during the IPO process, we fill this void.

*3.2 Institutional investors*

Chiang et al. (2010) report that institutional investors are better informed than retail investors in bidding IPO auctions in Taiwan and the IPOs' initial returns are higher when institutional investors bid higher prices. Tong et al. (2013) find that institutional investors buy shares two days before a firm announces its share structure reform in China and make a good profit. That is, institutional investors have a superior information advantage over other investors.

Ramalingegowda (2014) reports that institutional investors with long-term investment horizons sell more shares of impending bankrupt firms at least one quarter

[7] We thank the referee for clarifying this point.

[8] These two studies do not reach a consensus. DuCharme et al. (2001) find that both pre-IPO accruals and cash flows are positively related to IPO issue price while Armstrong et al. (2015) show that IPO offer price is unaffected by pre-IPO accrual-based earnings management (both discretionary and non-discretionary).

ahead of other investors. The author attributes this to institutional investors being more informed about the future firm value than other investors are. Park et al. (2014) document that institutional investors can trade profitably around positive or negative earnings surprise announcements relative to foreign and individual investors in Korea. The authors suggest that domestic institutional investors have a superior information advantage over other investors. All in all, the literature shows that institutional investors are generally better informed than other investors.

*3.3 Testable hypotheses*

The two strands of literature suggest that (1) IPO firms have an incentive to engage in earnings management, despite recent studies suggesting the extent of earnings management is lower, and (2) Institutional investors are better informed than individual investors and are likely to recognize pre-IPO earnings management in IPO firms. Taking together, if an IPO firm engages in high pre-IPO earnings management, it increases the degree of information asymmetry between institutional investors and underwriters. Accordingly, earnings management adversely affects the quality of the earnings reported in the financial statements. Then, ceteris paribus, if institutional investors can recognize pre-IPO earnings management, then they lower the valuation of the IPO shares and submit lower bid prices accordingly. Hence, the first testable hypothesis is as follows.

*H1: Institutional investors' bid prices are negatively correlated with pre-IPO earnings management.*

As to individual investors, since they bids after the offering price is set in the offline stage, their demand will be not correlated with pre-IPO earnings management if they are smart enough to see through the earnings management and understand that the issue price

will fully adjust to such manipulation. If individual investors are also able to see through the earnings management of IPO firms and do not believe that the issue price has fully adjust to such earnings manipulation, they will subscribe less for firms with more earnings management in the online stage of the IPO. In contrast, if individual investors are unable to recognize earnings management and are thus misled by it, then, after the IPO offer price is adjusted to earnings management in the first phase, the subscription of the IPO by individual investors should be positively related to earnings management. In sum, the impact of earnings management on individual investors subscription in the online stage is an empirical question.

## 4. Data, key variables, and methods

### *4.1 Data*

We use Chinese IPOs from November 1, 2010, to December 31, 2012, after the CSRC mandated underwriters and IPO firms to disclose institutional investors' bidding prices and quantities in the auction process. We end the sample period on December 31, 2012, because we need to examine long-term IPO performance using two years of post-IPO stock returns. There are a total of 479 IPO applications. After deleting one unsuccessful application, four related to financial firms, and two without earnings management information, our final sample contains 472 IPO firms. The bidding price and quantity were manually collected and financial information is from the China Stock Market & Accounting Research database (CSMAR). CSRC requires IPO firms to provide prior three years financial information before their IPO year (t) in their application. Hence, we are able to use the t-2 and t-1 year financial information to calculate the earnings management at t-1. We obtain this pre-IPO financial information from the IPO module of CSMAR.

*4.2 Key variables*

*4.2.1 Institutional investor bid prices*

Before opening up for bidding in the auction process, an underwriter proposes an indicative price range for the new IPO shares. Institutional investors then bid the IPO shares in terms of price and quantity offline. The weighted average bid price and bid quantity represent institutional investors' views on the IPO valuation. Based on the bid price and quantity, underwriters then set the IPO offer price in consultation with the issuing firm. The offer price is not necessarily the market clearing bidding price. In fact, underwriters, together with the issuing firms, have considerable discretion over the offer price, because the price is not set according to any explicit rule. The set IPO offer price is announced to allocate shares to institutional investors and available for individual investors for subscription online.

While there is no pre-specified rule for setting the IPO offer price after auction, Spatt and Srivastava (1991) and Cornelli and Goldreich (2003) show that the average and market clearing bid prices by institutional investors revealed in the order book summarize the information and play a significant role in the IPO process. Hence, we use average bidding–midpoint ($AVG\_BID_t$) and clearing bidding–midpoint ($CLEAR\_BID_t$) price differences relative to the midpoint of an underwriter's proposed price range to capture the bid price adjustments of institutional investors:

$$AVG\_BID_t = (AVERAGE_t - MIDPOINT_t) / MIDPOINT_t \quad (1)$$

$$CLEAR\_BID_t = (CLEAR_t - MIDPOINT_t) / MIDPOINT_t \quad (2)$$

where

$AVERAGE_t$ = the weighted average of all bid prices submitted by all institutional investors, using the bidding quantities as weights;

$MIDPOINT_t$ = the midpoint of the price range proposed by the underwriter;

$CLEAR_t$ = the market clearing price of all bids submitted by institutional investors. It is the price that equates bid quantities and IPO allotment to institutional investors.

Equation (1) follows the logic of Hanley (1993). The variable $AVG\_BID_t$ captures the view on the valuation of all institutional investors, while $CLEAR\_BID_t$ measures the view of a marginal institutional investor. Both measures capture institutional investors' bidding behavior.

In addition, we include the percent change of the IPO offer price relative to the midpoint of the proposed IPO price range, denoted by $CHG\_OFFER_t$, and calculate it as $(ISSUE_t - MIDPOINT_t)/MIDPOINT_t$, where *ISSUE* is the IPO offer price. $CHG\_OFFER_t$ captures the IPO firm's pricing behavior in the offline stage of the auction process after institutional investors' bidding. A negative (positive) $CHG\_OFFER_t$ suggests a less (more) aggressive IPO pricing strategy by the underwriter.

*4.2.2 Earnings management*

*4.2.2.1 Accrual-based earnings management*

There are several ways to measure accrual-based earnings management: as discretionary total accruals ($DTA_{t-1}$), discretionary total current accruals ($DTCA_{t-1}$), and discretionary revenue ($DREV_{t-1}$). The general intuition is that a firm manipulates accruals

to increase or decrease its earnings. For $DTA_{t-1}$, we follow Kothari et al. (2005) and model total accruals ($TA_{t-1}$) in the pre-IPO year (t-1) as

$$TA_{i,t-1} = \alpha_0 + \alpha_1(1/ASSET)_{i,t-2} + \alpha_2 \Delta REV_{i,t-1} + \alpha_3 PPE_{i,t-1} + \alpha_4 ROA_{i,t-1} + \varepsilon_{i,t-1} \quad (3)$$

where $ASSET_{i,t-2}$ is total assets for firm i at year t-2 end, $\Delta REV_{i,t-1}$ is change in revenue at time t-1, $PPE_{i,t-1}$ is fixed assets at time t-1, $ROA_{t-1}$ is return on assets at time t-1, and $\varepsilon$ is a random error term. We run Eq. (3) by all firms in the same industry and year. We classify all listed firms into 13 industries following the CSRC's four-digit industry classification system. The residual from Eq. (3) in a given year is discretionary total accruals ($DTA_{i,t-1}$) for firm *i* at time *t-1*. The predicted value from Eq. (3) is non-discretionary total accruals ($NDTA_{i,t-1}$)

Besides *discretionary total accrual* ($DTA_{t-1}$), Teoh et al. (1998a, b), Defond and Park (2001), and Dechow and Dichev (2002) use discretionary total current accruals ($DTCA_{t-1}$) to measure earnings management. Specifically, they consider

$$TCA_{i,t-1} = \beta_0 + \beta_1 CFO_{i,t-2} + \beta_2 CFO_{i,t-1} + \beta_3 CFO_{i,t} + \beta_4 \Delta REV_{i,t-1} + \beta_5 PPE_{i,t-1} + \mu_{i,t-1} \quad (4)$$

where $CFO_{t-2}$, $CFO_{t-1}$ , $CFO_t$ is cash flow from operations t-2, t-1 and t, respectively and $\mu_{i,t-1}$ is a random error term. We run Eq. (4) for all firms in the same industry and year. We use the residual from Eq. (4) in a given year as discretion total current accruals ($DTCA_{i,t-1}$) for firm *i* at time *t-1*. The predicted value from Eq. (4) is non-discretionary total current accruals ($NDTCA_{i,t-1}$).

Stubben (2010) suggests that among all accruals, accounts receivables and revenues are subject to more executive discretionary decisions. The author suggests using revenue to construct a measure of earnings management. Accordingly, we use the equation

$$\Delta AR_{i,t-1} = \gamma_0 + \gamma_1 \Delta REV_{i,t-1} + \pi_{i,t-1} \quad (5)$$

where $\Delta AR_{i,t-1}$ is change in accounts receivables and $\pi_{i,t-1}$ is a random error term. The residuals from Eq. (5) using annual regression for all firms in the same industry are the discretionary revenue ($DREV_{i,t-1}$). The predicted value from Eq. (5) is the non-discretionary revenue ($DREV_{i,t-1}$).

Overall, large values of $DTA_{t-1}$, $DTCA_{t-1}$, or $DREV_{t-1}$ suggest large accrual-based earnings management in the Pre-IPO and vice versa.

*4.2.2.2 Real earnings management*

A firm can also manage its earnings through real activities. Roychowdhury (2006) suggests using discretionary cash flow ($DCFO_{t-1}$), discretionary production costs ($DPROC_{t-1}$), and discretionary expenses ($DEXP_{t-1}$) to measure real earnings management. For *DCFO* in t-1, real earnings management is the residual from the equation

$$CFO_{i,t-1} = \delta_0 + \delta_1(1/ASSET)_{i,t-2} + \delta_2 REV_{i,t-1} + \delta_3 \Delta REV_{i,t-1} + \sigma_{i,t-1} \quad (6)$$

For *DPROC* in t-1, it is the residual from

$$PROC_{i,t-1} = \theta_0 + \theta_1(1/ASSET)_{i,t-2} + \theta_2 REV_{i,t-1} + \theta_3 \Delta REV_{i,t-1} + \theta_3 \Delta REV_{i,t-2} + \xi_{i,t-1} \quad (7)$$

For *DEXP* in t-1, we use the residual from

$$EXP_{i,t-1} = \emptyset_0 + \emptyset_1(1/ASSET)_{i,t-2} + \emptyset_2 REV_{i,t-2} + \tau_{i,t-1} \quad (8)$$

For convenience of interpretation, we multiply the residuals in Eqs. (6) to (8) by -1 so that large values of $DCFO_{t-1}$, $DPROC_{t-1}$, and $DEXP_{t-1}$ are associated with large real earnings management. As in Eqs. (3) to (5), we also construct non-discretionary measures, denoted $NDCFO_{t-1}$, $NDPROC_{t-1}$, and $NDEXP_{t-1}$, respectively, using the corresponding predicted values from Eqs. (6) to (8) to control for their impact on institutional investors' bid prices. We estimate Eqs. (6) to (8) for each group containing all the firms in the same industry and year. We notice that we need some variables (e.g., *ASSET*) to be in t-2 to calculate specific

earnings management variables in the pre-IPO (t-1) so that institutional investors react to the proposed price range of IPO at t.

*4.3 Methods*

To examine H1 with respect to accrual-based earnings management, we use the following multiple regression model:

$$AVG\_BID_{i,t} \text{ (or } CLEAR\_BID_{i,t}) = \alpha_0 + \alpha_1 \text{ (Accrual-Based Earnings Management measure)}_{l,t-1}$$

$$+\sum \alpha_j * (Control\ variables)_{j,t-1} + YEAR + INDUSTRY + \mu_{i,t} \quad (9)$$

where $\mu_{i,t}$ is a random error term. We use a set of control variables that includes operating cash flow ($CFO_{t-1}$), leverage ($LEV_{t-1}$), *the* logarithm of revenue ($LNREV_{t-1}$), the ratio of fixed assets to total assets ($FIXRAT_{t-1}$), the IPO's proposed price range ($RANGE_t$), IPO market sentiment as measured by the logarithm of the average online oversubscription ratio of the 10 most recent IPOs ($LNLAG10_t$), industry IPO activities ($INDACT_t$), underwriter reputation ($REPU_t$), a dummy variable to account for the removal of the three-month lock-up in 2012 ($REFORM_t$), and a dummy to account for main board listing ($MAIN_t$).[9] The detailed definitions are presented in Table 1.

We use $DTA_{i,t-1}$, $DTCA_{i,t-1}$, and $DREV_{i,t-1}$ for the accrual-based earnings management measure in the pre-IPO. To account for corresponding non-discretionary items, we include $NDTA_{i,t-1}$, $NDTCA_{i,t-1}$, and $NDREV_{i,t-1}$, respectively. Our key coefficient of interest is $\alpha_1$. If institutional investors can recognize earnings management in t-1 and submit a lower bid in

[9] China has three boards: the main board, small and medium-sized enterprises (SME) board, and growth enterprises market (GEM or ChiNext). The main board is for large firms. There is no explicit difference in terms of auction between the SME market and GEM markets.

t, then $\alpha_1$ will be negative and significant to indicate that they can discount the inflated earnings from the IPO firm.

To examine H1 with respect to real earnings management, we use a multiple regression model that is similar to Eq. (9) but with slightly different control variables due to using real earnings management. The model is

$$AVG\_BID_{i,t} \text{ (or } CLEAR\_BID_{i,t}) = \beta_0 + \beta_1 (\text{Real Earnings Management measure})_{I,t-1} + \sum \beta_j * (\text{Control variables})_{j,t-1} + YEAR + INDUSTRY + \pi_{i,t} \quad (10)$$

where $\pi_{i,t}$ is a random error term. For the real earnings management measure in t-1, we use $DCFO_{i,t-1}$, $DPROC_{i,t-1}$, and $DEXP_{i,t-1}$. As in Eq. (9), we include $NDCFO_{i,t-1}$, $NDPROC_{i,t-1}$, and $NDEXP_{i,t-1}$ to account for the corresponding non-discretionary items of real earnings management in t-1. If institutional investors can recognize real earnings management in t-1 and submit a lower bid in t, then $\beta_1$ will be negative and significant. The control variables in Eq. (10) are similar to those in Eq. (9), except that we use return on assets ($ROA_{t-1}$) instead of $CFO_{t-1}$ because we use discretionary operating cash flow to gauge real earnings management.

To examine the impact of earnings management in t-1 on individual investors' demand at the online stage in t, we use both Eqs. (9) and (10) and substitute the bid prices by individual investors' online oversubscription rate.

## 5. Results and discussion

### *5.1 Summary statistics*

We present the summary statistics of the sample in Table 2. The means of $AVG\_BID_t$, $CLEAR\_BID_t$, and $CHG\_OFFER_t$ are -0.177, 0.048, and -0.112, respectively. That is, the average bidding price of institutional investors is 17.7% below the midpoint of the

proposed price range, the market clearing price of institutional investors is 4.8% above and the mean IPO offer price is 11.2% below the midpoint. Both negative mean values of $AVG\_BID_t$ and $CHG\_OFFER_t$ suggest that, on average, underwriters and IPO issuing firms consider institutional investors' bidding prices to adjust IPO offer prices downward.

In terms of individual investor participation via online subscription, the $ONLINEOVER_t$ variable has a mean value of 4.466, which is equivalent to an oversubscription rate of 87 times. In contrast, the oversubscription rate of institutional investors ($LNOVER_t$) during the auction process has a mean value of 3.68, which is 39.6 times oversubscription. For the risk-adjusted long-term IPO performance after two years ($LRET_{t+2}$), the mean and median are -0.043% and -0.099%, respectively, indicating there are a few firms with a high $LRET_{t+2}$ while most firms experience only a negative $LRET_{t+2}$. In terms of accrual-based earnings management in t-1, the means of $DTA_{t-1}$, $DTCA_{t-1}$, and $DREV_{t-1}$ are -0.021, 0.024, and -0.001, respectively, with corresponding standard deviations of 0.103, 0.314, and 0.084. These statistics suggest the accrual-based earnings management in the pre-IPO is only moderate but varies greatly among IPO firms. For real earnings management, $DCFO_{t-1}$, $DPROC_{t-1}$, and $DEXP_{t-1}$ show patterns similar to the accrual-based measures, with relatively small mean values but large variations among IPO firms.

We present the correlation matrix of all regression variables in Table 3. The Spearman correlation coefficients between six earnings measures ($DTA_{t-1}$, $DTCA_{t-1}$, $DREV_{t-1}$, $DCFO_{t-1}$, $DPROC_{t-1}$, and $DEXP_{t-1}$) and the natural logarithm of firm revenues ($LNREV_{t-1}$) are 0.0259, -0.155, -0.0566, 0.148, -0.0485 and 0.0275, respectively; does not suggest that revenues are highly (positively) associated with earnings management. The corresponding Pearson correlation coefficients suggest qualitatively the same results. It is unlikely that the

negative relationship between earnings management are attributed to the relationship between revenues and earnings management.

*5.2 Earnings management and institutional investor bidding*

We present the findings related to H1 in columns (1) and (3) of Table 4 with the difference between the average institutional investor bidding price and the midpoint of the proposed price range as the dependent variable ($AVG\_BID_t$). Columns (1) to (3) all show that the accrual-based earnings management coefficients ($DTA_{t-1}$, $DTCA_{t-1}$, and $DREV_{t-1}$) are negative and significant at the 1% or 5% level, suggesting that, when an IPO firm engages in accrual-based earnings management in pre-IPO in t-1, institutional investors, on average, submit a lower bid price relative to the IPO's proposed price range in t. The coefficients are also economically significant. For instance, in column (1), the estimated coefficient of $DTA_{t-1}$ is -0.225, indicating that when an IPO firm puts up an additional 1% in discretionary total accruals, the submitted bid price drops -0.225% below the midpoint of the IPO proposed price range, corresponding to 1.27% of the mean value of $AVG\_BID_t$. Hence, institutional investors can recognize accrual-based earnings management and adjust their bidding price downward. In addition, the coefficients of $LNREV_{t-1}$ (the logarithm of a firm's revenues, representing firm size) and $FIXRAT_{t-1}$ (the ratio of fixed assets to total assets) are consistently negative and significant in columns (1) to (3), suggesting that institutional investors bid lower prices for large firms and firms with more fixed assets. In contrast, the coefficients of $LNLAG10_t$, $REFORM_t$, and $MAIN_t$ are positive and significant, indicating that institutional investors bid higher in a "hot" market, after CSRC abolished the three-months lock-up, and when the IPO firm will be listed in the main board.

The results in columns (4) to (6) of Table 4 show the impact of accrual-based earnings management on the difference between the market clearing price and the midpoint of the proposed price range ($CLEAR\_BID_t$). Similar to columns (1) to (3), columns (4) to (6) show that the coefficients of $DTA_{t-1}$, $DTCA_{t-1}$, and $DREV_{t-1}$ are negative and significant at the 1% or 5% level, indicating that, when an IPO firm engages in accrual-based earnings management in t-1, marginal institutional investors submit lower bid prices for the IPO in t. The coefficients are also economically significant. For instance, in column (4), the estimated coefficient of $DTA_{t-1}$ is -0.283, indicating that when an IPO firm puts up an additional 1% in discretionary total accruals in t-1, the submitted bid price drops -0.283% below the midpoint of the IPO proposed price range in t, corresponding to a 5.90% of the mean value of $CLEAR\_BID_t$. The control variables in columns (4) to (6), if significant, carry the same signs as those in columns (1) to (3). The overall findings in Table 4 support H1.

We present the relation between real earnings management in t-1 and institutional investor bidding price in t in Table 5. With $AVG\_BID_t$ as the dependent variable, we find that the coefficients of $DCFO_{t-1}$ and $DEXP_{t-1}$ are negative and significant at the 5% level in columns (1) and (3), while the coefficient of $DPROC_{t-1}$ is not significant in column (2). With $CLEAR\_BID_t$ as the dependent variable, the coefficient of $DEXP_{t-1}$ in column (6) is negative and significant at the 10% level. The coefficients of $DCFO_{t-1}$ and $DPROC_{t-1}$ are not significant in columns (4) and (5). Hence, three of six columns in Table 6 display a negative correlation between real earnings management in t-1 and institutional investor bidding price in t. The control variables carry the expected signs and significance levels consistently across all columns in Table 6. For instance, the coefficients of $LNLAG10_t$ and $REFORM_t$ are

consistently positive and significant at the 1% level in all columns, suggesting that, when an IPO firm is in a hot market ($LNLAG10_t$ is large) or after the lifting of the three-month lock-up regulation, institutional investors, on average, bid a higher price. The results in Table 5 offer a weak support to H1.

Taken together, the results in Tables 3 and 4 show that institutional investors bid lower in t if an IPO firm engages in accrual-based or real earnings management in pre-IPO in t-1. Institutional investors can recognize earnings management despite the information asymmetry in the IPO process in China. In addition, they react more to accrual-based earnings management than to real earnings management, suggesting that real earnings management is harder to recognize, a result that is consistent with the work of Cohen and Zarowin (2010) and Kothari et al. (2015).

*5.3 Earnings management and individual investor subscription*

Are individual investors able to recognize earnings management in t-1 in the online phase of the IPO process in t? We use the oversubscription rate as the dependent variable to gauge the ability of individual investors to recognize earnings management. If individual investors are also able to see through the earnings management in pre-IPO and do not believe that the issue price has fully adjust to such manipulation, they will subscribe less for firms in t with more earnings management in t-1 at the online stage of the IPO. In contrast, if individual investors are unable to recognize earnings management and are thus misled by it, then, after the IPO offer price is adjusted to earnings management in the first phase, the subscription of the IPO in t by individual investors should be positively related to earnings management in t-1. Table 6 presents the results of accrual-based and real

earnings management. In accrual-based earnings management, in columns (1) to (3), only the coefficient of $DTA_{t-1}$ in column (1) is negative and significant at 1% level, suggesting that individual investors subscribe less to IPO shares if a firm engages in earnings management in terms of $DTA_{t-1}$. For columns (2) and (3), the coefficients of $DTCA_{t-1}$ and $DREV_{t-1}$ are not significant.

The results for real earnings management are presented in columns (4) to (6) of Table 6. In all columns, the coefficients of $DCFO_{t-1}$, $DPROC_{t-1}$, and $DEXP_{t-1}$ are positive and significant at the 1% or 5% level, indicating that individual investors subscribe to more IPO shares online in t after the IPO firm engages in real earnings management in t-1. The coefficients are also economically significant. For instance, in column (4), the estimated coefficient of $DCFO_{t-1}$ is 0.998, indicating that when an IPO firm puts up an additional 1% in discretionary cash flow in t-1, the oversubscription rate of individual investors increases 0.998%, corresponding to 86.8% increases in the demand for IPO shares. These results suggest that, on average, IPO firms' real earnings management misled individual investors.

The control variables in Table 6 carry the expected signs. For instance, the coefficients of $LNOVER_t$ and $LNLAG10_t$ are consistently positive and significant at the 1% level across all columns in Table 6, suggesting that individual investors subscribe more when they notice institutional investors subscribe more ($LNOVER_t$ is large) or in a hot IPO market ($LNLAG10_t$ is large). In contrast, the coefficients of $REFORM_t$ are negative and significant at the 1% level in all columns, indicating that, on average, individual investors subscribed less to IPO shares after they learn institutional investors no longer had the three-month lock-up requirement.

Overall, the findings in Table 6 suggest that individual investors do not have the capability for recognizing real earnings management but they show some capabilities for recognizing some accrual-based earnings management. The findings are mixed for the impact of earnings management on individual investors' demand for IPO shares, depending on whether for accrual-based or real earnings management. We contend that the mixed findings are consistent with the notion that individual investors are less able than institutional investors to recognize earnings management. It is because accrual-based earnings management is accounting manipulation, which is easier to recognize. In contrast, real earnings management involves real activities, which are more challenging to recognize.

*5.4 Additional results*

*5.4.1 Earnings management and the IPO offer price*

According to IPO pricing theory, the information shown in the order book plays a role in setting the IPO offering price (Benveniste and Spindt, 1989; Cornelli and Goldreich, 2003). Therefore, if institutional investors bid lower prices in t due to earnings management in t-1, we should observe a lower IPO offering price for firms with higher pre-IPO earnings management. We present the relation between earnings management and the IPO offer price in Table 7. The dependent variable is $CHG\_OFFER_t$. We use the same set of control variables as in Eqs. (9) and (10). Columns (1) to (6) suggest that four of the six accrual-based and real earnings management variables are negative and significant at the 5% or 1% level. The coefficients are also economically significant. For instance, in column (1), the estimated coefficient of $DTA_{t-1}$ is -0.210, indicating that when an IPO firm puts up an additional 1% in discretionary cash flow, the offering price drops -0.210% below the midpoint of the IPO proposed price range, corresponding to a 1.86% of the mean value of

$CHG\_OFFER_t$. The insignificant coefficients are for the $DTCA_{t-1}$ and $DPROC_{t-1}$ regression equations. Hence, with the exception of $DTCA_{t-1}$ and $DPROC_{t-1}$, the more a firm engages in earnings management, the lower the IPO offer price is relative to the midpoint of the proposed price range. That is, despite a Chinese IPO firm possibly had an incentive to engage in earnings management in the P/E era, earnings management would actually hurt the IPO offer price under the auction regime. Our findings in Table 7 echo those of Liu et al. (2014), who find earnings management to be significantly lower since China switched from a P/E to a auction process. In addition, the results in Table 7 are consistent with the summary statistics in Table 2, which shows only moderate mean values of earnings management. An average IPO firm engages in less earnings management since implementing the auction IPO process. We attribute the lesser earnings management and the negative relation between earnings management and the IPO offer price to institutional investors' recognition of earnings management.

*5.3.2 Earnings management and long-term IPO performance*

Teoh et al. (1998a) explain that the generally negative long-term IPO performance is due to earnings management. When an IPO engages in earnings management, IPO investors do not recognize it so that the IPO firm is overvalued in the short-term. Over the long term, the valuation reverts to its intrinsic value and thus long-term IPO performance is negative. If our Chinese environment shows institutional investors can recognize pre-IPO earnings management and bid lower IPO prices accordingly, then the extent of long-term negative IPO performance should be less pronounced.

We present the findings in Table 8 using risk-adjusted IPO long-term returns, $LRET_{t+2}$, as the dependent variable with the set of control variables from Eqs. (9) and (10).

Following Purnanandam and Swaminathan (2004), we regress each IPO's weekly excess returns (stock returns in excess of risk-free rate) starting the first week after it went public and ending two years after it went public on Fama and French three factors for the same period. The $LRET_{t+2}$ is the intercept from this regression multiplied by 104. Among all six columns in Table 8, only column (2) shows $DEXP_{t-1}$ to be negative and significant at the 5% level. The results, while do not overwhelmingly refute those of Teoh et al. (1998a), only weakly support the notion that earnings management adversely affects long-term IPO performance. We contend that China's auction system with institutional investors' ability to recognize earnings management helps lower the initial overvaluation of IPO shares. Thus, long-term underperformance is less severe.

## 6. Conclusions

We examine if institutional investors can recognize pre-IPO earnings management in a sample of IPOs in China from 2010 to 2012. While the earlier literature generally assumes that IPO firms manipulate their earnings to boost their offer price in the IPO. Hence, long-term IPO performance, on average, is not as good those seasoned firms due to the overvaluation. However, to the best of our knowledge, there is no empirical literature examining *directly* how investors, especially institutional investors, react to pre-IPO earnings management during the IPO process due to the unavailability of detailed bid data in the book-building process. Leveraging the unqiue detailed bid data of institutional investors during the IPO process in China, we examine whether institutional IPO investors are able to adjust their IPO bidding prices downward in the auction process of IPO in t when facing earnings management in t-1.

The recent IPO reform in China requires an IPO firm to undergo a two-phase process. Institutional investors submit their bids and quantities to subscribe to IPO shares. Such process separates the reaction of pre-IPO earnings management from institutional and individual investors. Our findings suggest that institutional investors' IPO bid prices in t are negatively correlated with earnings management in t-1. The finding is robust to a battery of different bid prices and accrual-based and real earnings management specifications. In contrast, we document that individual investors' oversubscription ratio is positively correlated with pre-IPO real earnings management. Our additional results show that the IPO offer price (relative to the proposed price range) is negatively correlated with pre-IPO earnings management, suggesting that institutional investors' ability to recognize pre-IPO earnings management pressures the IPO issuing firm into setting a lower offer price. Lastly, we find that, while long-term IPO performance is negatively related to pre-IPO earnings management, it is not as strong as those reported in the literature.

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## Table 1. Variable definitions

This table defines the variables.

| Variable | Definition |
|---|---|
| $AVG\_BID_t$ | Mean–median price difference, which is equal to (*MEAN* - *MEDIAN*)/*MEDIAN*, where *MEAN* is the weighted average of all bid prices submitted by all institutional investors using the bidding quantities as weights and *MEDIAN* is the midpoint of the price range proposed by the underwriter. |
| $CLEAR\_BID_t$ | Equilibrium–median price difference, which is (*EQULI* - *MEDIAN*)/*MEDIAN*, where *EQULI* is the equilibrium bid price of all bids submitted by institutional investors. It is the price that equates bid quantities and IPO allotment to institutional investors. |
| $CHG\_OFFER_t$ | Issue–median price difference, which is equal to (*ISSUE* - *MEDIAN*)/*MEDIAN*, where *ISSUE* is the IPO offer price. |
| $ONLINEOVER_t$ | Natural logarithm of the online oversubscription rate of individual investors. |
| $LRET_{t+2}$ | The risk-adjusted IPO long-term return, which follows Purnanandam and Swaminathan (2004). We regress each IPO's weekly excess returns (stock returns in excess of risk-free rate) starting the first week after they go public and ending two years after they go public on Fama and French three factors for the same period. The risk adjusted return *LRET* is the intercept from this regression multiplied by 104. |
| $DTA_{t-1}$ | Discretionary total accruals, which is the residual from Eq. (3). |
| $NDTA_{t-1}$ | Non-discretionary total accruals, which is the predicted value of Eq. (3). |
| $DTCA_{t-1}$ | Discretionary total current accruals, which is the residual from Eq. (4). |
| $NDTCA_{t-1}$ | Non-discretionary total current accruals, which is the predicted value of Eq. (4). |
| $DREV_{t-1}$ | Discretionary revenue, which is the residual from Eq. (5). |
| $NDREV_{t-1}$ | Non-discretionary revenue, which is the predicted value of Eq. (5). |
| $DCFO_{t-1}$ | Discretionary cash flow, which is the residual from Eq. (6). |
| $NDCFO_{t-1}$ | Non-discretionary cash flow, which is the predicted value of Eq. (6). |
| $DPROC_{t-1}$ | Discretionary production cost, which is the residual from Eq. (7). |
| $NDPROC_{t-1}$ | Non-discretionary production cost, which is the predicted value of Eq. (7). |

| | |
|---|---|
| $DEXP_{t-1}$ | Discretionary expenses, which is the residual from Eq. (8). |
| $NDEXP_{t-1}$ | Non-discretionary expenses, which is the predicted value of Eq. (8). |
| $CFO_{t-1}$ | Operating cash flow, which is the net operating cash flow of the IPO firm at year t-1, divided by total assets. |
| $ROA_{t-1}$ | Return on assets, which is the net earnings of the IPO firm one year prior to the IPO, divided by total assets. |
| $LEV_{t-1}$ | Leverage ratio, which is the total liabilities of the IPO firm one year prior to the IPO, divided by total assets. |
| $LNREV_{t-1}$ | Natural logarithm of the IPO firm's revenue one year prior to the IPO. |
| $FIXRAT_{t-1}$ | Fixed asset ratio, which is total fixed assets divided by total assets one year prior to the IPO. |
| $RANGE_t$ | Price range of the IPO firm as proposed by its underwriter, which is the high end of the proposed price range minus the low end, divided by the median. |
| $LNNUM_t$ | Natural logarithm of the total number of institutional investor bids. |
| $LNOVER_t$ | Natural logarithm of the oversubscription ratio by institutional investors in the offline stage of the IPO process. |
| $LNLAG10_t$ | Logarithm of the average online oversubscription ratio of the 10 most recent IPOs. |
| $INDACT_t$ | Industry activities, which is the logarithm of the total number of IPOs in the 90 days prior to the IPO. |
| $REPU_t$ | Underwriter reputation, which has a value of one if the underwriter is a top 10 underwriter in terms of underwriting revenue in a given year and zero otherwise. |
| $REFORM_t$ | Dummy variable representing the reform on the three-month IPO lock-up that has a value of one if the IPO is after April 28, 2012, and zero. |
| $MAIN_t$ | Dummy variable for main board listing that has a value of one if the IPO firm is listed in the main board and zero otherwise. |

## Table 2. Descriptive statistics

This table reports the descriptive statistics of all the variables. The definitions are presented in Table 1. Several firms are missing accounting information, such that the value of N for *DPROC* is less than 472.

| Variable | N | Mean | Std | P25 | Median | P75 |
|---|---|---|---|---|---|---|
| $AVG\_BID_t$ | 472 | -0.177 | 0.177 | -0.306 | -0.184 | -0.069 |
| $CLEAR\_BID_t$ | 472 | 0.048 | 0.231 | -0.112 | 0.037 | 0.177 |
| $CHG\_OFFER_t$ | 472 | -0.112 | 0.176 | -0.229 | -0.110 | 0.006 |
| $ONLINEOVER_t$ | 472 | 4.466 | 0.875 | 3.961 | 4.605 | 5.066 |
| $LRET_{t+2}$ | 472 | -0.043 | 0.493 | -0.395 | -0.099 | 0.217 |
| $DTA_{t-1}$ | 472 | -0.021 | 0.103 | -0.082 | -0.024 | 0.034 |
| $NDTA_{t-1}$ | 472 | 0.045 | 0.068 | 0.009 | 0.042 | 0.078 |
| $DTCA_{t-1}$ | 472 | 0.024 | 0.314 | -0.100 | 0.005 | 0.090 |
| $NDTCA_{t-1}$ | 472 | 0.025 | 0.285 | -0.018 | 0.042 | 0.098 |
| $DREV_{t-1}$ | 472 | -0.001 | 0.084 | -0.048 | -0.009 | 0.038 |
| $NDREV_{t-1}$ | 472 | 0.072 | 0.051 | 0.042 | 0.066 | 0.088 |
| $DCFO_{t-1}$ | 472 | -0.068 | 0.126 | -0.140 | -0.056 | 0.010 |
| $NDCFO_{t-1}$ | 472 | 0.100 | 0.071 | 0.049 | 0.090 | 0.131 |
| $DPROC_{t-1}$ | 458 | -0.068 | 0.187 | -0.151 | -0.055 | 0.029 |
| $NDPROC_{t-1}$ | 458 | 1.051 | 0.636 | 0.648 | 0.896 | 1.269 |
| $DEXP_{t-1}$ | 472 | -0.012 | 0.108 | -0.048 | 0.011 | 0.048 |
| $NDEXP_{t-1}$ | 472 | 0.179 | 0.073 | 0.128 | 0.167 | 0.220 |
| $CFO_{t-1}$ | 472 | 0.170 | 0.139 | 0.083 | 0.148 | 0.241 |
| $ROA_{t-1}$ | 472 | 0.141 | 0.072 | 0.091 | 0.127 | 0.174 |
| $LEV_{t-1}$ | 472 | 0.413 | 0.163 | 0.301 | 0.413 | 0.527 |
| $LNREV_{t-1}$ | 472 | 20.143 | 1.132 | 19.319 | 19.947 | 20.794 |
| $FIXRAT_{t-1}$ | 472 | 0.282 | 0.186 | 0.140 | 0.258 | 0.388 |
| $RANGE_t$ | 472 | 0.159 | 0.059 | 0.118 | 0.155 | 0.187 |
| $LNNUM_t$ | 472 | 4.478 | 0.492 | 4.143 | 4.437 | 4.828 |
| $LNOVER_t$ | 472 | 3.680 | 0.691 | 3.252 | 3.712 | 4.175 |
| $LNLAG10_t$ | 472 | 4.666 | 0.470 | 4.373 | 4.728 | 5.055 |
| $INDACT_t$ | 472 | 1.969 | 0.989 | 1.099 | 2.079 | 2.890 |
| $REPU_t$ | 472 | 0.566 | 0.496 | 0 | 1 | 1 |
| $REFORM_t$ | 472 | 0.161 | 0.368 | 0 | 0 | 0 |
| $MAIN_t$ | 472 | 0.136 | 0.343 | 0 | 0 | 0 |

## Table 3 Correlation Matrix

This table reports the correlation matrix of the variables. The upper right matrix reports Pearson correlation coefficients and the lower left matrix reports Spearman correlation ones. The definition of concerned variables is presented in table 1 of our revised manuscript. *, **, and *** denote significance at the 10%, 5%, and 1% levels respectively.

| **Panel A:** | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (1)*AVG_BID* | 1 | 0.935*** | 0.941*** | 0.358*** | -0.0695 | -0.0603 | -0.116** | 0.100** | -0.138*** | -0.0457 | -0.0492 | - | 0.140*** | 0.0285 | -0.243*** |
| (2) *CLEAR_BID* | 0.934*** | 1 | 0.889*** | 0.398*** | -0.0669 | -0.0328 | -0.146*** | 0.0888* | -0.112** | -0.0360 | -0.0827* | 0.0365 | 0.164*** | 0.0569 | -0.263*** |
| (3)*CHG_OFFER* | 0.940*** | 0.885*** | 1 | 0.309*** | -0.0999** | -0.0551 | -0.105** | 0.0801* | -0.0934** | -0.0528 | -0.0611 | -0.00607 | 0.0730 | 0.00388 | -0.209*** |
| (4)*ONLINEOVER* | 0.372*** | 0.397*** | 0.320*** | 1 | -0.0283 | 0.0422 | -0.167*** | 0.0587 | -0.122*** | 0.0408 | -0.0805* | 0.0912** | 0.0721 | 0.155*** | -0.276*** |
| (5)$LRET_1$ | -0.0752 | -0.0739 | -0.0978** | -0.0442 | 1 | -0.0538 | 0.0476 | -0.0148 | -0.0402 | 0.0600 | -0.00920 | -0.0675 | 0.0722 | -0.00337 | -0.0785* |
| (6)*DTA* | -0.0461 | -0.0258 | -0.0504 | 0.0372 | -0.0675 | 1 | -0.233*** | 0.0453 | 0.242*** | 0.352*** | 0.00127 | 0.710*** | 0.0263 | 0.155*** | -0.0329 |
| (7)*NDTA* | -0.117** | -0.127*** | -0.0858* | -0.125*** | 0.0278 | -0.279*** | 1 | 0.0978** | 0.154*** | 0.0518 | 0.337*** | -0.183*** | -0.244*** | -0.137*** | 0.0971** |
| (8)*DTCA* | 0.0480 | 0.0157 | 0.0107 | 0.0326 | -0.00988 | 0.00453 | 0.101** | 1 | -0.545*** | 0.0259 | 0.00188 | -0.0851* | 0.0746 | -0.0747 | -0.164*** |
| (9)*NDTCA* | -0.0741 | -0.0439 | -0.0267 | -0.0406 | -0.00283 | 0.151*** | 0.00450 | -0.902*** | 1 | 0.159*** | 0.0510 | 0.228*** | -0.117** | -0.0548 | 0.0711 |
| (10)*DREV* | -0.0416 | -0.0362 | -0.0533 | 0.0345 | 0.0349 | 0.335*** | 0.0432 | 0.00381 | 0.0816* | 1 | -0.195*** | 0.235*** | -0.152*** | -0.0916* | -0.0970** |
| (11)*NDREV* | -0.0426 | -0.0600 | -0.0561 | -0.104** | 0.00062 | -0.00476 | 0.300*** | 0.0488 | -0.0235 | -0.287*** | 1 | -0.0160 | 0.188*** | 0.109** | 0.236*** |
| (12)*DCFO* | 0.0179 | 0.0555 | 0.00742 | 0.138*** | -0.112** | 0.683*** | -0.210*** | -0.112** | 0.165*** | 0.202*** | -0.0509 | 1 | 0.151*** | 0.367*** | 0.0509 |
| (13)*NDCFO* | 0.119*** | 0.124*** | 0.0508 | 0.0366 | 0.0594 | 0.0180 | -0.249*** | 0.0521 | -0.0941** | -0.150*** | 0.183*** | 0.141*** | 1 | 0.173*** | 0.130*** |
| (14)*DPROC* | 0.0580 | 0.0900* | 0.0396 | 0.154*** | -0.0182 | 0.158*** | -0.118** | 0.0254 | -0.0670 | -0.0740 | 0.121*** | 0.401*** | 0.119** | 1 | -0.0341 |
| (15)*NDPROC* | -0.187*** | -0.197*** | -0.152*** | -0.227*** | -0.0976** | 0.0117 | 0.0583 | -0.0780* | 0.0453 | -0.0662 | 0.201*** | 0.0474 | 0.124*** | -0.118** | 1 |
| (16)*DEXP* | -0.0938** | -0.0557 | -0.0875* | 0.0823* | -0.0590 | 0.0501 | 0.0688 | -0.00804 | 0.0285 | 0.0395 | -0.0311 | 0.239*** | -0.0734 | 0.486*** | -0.0168 |
| (17)*NDEXP* | - | 0.00385 | -0.0293 | 0.0310 | 0.197*** | -0.0219 | 0.120*** | 0.150*** | -0.137*** | -0.0797* | 0.191*** | -0.0685 | 0.513*** | 0.0880* | 0.229*** |
| (18)*CFO* | 0.0388 | 0.00937 | 0.00973 | -0.110** | 0.138*** | -0.594*** | 0.0427 | 0.129*** | -0.204*** | -0.268*** | 0.131*** | -0.821*** | 0.421*** | -0.302*** | 0.0113 |
| (19)*ROA* | -0.0618 | -0.0902* | -0.0726 | -0.128*** | 0.127*** | -0.0614 | 0.427*** | 0.256*** | -0.105** | -0.0520 | 0.248*** | -0.513*** | 0.258*** | -0.327*** | -0.0126 |
| (20)*LNREV* | -0.223*** | -0.249*** | -0.159*** | -0.364*** | -0.204*** | 0.0259 | -0.104** | -0.155*** | 0.1000** | -0.0566 | -0.0367 | 0.148*** | -0.254*** | -0.0485 | 0.544*** |
| (21)*LEV* | -0.0910** | -0.0700 | -0.0477 | -0.105** | -0.159*** | 0.0976** | -0.160*** | -0.252*** | 0.0979** | 0.0657 | 0.0479 | 0.354*** | -0.0860* | 0.197*** | 0.397*** |
| (22)*FIXRAT* | -0.0426 | -0.0156 | -0.0458 | 0.0580 | -0.0491 | -0.00524 | -0.414*** | -0.145*** | 0.0644 | -0.0635 | -0.211*** | -0.0496 | 0.125*** | 0.00302 | -0.0835* |
| (23)*RANGE* | -0.0195 | 0.0134 | 0.0117 | 0.104** | 0.0931** | -0.0360 | -0.0833* | -0.0689 | 0.0507 | 0.0233 | -0.102** | -0.0631 | -0.127*** | 0.0207 | -0.0843* |
| (24)*LNNUM* | 0.579*** | 0.552*** | 0.545*** | 0.314*** | -0.0336 | -0.0832* | -0.132*** | -0.0123 | -0.0313 | -0.00527 | -0.149*** | -0.0164 | 0.0139 | -0.0406 | -0.118** |
| (25)*LNOVER* | 0.493*** | 0.555*** | 0.480*** | 0.488*** | 0.0211 | -0.102** | -0.0746 | -0.0207 | -0.0156 | -0.00463 | -0.0572 | -0.0337 | 0.0426 | 0.0623 | -0.194*** |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (26)*LNLAG10* | 0.442*** | 0.418*** | 0.475*** | 0.472*** | -0.0844* | 0.0224 | -0.110** | -0.0127 | 0.0212 | -0.0310 | -0.0395 | 0.0537 | 0.0404 | 0.00860 | -0.0836* |
| (27)*INDACT* | 0.0303 | 0.0349 | 0.0134 | - | -0.0650 | -0.0112 | 0.0675 | - | - | -0.0765* | 0.232*** | 0.00180 | 0.0562 | 0.0371 | -0.116** |
| (28)*REPU* | 0.0837* | 0.0134 | 0.0947** | -0.00335 | -0.0143 | 0.0165 | 0.0719 | 0.00569 | -0.00676 | 0.0250 | -0.00281 | -0.00611 | 0.0416 | -0.0902* | 0.0676 |
| (29)*REFORM* | 0.0462 | 0.0220 | 0.0576 | -0.0805* | -0.0927** | -0.0137 | 0.121*** | -0.0349 | 0.0509 | 0.0574 | 0.0102 | -0.0454 | -0.236*** | -0.0305 | -0.00221 |
| (30) *MAIN* | -0.104** | -0.137*** | -0.0635 | -0.251*** | -0.116** | 0.0355 | -0.110** | -0.0210 | -0.00912 | 0.0267 | -0.124*** | 0.0624 | -0.173*** | -0.0103 | 0.175*** |
| **Panel B:** | (16) | (17) | (18) | (19) | (20) | (21) | (22) | (23) | (24) | (25) | (26) | (27) | (28) | (29) | (30) |
| (1)*AVG_BID* | -0.0745 | 0.00035 | 0.0556 | -0.0250 | -0.221*** | -0.0870* | -0.0825* | 0.00443 | 0.583*** | 0.537*** | 0.439*** | 0.0379 | 0.0932** | 0.0776* | -0.105** |
| (2) *CLEAR_BID* | -0.0474 | 0.00031 | 0.0316 | -0.0482 | -0.245*** | -0.0713 | -0.0528 | 0.0276 | 0.563*** | 0.593*** | 0.435*** | 0.0493 | 0.0357 | 0.0503 | -0.130*** |
| (3)*CHG_OFFER* | -0.0840* | -0.0443 | 0.0337 | -0.0441 | -0.149*** | -0.0392 | -0.0783* | 0.0210 | 0.567*** | 0.520*** | 0.470*** | 0.0182 | 0.105** | 0.0777* | -0.0560 |
| (4)*ONLINEOVER* | 0.115** | 0.0384 | -0.0704 | -0.105** | -0.337*** | -0.0807* | 0.0923** | 0.148*** | 0.334*** | 0.493*** | 0.472*** | 0.0201 | -0.0225 | -0.107** | -0.217*** |
| (5)*LRET* | -0.0359 | 0.205*** | 0.121*** | 0.133*** | -0.231*** | -0.144*** | -0.0354 | 0.0580 | -0.0544 | 0.0186 | -0.0923** | -0.0870* | -0.00839 | -0.0925** | -0.130*** |
| (6)*DTA* | 0.0655 | -0.0292 | -0.628*** | -0.0757 | 0.0368 | 0.105** | -0.0424 | -0.0337 | -0.0780* | -0.117** | 0.0219 | -0.0220 | 0.0222 | -0.0195 | 0.0546 |
| (7)*NDTA* | -0.0376 | 0.115** | 0.0319 | 0.450*** | -0.141*** | -0.207*** | -0.386*** | -0.0838* | -0.151*** | -0.0724 | -0.156*** | 0.0501 | 0.0964** | 0.141*** | -0.113** |
| (8)*DTCA* | - | 0.0975** | 0.0949** | 0.269*** | -0.165*** | -0.349*** | -0.0955** | -0.0472 | 0.0467 | 0.0130 | 0.0836* | 0.00749 | -0.00231 | -0.0218 | -0.0140 |
| (9)*NDTCA* | 0.00224 | -0.0904** | -0.261*** | 0.0380 | 0.0510 | 0.0379 | -0.0976** | 0.00851 | -0.130*** | -0.0561 | -0.0877* | 0.0230 | -0.00679 | 0.0459 | -0.0625 |
| (10)*DREV* | 0.0396 | -0.0819* | -0.313*** | -0.0490 | -0.0340 | 0.0602 | -0.0788* | 0.00723 | -0.0151 | -0.0127 | -0.0345 | -0.0667 | 0.0270 | 0.0603 | 0.0385 |
| (11)*NDREV* | -0.0489 | 0.247*** | 0.113** | 0.284*** | -0.126*** | 0.00768 | -0.249*** | -0.0819* | -0.168*** | -0.0262 | -0.0531 | 0.355*** | 0.0220 | 0.0140 | -0.165*** |
| (12)*DCFO* | 0.232*** | -0.0616 | -0.810*** | -0.416*** | 0.165*** | 0.335*** | -0.0915** | -0.0368 | -0.0190 | -0.0616 | 0.0370 | 0.00522 | 0.0102 | -0.0463 | 0.0668 |
| (13)*NDCFO* | - | 0.470*** | 0.372*** | 0.280*** | -0.266*** | -0.0824* | 0.121*** | -0.131*** | 0.0287 | 0.0816* | 0.112** | 0.0831* | 0.0355 | -0.284*** | -0.199*** |
| (14)*DPROC* | 0.535*** | 0.113** | -0.257*** | -0.284*** | -0.0525 | 0.211*** | 0.0213 | 0.0255 | -0.0500 | 0.0264 | 0.0148 | 0.0503 | -0.0763 | -0.0683 | -0.0423 |
| (15)*NDPROC* | -0.0136 | 0.219*** | 0.0239 | -0.0115 | 0.575*** | 0.425*** | -0.0659 | -0.132*** | -0.210*** | -0.293*** | -0.0977** | -0.0881* | 0.0656 | -0.0494 | 0.115** |
| (16)*DEXP* | 1 | 0.0704 | -0.217*** | -0.197*** | 0.0214 | 0.135*** | 0.0450 | 0.0574 | -0.129*** | -0.0601 | -0.0349 | -0.0143 | -0.0332 | 0.0211 | -0.0192 |
| (17)*NDEXP* | 0.0545 | 1 | 0.333*** | 0.466*** | -0.335*** | -0.224*** | -0.165*** | -0.141*** | -0.138*** | 0.0750 | -0.0738 | -0.0411 | 0.0702 | -0.00952 | -0.273*** |
| (18)*CFO* | -0.244*** | 0.372*** | 1 | 0.555*** | -0.305*** | -0.372*** | 0.137*** | -0.0456 | 0.0261 | 0.0893* | -0.00272 | 0.0294 | 0.0367 | -0.0913** | -0.152*** |
| (19)*ROA* | -0.177*** | 0.448*** | 0.629*** | 1 | -0.484*** | -0.583*** | -0.154*** | -0.163*** | -0.123*** | 0.00026 | -0.0689 | 0.0350 | 0.118** | -0.0138 | -0.278*** |
| (20)*LNREV* | 0.0275 | -0.306*** | -0.280*** | -0.403*** | 1 | 0.561*** | 0.0475 | -0.00928 | 0.00330 | -0.333*** | 0.00278 | -0.0975** | 0.0398 | 0.0172 | 0.501*** |
| (21)*LEV* | 0.145*** | -0.226*** | -0.382*** | -0.559*** | 0.559*** | 1 | -0.00410 | -0.0234 | -0.0845* | -0.133*** | 0.00525 | 0.0648 | -0.0540 | -0.0910** | 0.198*** |
| (22)*FIXRAT* | 0.0213 | -0.168*** | 0.0999** | -0.175*** | 0.00657 | -0.0189 | 1 | -0.0173 | 0.0587 | -0.00480 | 0.0519 | -0.0298 | -0.0208 | -0.0721 | -0.000227 |
| (23)*RANGE* | 0.0467 | -0.116** | -0.00120 | -0.0792* | 0.0563 | -0.0323 | -0.0390 | 1 | 0.158*** | 0.128*** | 0.102** | -0.0109 | -0.0959** | 0.0407 | 0.0778* |
| (24)*LNNUM* | -0.158*** | -0.117** | 0.0211 | -0.126*** | 0.0710 | -0.0827* | 0.0695 | 0.161*** | 1 | 0.646*** | 0.417*** | -0.0890* | 0.0489 | 0.142*** | 0.238*** |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (25)*LNOVER* | -0.0381 | 0.0777* | 0.0499 | -0.0433 | -0.349*** | -0.144*** | 0.00634 | 0.122*** | 0.627*** | 1 | 0.307*** | -0.0211 | -0.0630 | 0.239*** | -0.158*** |
| (26)*LNLAG10* | -0.0564 | -0.100** | -0.0431 | -0.0907** | -0.0111 | 0.00094 | 0.0270 | 0.0859* | 0.401*** | 0.295*** | 1 | -0.00512 | 0.0967** | -0.224*** | -0.0792* |
| (27)*INDACT* | 0.0219 | -0.0555 | 0.00973 | 0.0173 | -0.114** | 0.0562 | -0.0645 | -0.0339 | -0.125*** | -0.0402 | -0.0351 | 1 | -0.0203 | -0.145*** | -0.0684 |
| (28)*REPU* | -0.0571 | 0.0565 | 0.0386 | 0.118** | 0.0232 | -0.0480 | -0.0207 | -0.106** | 0.0449 | -0.0829* | 0.0899* | -0.0106 | 1 | 0.0117 | 0.0224 |
| (29)*REFORM* | 0.0449 | -0.0189 | -0.0779* | 0.00017 | 0.0192 | -0.0881* | -0.0454 | 0.0257 | 0.151*** | 0.231*** | -0.181*** | -0.143*** | 0.0117 | 1 | 0.0117 |
| (30) *MAIN* | -0.0262 | -0.271*** | -0.149*** | -0.240*** | 0.584*** | 0.201*** | 0.0330 | 0.0828* | 0.258*** | -0.143*** | -0.0837* | -0.0783* | 0.0224 | 0.0117 | 1 |

## Table 4. Accrual-based earnings management and institutional investor IPO bid price

This table presents the relation between accrual-based earnings management and the IPO bid price of institutional investors. The variable $AVG\_BID_t$ ($CLEAR\_BID_t$) captures the difference between the mean (marginal) institutional investor bidding price and the midpoint of the proposed price range. The variables $DTA_{t-1}$, $DTCA_{t-1}$, and $DREV_{t-1}$ measure the extent of accrual-based earnings management. The definitions of all the variables are presented in Table 1. The *p*-values reported in parentheses are based on White heteroscedasticity-robust standard errors. The superscripts *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

| | Dependent variable = $AVG\_BID_t$ | | | Dependent variable = $CLEAR\_BID_t$ | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| *INTERCEPT* | 0.160 | 0.088 | 0.160 | 0.725*** | 0.639*** | 0.740*** |
| | (0.94) | (0.54) | (0.96) | (3.22) | (2.99) | (3.40) |
| $DTA_{t-1}$ | -0.225*** | | | -0.283*** | | |
| | (-3.03) | | | (-2.79) | | |
| $NDTA_{t-1}$ | -0.057 | | | -0.070 | | |
| | (-0.53) | | | (-0.49) | | |
| $DTCA_{t-1}$ | | -0.126*** | | | -0.187*** | |
| | | (-2.81) | | | (-3.33) | |
| $NDTCA_{t-1}$ | | -0.140*** | | | -0.191*** | |
| | | (-2.80) | | | (-3.05) | |
| $DREV_{t-1}$ | | | -0.169** | | | -0.243** |
| | | | (-2.30) | | | (-2.31) |
| $NDREV_{t-1}$ | | | -0.105 | | | -0.193 |
| | | | (-0.89) | | | (-1.30) |
| $CFO_{t-1}$ | -0.096* | -0.024 | -0.002 | -0.178** | -0.090 | -0.059 |
| | (-1.66) | (-0.50) | (-0.05) | (-2.27) | (-1.44) | (-0.95) |
| $LNREV_{t-1}$ | -0.046*** | -0.042*** | -0.046*** | -0.069*** | -0.064*** | -0.070*** |
| | (-6.14) | (-5.68) | (-6.20) | (-6.84) | (-6.56) | (-7.00) |
| $LEV_{t-1}$ | -0.034 | -0.076 | -0.001 | 0.001 | -0.065 | 0.046 |
| | (-0.75) | (-1.51) | (-0.03) | (0.02) | (-1.00) | (0.82) |
| $FIXRAT_{t-1}$ | -0.063* | -0.083** | -0.069** | -0.049 | -0.081* | -0.060 |
| | (-1.71) | (-2.55) | (-2.08) | (-1.02) | (-1.93) | (-1.45) |
| $RANGE_t$ | -0.093 | -0.092 | -0.080 | 0.032 | 0.023 | 0.042 |
| | (-0.93) | (-0.92) | (-0.78) | (0.24) | (0.17) | (0.31) |
| $LNLAG10_t$ | 0.117*** | 0.119*** | 0.117*** | 0.140*** | 0.142*** | 0.140*** |
| | (10.14) | (10.34) | (10.22) | (8.94) | (9.21) | (9.15) |
| $INDACT_t*10^{-2}$ | 0.408 | 0.402 | 0.515 | 0.035 | 0.003 | 0.235 |
| | (0.62) | (0.62) | (0.77) | (0.04) | (0.00) | (0.26) |
| $REPU_t*10^{-1}$ | 0.216* | 0.183 | 0.204* | -0.004 | -0.045 | -0.017 |
| | (1.84) | (1.56) | (1.73) | (-0.02) | (-0.28) | (-0.11) |
| $REFORM_t$ | 0.143*** | 0.142*** | 0.145*** | 0.167*** | 0.167*** | 0.169*** |
| | (7.25) | (7.09) | (7.26) | (6.35) | (6.23) | (6.30) |
| $MAIN_t$ | 0.046** | 0.042* | 0.048** | 0.047 | 0.042 | 0.048* |
| | (2.13) | (1.91) | (2.17) | (1.64) | (1.49) | (1.67) |

| | | | | | | |
|---|---|---|---|---|---|---|
| *Year* | Yes | Yes | Yes | Yes | Yes | Yes |
| *Industry* | Yes | Yes | Yes | Yes | Yes | Yes |
| Adj. $R^2$ | 0.554 | 0.551 | 0.549 | 0.514 | 0.514 | 0.512 |
| F | 37.59 | 32.34 | 31.28 | 32.38 | 25.58 | 25.00 |
| *N* | 472 | 472 | 472 | 472 | 472 | 472 |

## Table 5. Real earnings management and institutional investor IPO bid price

This table presents the relation between real earnings management and the IPO bid price of institutional investors. The variable $AVG\_BID_t$ ($CLEAR\_BID_t$) captures the difference between the mean (marginal) institutional investor bidding price and the midpoint of the proposed price range. The variables $DCFO_{t-1}$, $DPROC_{t-1}$, and $DEXP_{t-1}$ measure the extent of real earnings management. The definitions of all the variables are presented in Table 1. The *p*-values reported in parentheses are based on White heteroscedasticity-robust standard errors. The superscripts *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

| | Dependent variable = $AVG\_BID_t$ | | | Dependent variable = $CLEAR\_BID_t$ | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| *INTERCEPT* | 0.229 | 0.182 | 0.165 | 0.814*** | 0.832*** | 0.726*** |
| | (1.32) | (0.94) | (0.96) | (3.57) | (3.25) | (3.25) |
| $DCFO_{t-1}$ | -0.141** | | | -0.116 | | |
| | (-2.53) | | | (-1.52) | | |
| $NDCFO_{t-1}$ | -0.015 | | | -0.050 | | |
| | (-0.14) | | | (-0.35) | | |
| $DPROC_{t-1}$ | | -0.016 | | | -0.011 | |
| | | (-0.44) | | | (-0.22) | |
| $NDPROC_{t-1}$ | | 0.001 | | | 0.011 | |
| | | (0.06) | | | (0.69) | |
| $DEXP_{t-1}$ | | | -0.124** | | | -0.132* |
| | | | (-2.34) | | | (-1.90) |
| $NDEXP_{t-1}$ | | | 0.117 | | | 0.218 |
| | | | (1.11) | | | (1.48) |
| $ROA_{t-1}$ | -0.324** | -0.205* | -0.267** | -0.442** | -0.390*** | -0.456*** |
| | (-2.45) | (-1.67) | (-2.36) | (-2.58) | (-2.59) | (-3.30) |
| $LNREV_{t-1}$ | -0.047*** | -0.045*** | -0.045*** | -0.070*** | -0.071*** | -0.068*** |
| | (-6.32) | (-5.39) | (-6.16) | (-7.00) | (-6.24) | (-6.93) |
| $LEV_{t-1}$ | -0.051 | -0.066 | -0.059 | -0.029 | -0.060 | -0.040 |
| | (-1.01) | (-1.21) | (-1.19) | (-0.45) | (-0.88) | (-0.63) |
| $FIXRAT_{t-1}$ | -0.092*** | -0.072** | -0.073** | -0.087** | -0.069 | -0.070 |
| | (-2.69) | (-2.12) | (-2.20) | (-1.99) | (-1.59) | (-1.64) |
| $RANGE_t$ | -0.118 | -0.088 | -0.071 | -0.002 | 0.047 | 0.050 |
| | (-1.17) | (-0.84) | (-0.70) | (-0.02) | (0.33) | (0.37) |
| $LNLAG10_t$ | 0.115*** | 0.114*** | 0.115*** | 0.138*** | 0.135*** | 0.139*** |
| | (10.03) | (9.58) | (9.96) | (8.84) | (8.45) | (8.94) |
| $INDACT_t$ | 0.003 | 0.004 | 0.005 | -0.001 | 0.001 | 0.003 |
| | (0.42) | (0.57) | (0.82) | (-0.13) | (0.09) | (0.33) |
| $REPU_t*10^{-1}$ | 0.250** | 0.202* | 0.213* | 0.037 | -0.030 | -0.003 |
| | (2.12) | (1.68) | (1.80) | (0.23) | (-0.18) | (-0.02) |
| $REFORM_t$ | 0.144*** | 0.134*** | 0.141*** | 0.168*** | 0.153*** | 0.161*** |
| | (7.21) | (6.36) | (6.90) | (6.29) | (5.48) | (5.99) |
| $MAIN_t$ | 0.041* | 0.040* | 0.043** | 0.040 | 0.039 | 0.044 |
| | (1.91) | (1.80) | (1.98) | (1.41) | (1.33) | (1.55) |
| *Year* | Yes | Yes | Yes | Yes | Yes | Yes |

| | | | | | | |
|---|---|---|---|---|---|---|
| *Industry* | Yes | Yes | Yes | Yes | Yes | Yes |
| Adj. $R^2$ | 0.555 | 0.544 | 0.554 | 0.515 | 0.509 | 0.517 |
| F | 36.76 | 34.99 | 36.84 | 29.29 | 30.19 | 31.59 |
| *N* | 472 | 458 | 472 | 472 | 458 | 472 |

## Table 6. Earnings management and individual investor online oversubscription

This table presents the relation between accrual-based and real earnings management and the online subscription of individual investors. The variables $DTA_{t-1}$, $DTCA_{t-1}$, and $DREV_{t-1}$ measure the extent of accrual-based earnings management. The variables $DCFO_{t-1}$, $DPROC_{t-1}$, and $DEXP_{t-1}$ measure the extent of pre-IPO real earnings management. The definitions of all the variables are presented in Table 1. The *p*-values reported in parentheses are based on White heteroscedasticity-robust standard errors. The superscripts *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

| | Dependent variable = $ONLINEOVER_t$ | | | | | |
|---|---|---|---|---|---|---|
| | Accrual-based earnings management | | | Real earnings management | | |
| | *DTA* | *DTCA* | *DREV* | *DCFO* | *DPROC* | *DEXP* |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| *INTERCEPT* | 6.423*** | 5.504*** | 5.803*** | 5.784*** | 7.521*** | 6.128*** |
| | (6.56) | (5.68) | (5.95) | (5.69) | (6.45) | (5.98) |
| $DTA_{t-1}$ | -1.193*** | | | | | |
| | (-2.64) | | | | | |
| $NDTA_{t-1}$ | -1.673*** | | | | | |
| | (-2.68) | | | | | |
| $DTCA_{t-1}$ | | -0.216 | | | | |
| | | (-0.73) | | | | |
| $NDTCA_{t-1}$ | | -0.431 | | | | |
| | | (-1.33) | | | | |
| $DREV_{t-1}$ | | | -0.512 | | | |
| | | | (-1.31) | | | |
| *NDREV* | | | -1.253* | | | |
| | | | (-1.88) | | | |
| $DCFO_{t-1}$ | | | | 0.998*** | | |
| | | | | (3.29) | | |
| $NDCFO_{t-1}$ | | | | -0.473 | | |
| | | | | (-0.81) | | |
| $DPROC_{t-1}$ | | | | | 0.342** | |
| | | | | | (1.74) | |
| $NDPROC_{t-1}$ | | | | | -0.192 | |
| | | | | | (-0.20) | |
| $DEXP_{t-1}$ | | | | | | 0.806*** |
| | | | | | | (2.98) |
| $NDEXP_{t-1}$ | | | | | | 0.626 |
| | | | | | | (1.09) |
| $LNOVER_t$ | 0.258*** | 0.300*** | 0.293*** | 0.276*** | 0.242*** | 0.243*** |
| | (3.61) | (4.66) | (4.57) | (4.33) | (3.68) | (3.86) |
| $AMIDIF_tF$ | 0.342 | 0.170 | 0.163 | 0.159 | 0.0270 | 0.105 |
| | (1.24) | (0.62) | (0.58) | (0.58) | (0.10) | (0.38) |
| $LNNUM_t$ | 0.180 | 0.168 | 0.182 | 0.187 | 0.191* | 0.233** |
| | (1.56) | (1.40) | (1.54) | (1.59) | (1.67) | (1.98) |

| | | | | | | |
|---|---|---|---|---|---|---|
| $CFO_{t-1}$ | -1.837*** | -1.438*** | -1.291*** | -1.858*** | -3.153*** | -3.002*** |
| | (-4.94) | (-5.19) | (-4.81) | (-2.60) | (-4.72) | (-4.60) |
| $LNREV_{t-1}$ | -0.272*** | -0.261*** | -0.276*** | -0.275*** | -0.334*** | -0.285*** |
| | (-6.27) | (-5.74) | (-6.10) | (-6.08) | (-5.79) | (-6.48) |
| $LEV_{t-1}$ | 0.246 | 0.296 | 0.481* | 0.0911 | -0.128 | 0.105 |
| | (0.93) | (0.97) | (1.87) | (0.31) | (-0.44) | (0.35) |
| $FIXRAT_{t-1}$ | 0.155 | 0.347** | 0.298* | 0.211 | 0.0934 | 0.103 |
| | (0.85) | (1.99) | (1.70) | (1.20) | (0.55) | (0.59) |
| $RANGE_t$ | -0.799 | 0.934* | 0.786 | 0.761 | 0.855 | 0.566 |
| | (-1.10) | (1.66) | (1.36) | (1.35) | (1.47) | (1.02) |
| $LNLAG10_t$ | 0.628*** | 0.585*** | 0.581*** | 0.584*** | 0.603*** | 0.604*** |
| | (7.52) | (6.94) | (6.83) | (6.98) | (7.17) | (7.41) |
| $INDACT_t$ | -0.013 | -0.012 | 0.002 | -0.013 | -0.012 | -0.008 |
| | (-0.32) | (-0.30) | (0.04) | (-0.32) | (-0.30) | (-0.22) |
| $REPU_t$ | 0.031 | 0.005 | 0.010 | 0.015 | 0.019 | 0.027 |
| | (0.50) | (0.09) | (0.16) | (0.24) | (0.30) | (0.43) |
| $REFORM_t$ | -0.458*** | -0.432*** | -0.415*** | -0.433*** | -0.435*** | -0.440*** |
| | (-3.30) | (-3.20) | (-3.07) | (-3.22) | (-3.29) | (-3.33) |
| $MAIN_t$ | -0.142 | -0.196 | -0.185 | -0.193 | -0.147 | -0.178 |
| | (-1.14) | (-1.53) | (-1.44) | (-1.53) | (-1.13) | (-1.42) |
| *Year* | Yes | Yes | Yes | Yes | Yes | Yes |
| *Industry* | Yes | Yes | Yes | Yes | Yes | Yes |
| Adj. $R^2$ | 0.468 | 0.459 | 0.459 | 0.466 | 0.476 | 0.466 |
| F | 19.91 | 17.84 | 18.23 | 20.26 | 23.72 | 19.92 |
| *N* | 472 | 472 | 472 | 472 | 458 | 472 |

## Table 7. Earnings management and the IPO offer price relative to the proposed price range

This table presents the relation between accrual-based and real earnings management and the online IPO offer price. The variable $CHG\_OFFER_t$ captures the difference between the IPO offer price and the midpoint of the proposed price range. The variables $DTA_{t-1}$, $DTCA_{t-1}$, and $DREV_{t-1}$ measure the extent of accrual-based earnings management while $DCFO_{t-1}$, $DPROC_{t-1}$, and $DEXP_{t-1}$ measure the extent of real earnings management. The definitions of all the variables are presented in Table 1. The *p*-values reported in parentheses are based on White heteroscedasticity-robust standard errors. The superscripts *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

| | Dependent variable = $CHG\_OFFER_t$ | | | | | |
|---|---|---|---|---|---|---|
| | Accrual-based earnings management | | | Real earnings management | | |
| | *DTA* (1) | *DTCA* (2) | *DREV* (3) | *DCFO* (4) | *DPROC* (5) | *DEXP* (6) |
| *INTERCEPT* | -0.042 | -0.108 | -0.016 | 0.022 | -0.028 | -0.044 |
| | (-0.24) | (-0.63) | (-0.09) | (0.12) | (-0.14) | (-0.25) |
| $DTA_{t-1}$ | -0.210*** | | | | | |
| | (-2.78) | | | | | |
| $NDTA_{t-1}$ | -0.022 | | | | | |
| | (-0.20) | | | | | |
| $DTCA_{t-1}$ | | -0.066 | | | | |
| | | (-1.29) | | | | |
| $NDTCA_{t-1}$ | | -0.067 | | | | |
| | | (-1.18) | | | | |
| $DREV_{t-1}$ | | | -0.201** | | | |
| | | | (-2.38) | | | |
| $NDREV_{t-1}$ | | | -0.198 | | | |
| | | | (-1.52) | | | |
| $CFO_{t-1}$ | -0.081 | 0.007 | 0.008 | | | |
| | (-1.37) | (0.14) | (0.17) | | | |
| $DCFO_{t-1}$ | | | | -0.140** | | |
| | | | | (-2.36) | | |
| $NDCFO_{t-1}$ | | | | -0.076 | | |
| | | | | (-0.70) | | |
| $DPROC_{t-1}$ | | | | | -0.0261 | |
| | | | | | (-0.66) | |
| $NDPROC_{t-1} *10^{-1}$ | | | | | -0.003 | |
| | | | | | (-0.02) | |
| $DEXP_{t-1}$ | | | | | | -0.118** |
| | | | | | | (-2.17) |
| $NDEXP_{t-1}$ | | | | | | 0.075 |
| | | | | | | (0.66) |
| $ROA_{t-1}$ | | | | -0.231* | -0.142 | -0.181 |
| | | | | (-1.71) | (-1.14) | (-1.55) |
| $LNREV_{t-1}$ | -0.041*** | -0.038*** | -0.043*** | -0.043*** | -0.041*** | -0.041*** |

| | | | | | | |
|---|---|---|---|---|---|---|
| | (-5.11) | (-4.70) | (-5.28) | (-5.31) | (-4.33) | (-5.11) |
| $LEV_{t-1}$ | 0.017 | 0.001 | 0.052 | 0.015 | 0.003 | 0.002 |
| | (0.33) | (0.02) | (1.06) | (0.27) | (0.05) | (0.04) |
| $FIXRAT_{t-1}$ | -0.051 | -0.067* | -0.066* | -0.076** | -0.061* | -0.062* |
| | (-1.28) | (-1.95) | (-1.88) | (-2.15) | (-1.72) | (-1.78) |
| $RANGE_t$ | -0.014 | -0.013 | -0.015 | -0.041 | -0.014 | 0.005 |
| | (-0.13) | (-0.12) | (-0.13) | (-0.37) | (-0.12) | (0.04) |
| $LNLAG10_t$ | 0.142*** | 0.144*** | 0.143*** | 0.141*** | 0.139*** | 0.141*** |
| | (10.57) | (10.73) | (10.77) | (10.53) | (10.20) | (10.58) |
| $INDACT_t*10^{-1}$ | -0.002 | 0.0012 | 0.020 | -0.016 | -0.005 | 0.008 |
| | (-0.03) | (0.01) | (0.28) | (-0.22) | (-0.07) | (0.11) |
| $REPU_t$ | 0.021* | 0.019 | 0.020 | 0.025* | 0.019 | 0.021 |
| | (1.65) | (1.45) | (1.60) | (1.91) | (1.47) | (1.60) |
| $REFORM_t$ | 0.128*** | 0.130*** | 0.130*** | 0.132*** | 0.122*** | 0.128*** |
| | (5.38) | (5.39) | (5.48) | (5.51) | (4.79) | (5.22) |
| $MAIN_t$ | 0.053** | 0.050** | 0.053** | 0.048** | 0.049** | 0.049** |
| | (2.34) | (2.20) | (2.32) | (2.14) | (2.11) | (2.16) |
| *Year* | Yes | Yes | Yes | Yes | Yes | Yes |
| *Industry* | Yes | Yes | Yes | Yes | Yes | Yes |
| Adj. $R^2$ | 0.476 | 0.469 | 0.475 | 0.477 | 0.463 | 0.473 |
| F | 23.96 | 23.21 | 23.57 | 24.17 | 23.29 | 24.80 |
| *N* | 472 | 472 | 472 | 472 | 458 | 472 |

## Table 8. Earnings management and long-term IPO performance

This table presents the relation between accrual-based and real earnings management and long-term IPO performance. The variables $DTA_{t-1}$, $DTCA_{t-1}$, and $DREV_{t-1}$ measure the extent of accrual-based earnings management while $DCFO_{t-1}$, $DPROC_{t-1}$, and $DEXP_{t-1}$ measure the extent of real earnings management. The definitions of all the variables are presented in Table 1. The *p*-values reported in parentheses are based on White heteroscedasticity-robust standard errors. The superscripts *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

| | Dependent variable = $LRET_{t+2}$ | | | | | |
|---|---|---|---|---|---|---|
| | Accrual-based earnings management | | | Real earnings management | | |
| | $DTA_{t-1}$ | $DTCA_{t-1}$ | $DREV_{t-1}$ | $DCFO_{t-1}$ | $DPROC_{t-1}$ | $DEXP_{t-1}$ |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| *INTERCEPT* | 2.000** | 1.886** | 1.908** | 1.920** | 2.345** | 1.784** |
| | (2.38) | (2.29) | (2.15) | (2.28) | (2.42) | (2.16) |
| $DTA_{t-1}$ | -0.288 | | | | | |
| | (-1.18) | | | | | |
| $NDTA_{t-1}$ | -0.439 | | | | | |
| | (-0.91) | | | | | |
| $DTCA_{t-1}$ | | -0.365** | | | | |
| | | (-2.08) | | | | |
| $NDTCA_{t-1}$ | | -0.275 | | | | |
| | | (-1.42) | | | | |
| $DREV_{t-1}$ | | | -0.0214 | | | |
| | | | (-0.06) | | | |
| $NDREV_{t-1}$ | | | -0.200 | | | |
| | | | (-0.42) | | | |
| $DCFO_{t-1}$ | | | | -0.253 | | |
| | | | | (-1.05) | | |
| $NDCFO_{t-1}$ | | | | 0.410 | | |
| | | | | (1.06) | | |
| $DPROC_{t-1}$ | | | | | -0.0565 | |
| | | | | | (-0.41) | |
| $NDPROC_{t-1}$ | | | | | 0.0178 | |
| | | | | | (0.37) | |
| $DEXP_{t-1}$ | | | | | | -0.269 |
| | | | | | | (-1.25) |
| $NDEXP_{t-1}$ | | | | | | 1.143*** |
| | | | | | | (3.17) |
| $ONLINEOVER_t$ | -0.0847** | -0.0796** | -0.0884** | -0.0820** | -0.0911** | -0.0901** |
| | (-2.35) | (-2.24) | (-2.45) | (-2.25) | (-2.44) | (-2.49) |

| | | | | | | |
|---|---|---|---|---|---|---|
| $LNOVER_t$ | -0.00689 | -0.00651 | 0.00179 | -0.00369 | 0.00877 | -0.0114 |
| | (-0.15) | (-0.15) | (0.04) | (-0.08) | (0.19) | (-0.26) |
| $AVG\_BID_t$ | -0.193 | -0.192 | -0.181 | -0.192 | -0.136 | -0.204 |
| | (-1.00) | (-1.00) | (-0.94) | (-1.00) | (-0.69) | (-1.06) |
| $LNNUM_t$ | 0.142* | 0.129* | 0.140* | 0.137* | 0.112 | 0.138* |
| | (1.84) | (1.65) | (1.82) | (1.77) | (1.41) | (1.76) |
| $ROA_{t-1}$ | -0.248 | -0.219 | -0.342 | -0.753 | -0.575 | -0.868* |
| | (-0.50) | (-0.45) | (-0.68) | (-1.49) | (-1.09) | (-1.77) |
| $LNREV_{t-1}$ | -0.0964*** | -0.0879** | -0.0921** | -0.0916** | -0.108** | -0.0924** |
| | (-2.67) | (-2.46) | (-2.40) | (-2.51) | (-2.48) | (-2.58) |
| $LEV_{t-1}$ | -0.148 | -0.305 | -0.164 | -0.190 | -0.168 | -0.186 |
| | (-0.78) | (-1.54) | (-0.80) | (-0.99) | (-0.88) | (-0.98) |
| $FIXRAT_{t-1}$ | -0.117 | -0.130 | -0.0686 | -0.111 | -0.119 | -0.0276 |
| | (-0.84) | (-1.02) | (-0.54) | (-0.85) | (-0.95) | (-0.23) |
| $RANGE_t$ | 0.745* | 0.730* | 0.782** | 0.777** | 0.726* | 0.923** |
| | (1.96) | (1.92) | (2.06) | (2.03) | (1.83) | (2.41) |
| $LNLAG10_t$ | -0.0433 | -0.0401 | -0.0463 | -0.0458 | -0.0347 | -0.0292 |
| | (-0.71) | (-0.66) | (-0.76) | (-0.75) | (-0.57) | (-0.48) |
| $INDACT_t$ | -0.0375 | -0.0410* | -0.0360 | -0.0389 | -0.0449* | -0.0235 |
| | (-1.52) | (-1.66) | (-1.42) | (-1.56) | (-1.80) | (-0.97) |
| $REPU_t$ | 0.00811 | 0.00214 | 0.00679 | 0.00805 | 0.00413 | 0.00108 |
| | (0.18) | (0.05) | (0.15) | (0.18) | (0.09) | (0.02) |
| $REFORM_t$ | -0.212** | -0.194** | -0.218** | -0.213** | -0.190** | -0.225** |
| | (-2.35) | (-2.17) | (-2.43) | (-2.36) | (-2.12) | (-2.48) |
| $MAIN_t$ | -0.105 | -0.0942 | -0.112 | -0.105 | -0.0644 | -0.0793 |
| | (-1.30) | (-1.20) | (-1.39) | (-1.30) | (-0.80) | (-0.97) |
| *Year* | Yes | Yes | Yes | Yes | Yes | Yes |
| *Industry* | Yes | Yes | Yes | Yes | Yes | Yes |
| Adj. $R^2$ | 0.126 | 0.132 | 0.123 | 0.126 | 0.108 | 0.141 |
| F | 3.904 | 4.196 | 3.972 | 4.067 | 3.613 | 4.530 |
| *N* | 472 | 472 | 472 | 472 | 458 | 472 |