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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's pre-IPO earnings management (EM). Our findings suggest that institutional investors' bid prices are negatively correlated with pre-IPO EM. The results are more pronounced for accrual-based EM than real EM. The findings are robust to a battery of different bid prices. We also document that retail investor oversubscription ratio is negatively or not associated with pre-IPO accrual-based EM. However, such oversubscription ratio is positively correlated with pre-IPO real EM. Additional results show that IPO offer prices (relative to the proposed IPO price range) are negatively correlated with pre-IPO EM, suggesting that institutional investors' ability to recognize EM pressures IPO issuing firms into setting a lower offer price. Lastly, we find that, the long-run IPO performance is mostly unrelated to EM, which is different from what the literature depicts.

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 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 beliefs is that an IPO firm has incentives to engage in earnings management (hereafter, EM) to window-dress its performance and boost the IPO offer price.[1] The early literature supports this claim. For instance, Aharony et al. (1993), using US IPOs, report that EM 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 EM in the year they go public, resulting in higher IPO offer prices and better short-term IPO performance. They document that the long-run stock returns of IPO firms, on average, are lower than those of comparable seasoned firms because IPO firms engaging in EM underperform in the long term due to the initial overvaluation. The implicit assumption in the IPO EM literature is that IPO investors are unable to fully recognize EM in IPO firms in the short term. However, to the best of our knowledge, there is no empirical literature examining

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[1] Earnings management relates to other types of corporate events such as share repurchase (Farrell et al., 2014), equity carve-outs (Chahine et al., 2015), and management buyouts (Mao and Renneboog, 2015).

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directly how investors, especially institutional investors, react to pre-IPO EM during the IPO process. It arises from the fact that there is a lack of public data regarding investor behavior during the IPO bidding 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 EM. If institutional IPO investors can "see through" the EM of an IPO firm, we would expect their bidding prices to be negatively correlated with the firm's pre-IPO EM. If not, the bidding price should not be correlated with the IPO firm's EM. Whether institutional IPO investors can "discount" the proposed price range of the IPO shares in the presence of EM is a research question. In addition, it would be interesting to learn if retail investors respond to an IPO firm's EM in the context of their subscription and how the IPO's long-run performance relates to EM in the presence of institutional investors in an auction process. We use a sample of 472 Chinese IPOs during 2010–2012 to examine these 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 EM for the IPO firm (Aharony et al., 1993, 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 auctions. Hence, we have information to examine whether institutional investors can see through issuers' pre-IPO EM. 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, retail investors subscribe for IPO shares online according to the offer price set in the first phase. If the IPO is over-subscribed, underwriters allocate shares to retail investors by lottery. This hybrid mechanism separates institutional and retail investors in the IPO subscription[4] and provides an opportunity to examine potentially different responses to pre-IPO EM between institutional and retail 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' EM. To the best of our knowledge, few studies directly examine the impact of IPO firms' EM on institutional investors' bidding behavior. Our study fills this gap.

We document that institutional IPO investor bid prices are negatively correlated with pre-IPO EM. The finding is robust to different measures of bid prices and accrual-based and real EM. In contrast, we report that retail investors' oversubscription ratio is positively correlated with pre-IPO real EM. In addition, we find that the impact of institutional bid prices in response to pre-IPO EM leads to a lower IPO offer price available to retail investors. Furthermore, the long-run IPO performance is mostly not related to pre-IPO EM. Retail investors seem to get good deals from their IPO investment in the long run because institutional investors' recognition of pre-IPO EM pressures underwriters to lower the IPO offer price. That is, retail investors get underpriced IPOs but the long-run performances are not worsened by pre-EM. Overall, the new auction system in China reduces the information asymmetry in the IPO process and mitigates the adverse impact of EM on institutional investors' IPO subscription and long-run IPO performance.

We make two contributions to the literature. First, we document that institutional investors can recognize pre-IPO EM and react accordingly by submitting a lower IPO bidding price. This is a new finding in the IPO EM literature. The majority of these literature focuses on whether the firm conducts pre-IPO EM (e.g., Friedlan, 1994; Aharony et al., 2010) or the impact of IPO year EM 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 EM and the IPO issuing price and report *no relation* between the two. Few studies distinguish the reactions of institutional and retail investors. We are able to do so using the unique data in China. In the context of reactions to pre-IPO EM, our Chinese findings are related to but different from those in the US (e.g., Armstrong et al., 2015). The similarity is that both Chinese and US IPOs investors are not misled by pre-IPO accrual-based EM. The difference is that institutional investors in China are able to react in a way to counter the effect of pre-IPO accrual-based EM (by lowering IPO bid prices) but the US studies show investors (not specify institutional or retail investors) do not react to pre-IPO accrual-based EM.

Second, we show that IPO investors are not homogeneous. Specifically, institutional investors can recognize pre-IPO accrual-based and real EM. Retail investors, however, are only able to recognize pre-IPO accrual-based EM and not real EM. Thus, they continue to oversubscribe for shares from IPO firms with real EM. Our findings echo the literature on institutional investors'

[2] The 2012 Reform relaxed this regulation. Retail investors with experience and adequate funding can since participate in the offline auction process through underwriter recommendations. However, the participation of retail investors is very limited. In addition, underwriters usually recommend experienced retail investors, whose behaviors are more similar to those of institutional investors than to those of typical retail 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 because the online system is open to the public. 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 any share allotment. Therefore, almost all the subscription in the online stage is from retail investors.

superior ability relative to retail investors in trading on earnings news (Park et al. 2014), bankruptcy events (Ramalingegowda, 2014), and monitoring effectiveness (Kim et al., 2016).

2. Background

In the course of its economic development, China recognizes 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 sets 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 EM to boost their reported earnings to obtain a high IPO offer price during this period.

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 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 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' bids in consultation with the issuing firm without any pre-specified rule. In the second online phase, 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 retail investors are generally separated in the Chinese IPO process, which allows us to examine the specific response of both types of investors to pre-IPO EM.

On November 1, 2010, the CSRC issued "Guiding Opinions on Further Reforming the System of Issuance 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 some interesting aspects for examining the relation between institutional investors' bidding behavior and IPO EM. Most importantly, the bidding behavior of institutional investors is generally not masked by the participation of retail investors and allows us to directly relate institutional bidding price with pre-IPO EM. Data on bidding prices and quantities have been available since 2010, but few studies use them to examine the relation between institutional investor bidding and EM in the pre-IPO. Our study fills this void.

3. Literature review and testable hypotheses

We have two strands of related literature. The first strand focuses on EM 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 EM. While Aharony et al. find only small and highly leverage firms engage in EM before their IPOs, Friedlan provides evidence to show that IPO firms use pre-IPO accrual-based EM to boost their earnings. The different results of Aharony et al. (1993) and Friedlan (1994) are likely due to different sample years and EM measures.

Teoh et al. (1998a) study the relation between long-run IPO performance and EM 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-run IPO performance. These findings suggest that IPO firms mislead investors using EM so that the shares are overvalued in the market where they go public. Over the long term, the genuine firm value prevails, so that the IPO's long-run performance is poor. In a related study, Teoh et al. (1998b) further document various opportunistic EM 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 EM in *pre-IPO period*, 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 EM in the book-building process, suggesting that the offer price is not influenced by the issuing firm's pre-IPO EM. Although the offering price is set afterwards according to investors' bid prices and can be viewed as a summary of the information contained in investor bids, it is not as good as the information contained in the detailed investor bid prices.[7] Thus, due to data unavailability, Armstrong et al. (2015) do not examine how investors react to the issuing firms' pre-IPO EM *directly*.

[5] In China, CSRC and the media frequently call 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.

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

[7] It is because underwriters can choose not to fully respond to the investor bid prices and set the IPO offer price along issuing firms' preference. Hence, the offering price may only partially summarize the information contained in the investor bid prices.

There is also a separate body of literature related to IPO EM 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 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 EM 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 EM 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 EM (disputed by recent studies such as Armstrong et al. (2015)) mainly refers to the negative correlation between current year accrual-based EM and post-IPO long-run stock returns, which suggests that IPO firms with current year accrual-based EM 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 pre-IPO EM. The recent evidence (e.g., Armstrong et al., 2015) reports that US IPO offer price is uncorrelated with pre-IPO accrual-based EM. However, it only shows that investors do not *react* to pre-IPO accrual-based EM; 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 EM; and (2) different types of EM, i.e., accrual-based and real EM, would lead to different conclusions.

Second, the Chinese IPO studies suggest that it is common for Chinese IPO firms to engage in EM but less so since the auction system was implemented. The implicit assumption in these studies is that IPO investors are unable to fully recognize EM 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 EM during the IPO process directly. 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 EM 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 EM during the IPO process. Overall, it is unclear if institutional investors are able to recognize pre-IPO EM. 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-run investment horizons sell more shares of impending bankrupt firms at least one quarter ahead of other investors. The author attributes this to institutional investors being more informed about the future firm value than other investors. Park et al. (2014) document that institutional investors can trade profitably around positive or negative earnings surprise announcements relative to foreign and retail investors in Korea. The authors suggest that domestic institutional investors have a superior information advantage over other investors. Kim et al. (2016) examine the drivers behind monitoring effectiveness of institutional investors and suggest that these investors are effective in recognizing EM. 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 EM, despite recent studies suggesting the extent of EM is lower, and (2) Institutional investors are better informed than retail investors and are likely to recognize pre-IPO EM in IPO firms. Taking together, if an IPO firm engages in high pre-IPO EM, it increases the degree of information asymmetry between institutional investors and underwriters. Accordingly, EM adversely affects the quality of the earnings reported in the financial statements. Then, ceteris paribus, if institutional investors can recognize pre-IPO EM, then they should lower the valuation of the IPO shares and submit lower bid prices accordingly. Hence, the testable hypothesis is as follows.

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

As to retail investors, since they bid after the offering price is set at the offline stage, their demand will be not correlated with pre-IPO EM if they are smart enough to see through the EM and understand that the issue price will fully adjust to such manipulation. If retail investors are also able to see through the pre-IPO EM and do not believe that the issue price has fully adjust to such earnings manipulation, they will subscribe less for firms with more EM at the online stage of the IPO. In contrast, if retail investors are unable to recognize pre-IPO EM and are thus misled by it, then, after the IPO offer price is adjusted to EM in the first phase, the

[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).

subscription of the IPO by retail investors should be positively related to EM. In sum, the impact of EM on retail investor subscription at 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 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-run 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 EM 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 EM at t-1. We obtain this pre-IPO financial information from the IPO module of CSMAR.

4.2. Key variables

4.2.1. Institutional investors' 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 bid 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 retail investors for subscription online.

While there is no pre-specified rule for setting the IPO offer price after auction, Spatt and Srovastava (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

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

Eq. (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 offering price. CHG_OFFER_t captures the IPO firm's pricing behavior at 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 EM: 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 in year t-1, $PPE_{i,t-1}$ is fixed assets at year t-1 end, ROA_{t-1} is return on assets in year t-1, and ε 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 in year *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, 1998b), Defond and Park (2001), and Dechow and Dichev (2002) use discretionary total current accruals ($DTCA_{t-1}$) to measure EM. 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 in year 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 in year *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 EM. 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 ($NDREV_{i,t-1}$).

Overall, large values of DTA_{t-1}, $DTCA_{t-1}$, or $DREV_{t-1}$ suggest large accrual-based EM in the Pre-IPO year 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 EM. For *DCFO* in year t-1, real EM 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 year 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 year 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 EM. As in Eqs. (3)–(5), we also construct non-discretionary measures, denoted as $NDCFO_{t-1}$, $NDPROC_{t-1}$, and $NDEXP_{t-1}$, respectively, using the corresponding predicted values from Eqs. (6)–(8) to control for their impact on institutional investors' bid prices. We estimate Eqs. (6)–(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 EM variables in the pre-IPO (t-1) period.

4.3. Methods

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

$$AVG\_BID_{i,t}(orCLEAR\_BID_{i,t}) = \alpha_0 + \alpha_1 (Accrual - Based\ \ EM\ \ measure)_{i,t-1} + \sum \alpha_j * (Control\ \ variables)_{i,t} + YEAR + INDUSTRY + \mu_{i,t} \quad (9)$$

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 ($REFORM_t$), a dummy variable to control for state-ownership (*SOE*) 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 $DREV_{i,t-1}$ as the accrual-based EM measure in the pre-IPO year. 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 α_1. If institutional investors can recognize EM in t-1 and submit a lower bid in t, then α_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 EM, we use a multiple regression model that is similar to Eq. (9) but with slightly different control variables due to using real EM. The model is

[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 market.

Table 1
Variable definitions.
This table defines the variables.

Variable	Definition
AVG_BID_t	Mean–median price difference, which is equal to ($AVERAGE_t$ - $MIDPOINT_t$)/ $MIDPOINT_t$, where $AVERAGE_t$ is the weighted average of all bid prices submitted by all institutional investors using the bidding quantities as weights and $MIDPOINT_t$ is the midpoint of the price range proposed by the underwriter.
$CLEAR\_BID_t$	Equilibrium–median price difference, which is ($CLEAR_t$ - $MIDPOINT_t$)/ $MIDPOINT_t$, where $CLEAR_t$ 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 ($ISSUE_t$ - $MIDPOINT_t$)/ $MIDPOINT_t$, where $ISSUE_t$ is the IPO offer price.
$ONLINEOVER_t$	Natural logarithm of the online oversubscription rate of retail investors.
$LRET_{t+2}$	The risk-adjusted IPO long-run 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 in 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 at 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 in the same industry.
$REPU_t$	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.
SOE_t	SOE_t is a dummy variable, which is equal to 1 if its ultimate controlling shareholder is the state and 0 otherwise.

$$AVGBID_{i,t}(orCLEARBID_{i,t}) = \beta_0 + \beta_1(Real\ \ EM\ \ measure)_{i,t-1} + \sum \beta_j{}^*(Control\ \ variables)_{i,t} + YEAR + INDUSTRY + \pi_{i,t} \quad (10)$$

where $\pi_{i,t}$ is a random error term. For the real EM measures 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 EM in t-1. If institutional investors can recognize real EM in t-1 and submit a lower bid in t, then β_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 EM.

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

5. Results and discussion

5.1. Summary statistics, correlation, and univariate analysis

We present the summary statistics of the sample in Panel A of 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 offering prices downward.

In terms of retail 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-run 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

Table 2
Descriptive statistics and correlation matrix.

Panel A 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 $DPROC_{t-1}$ is less than 472. Panel B 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. The t-values for differences in means are based on t-tests. *, **, and *** denote significance at the 10%, 5%, and 1% levels respectively.

Panel A: Descriptive statistics

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
SOE_t	472	0.078	0.269	0	0	0

Panel B: Correlation coefficients

	Accrual-based EM measures			**Real EM measures**			
	DTA_{t-1}	$DTCA_{t-1}$	$DREV_{t-1}$	$DCFO_{t-1}$	$DPROC_{t-1}$	$DEXP_{t-1}$	ROA_{t-1}
DTA_{t-1}	1	0.103**	0.344***	0.643***	0.0745	0.0432	0.0492
$DTCA_{t-1}$	0.0572	1	−0.0228	−0.153***	−0.114**	−0.0451	0.367***
$DREV_{t-1}$	0.318***	−0.0272	1	0.235***	−0.0916*	0.0396	−0.0490
$DCFO_{t-1}$	0.601***	−0.219***	0.202***	1	0.367***	0.232***	−0.416***
$DPROC_{t-1}$	0.0853*	−0.0341	−0.0740	0.401***	1	0.535***	−0.284***
$DEXP_{t-1}$	0.0662	−0.0555	0.0395	0.239***	0.486***	1	−0.197***
ROA_{t-1}	0.0942**	0.336***	−0.0520	−0.513***	−0.327***	−0.177***	1

high $LRET_{t+2}$ while most firms experience only a negative $LRET_{t+2}$. In terms of accrual-based EM 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 EM in the pre-IPO is only moderate but varies greatly among IPO firms. For real EM, $DCFO_{t-1}$, $DPROC_{t-1}$, 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 coefficients of all EM measures with return on assets (ROA) in Panel B of Table 2. The three real EM measures, $DCFO_{t-1}$, $DPROC_{t-1}$, and $DEXP_{t-1}$ are all positively associated with each other. The correlations between real and accrual EM measures are not consistent, however. Real EM measures are significantly negatively associated with return on asset (ROA_{t-1}), suggesting real EM is related to bad observables. Hence, it is useful to mitigate this effect by using ROA_{t-1} as a control variable in our

Table 3
A comparison of IPO firm characteristics for high vs. low earnings management group.

This table reports the results of univariate analysis on the mean differences of firm characteristics for observations with high and low EM. We divide our sample into two subgroups by the median of six EM measures (DTA_{t-1}, $DTCA_{t-1}$, $DREV_{t-1}$, $DCFO_{t-1}$, $DPROC_{t-1}$, and $DEXP_{t-1}$). The definition of concerned variables is presented in Table 1. The t-values for differences in means are based on t-tests. *, **, and *** denote significance at the 10%, 5%, and 1% levels respectively.

Panel A: DTA_{t-1}				
	High DTA_{t-1}	Low DTA_{t-1}	Differences	t-statistics
ROA_{t-1}	0.143	0.138	0.005	0.75
$LNREV_{t-1}$	20.120	20.157	−0.037	−0.35
LEV_{t-1}	0.418	0.407	0.011	0.71
$FIXRAT_{t-1}$	0.280	0.285	−0.005	−0.28
Panel B: $DTCA_{t-1}$				
	High $DTCA_{t-1}$	Low $DTCA_{t-1}$	Differences	t-statistics
ROA_{t-1}	0.164	0.117	0.047	7.48***
$LNREV_{t-1}$	20.009	20.268	−0.259	−2.50**
LEV_{t-1}	0.361	0.464	−0.103	−7.24***
$FIXRAT_{t-1}$	0.268	0.297	−0.029	−1.72*
Panel C: $DREV_{t-1}$				
	High $DREV_{t-1}$	Low $DREV_{t-1}$	Differences	t-statistics
ROA_{t-1}	0.140	0.142	−0.002	−0.25
$LNREV_{t-1}$	20.047	20.231	−0.184	−1.77*
LEV_{t-1}	0.419	0.406	0.014	0.93
$FIXRAT_{t-1}$	0.262	0.303	−0.041	−2.41**
Panel D: $DCFO_{t-1}$				
	High $DCFO_{t-1}$	Low $DCFO_{t-1}$	Differences	t-statistics
ROA_{t-1}	0.114	0.167	−0.053	−8.58***
$LNREV_{t-1}$	20.346	19.932	0.414	4.04***
LEV_{t-1}	0.463	0.362	0.101	7.04***
$FIXRAT_{t-1}$	0.259	0.305	−0.046	−2.69***
Panel E: $DPROC_{t-1}$				
	High $DPROC_{t-1}$	Low $DPROC_{t-1}$	Differences	t-statistics
ROA_{t-1}	0.124	0.158	−0.034	−5.33***
$LNREV_{t-1}$	20.134	20.144	−0.010	−0.09
LEV_{t-1}	0.442	0.383	0.058	3.92***
$FIXRAT_{t-1}$	0.283	0.281	0.002	0.13
Panel F: $DEXP_{t-1}$				
	High $DEXP_{t-1}$	Low $DEXP_{t-1}$	Differences	t-statistics
ROA_{t-1}	0.129	0.153	−0.024	−3.67***
$LNREV_{t-1}$	20.138	20.140	−0.002	−0.02
LEV_{t-1}	0.428	0.397	0.032	2.13**
$FIXRAT_{t-1}$	0.293	0.272	0.021	1.20

analysis. In sum, real EM may capture a change of fundamentals for a firm. Hence, we should interpret the findings associated with real EM cautiously.[10]

To depict the relation between EM and IPO firm characteristics, we conduct a number of univariate t-tests to compare high vs. low EM firm. We use medians of each EM measures to divide the sample. For firm characteristics, we use returns on assets (ROA_{t-1}), revenue ($LNREV_{t-1}$), leverage (LEV_{t-1}), and fix assets ratio ($FIXRAT_{t-1}$). The results are presented in Table 3. Overall, the findings suggest that: (1) high accrual EM firms do not perform worse in terms of ROA_{t-1}; (2) high real EM firms indeed perform worse in terms of ROA_{t-1} and have larger leverage. Thus, we control firm fundamentals, including ROA_{t-1}, $LNREV_{t-1}$, LEV_{t-1} and $FIXRAT_{t-1}$, in our analyses to account for the effect of EM from bad performance firms.

5.2. Core findings

5.2.1. 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 EM 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 EM in pre-IPO year, 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 −0.220, indicating that when an IPO firm puts up an additional 1% in discretionary total

[10] We thanks for an anonymous reviewer to raise this point.

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

This table presents the relation between accrual-based EM and the IPO bid price of institutional investors. The variable AVG_BID_t ($CLEAR\_BID_t$) captures the difference between the average (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 EM. 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	0.169	0.103	0.170	0.740***	0.662***	0.755***
	(0.99)	(0.63)	(1.01)	(3.28)	(3.10)	(3.46)
DTA_{t-1}	−0.220***			−0.274***		
	(−2.92)			(−2.70)		
$NDTA_{t-1}$	−0.051			−0.059		
	(−0.47)			(−0.41)		
$DTCA_{t-1}$		−0.124***			−0.184***	
		(−2.75)			(−3.26)	
$NDTCA_{t-1}$		−0.138***			−0.189***	
		(−2.76)			(−3.01)	
$DREV_{t-1}$			−0.163**			−0.235**
			(−2.22)			(−2.23)
$NDREV_{t-1}$			−0.0937			−0.177
			(−0.78)			(−1.18)
$CFO_{t-1}*10^{-1}$	−0.935	−0.211	−0.005	−1.710**	−0.862	−0.565
	(−1.57)	(−0.44)	(−0.01)	(−2.17)	(−1.37)	(−0.91)
$LNREV_{t-1}$	−0.046***	−0.043***	−0.047***	−0.070***	−0.065***	−0.071***
	(−6.17)	(−5.73)	(−6.21)	(−6.90)	(−6.64)	(−7.03)
LEV_{t-1}	−0.0328	−0.0736	−0.00151	0.00343	−0.0622	0.0461
	(−0.72)	(−1.47)	(−0.03)	(0.06)	(−0.95)	(0.81)
$FIXRAT_{t-1}$	−0.062*	−0.082**	−0.068**	−0.047	−0.080*	−0.059
	(−1.67)	(−2.52)	(−2.06)	(−0.99)	(−1.90)	(−1.42)
$RANGE_t$	−0.0950	−0.0961	−0.0827	0.0279	0.0177	0.0383
	(−0.94)	(−0.95)	(−0.80)	(0.21)	(0.13)	(0.28)
$LNLAG10_t$	0.116***	0.118***	0.117***	0.139***	0.142***	0.140***
	(10.13)	(10.32)	(10.21)	(8.93)	(9.18)	(9.13)
$INDACT_t*10^{-2}$	0.401	0.394	0.496	0.0217	−0.009	0.206
	(0.61)	(0.61)	(0.74)	(0.02)	(−0.01)	(0.22)
$REPU_t*10^{-1}$	0.216*	0.185	0.205*	−0.003	−0.042	−0.015
	(1.85)	(1.58)	(1.74)	(−0.02)	(−0.26)	(−0.09)
$REFORM_t$	0.142***	0.140***	0.144***	0.165***	0.165***	0.167***
	(7.19)	(7.03)	(7.20)	(6.31)	(6.18)	(6.27)
$MAIN_t$	0.045**	0.040*	0.047**	0.044	0.039	0.046
	(2.06)	(1.82)	(2.10)	(1.55)	(1.37)	(1.58)
SOE_t	0.013	0.018	0.015	0.023	0.028	0.022
	(0.66)	(0.92)	(0.73)	(0.82)	(0.97)	(0.79)
Year	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.553	0.551	0.549	0.513	0.513	0.511
F	35.50	32.10	31.17	27.09	27.04	26.43
N	472	472	472	472	472	472

accruals, the submitted bid price drops −0.220% below the midpoint of the IPO proposed price range, corresponding to 1.24% of the mean value of AVG_BID_t. Hence, institutional investors can recognize accrual-based EM 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 EM 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 EM 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) of Table 4, the estimated coefficient of DTA_{t-1} is −0.274, indicating that when an IPO firm puts up an additional 1% in discretionary total accruals in t-1, the submitted market clearing bid price drops −0.274% below the midpoint of the IPO proposed price range in t, corresponding to a 5.71% 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.

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

This table presents the relation between real EM and the IPO bid price of institutional investors. The variable AVG_BID_t ($CLEAR\_BID_t$) captures the difference between the average (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 EM. 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	0.233	0.200	0.173	0.822***	0.859***	0.739***
	(1.34)	(1.03)	(1.01)	(3.61)	(3.35)	(3.31)
$DCFO_{t-1}$	−0.139**			−0.113		
	(−2.50)			(−1.48)		
$NDCFO_{t-1}$	−0.0152			−0.0496		
	(−0.14)			(−0.34)		
$DPROC_{t-1}$		−0.015			−0.010	
		(−0.42)			(−0.20)	
$NDPROC_{t-1}$		0.00235			0.0132	
		(0.19)			(0.84)	
$DEXP_{t-1}$			−0.125**			−0.133*
			(−2.37)			(−1.92)
$NDEXP_{t-1}$			0.118			0.220
			(1.12)			(1.50)
ROA_{t-1}	−0.317**	−0.195	−0.257**	−0.428**	−0.373**	−0.440***
	(−2.34)	(−1.56)	(−2.23)	(−2.46)	(−2.44)	(−3.13)
$LNREV_{t-1}$	−0.047***	−0.046***	−0.046***	−0.071***	−0.073***	−0.069***
	(−6.34)	(−5.41)	(−6.20)	(−7.06)	(−6.28)	(−6.99)
LEV_{t-1}	−0.050	−0.064	−0.057	−0.027	−0.057	−0.036
	(−0.98)	(−1.18)	(−1.13)	(−0.41)	(−0.84)	(−0.56)
$FIXRAT_{t-1}$	−0.091***	−0.070**	−0.072**	−0.086*	−0.065	−0.068
	(−2.65)	(−2.05)	(−2.16)	(−1.95)	(−1.50)	(−1.59)
$RANGE_t$	−0.119	−0.090	−0.074	−0.004	0.043	0.047
	(−1.17)	(−0.86)	(−0.72)	(−0.03)	(0.31)	(0.34)
$LNLAG10_t$	0.115***	0.114***	0.115***	0.138***	0.135***	0.138***
	(10.04)	(9.59)	(9.97)	(8.84)	(8.46)	(8.94)
$INDACT_t$	0.003	0.004	0.005	−0.001	0.001	0.003
	(0.42)	(0.58)	(0.81)	(−0.13)	(0.11)	(0.32)
$REPU_t*10^{-2}$	0.250**	0.203*	0.213*	0.037	−0.029	−0.002
	(2.11)	(1.69)	(1.80)	(0.23)	(−0.18)	(−0.01)
$REFORM_t$	0.144***	0.133***	0.140***	0.167***	0.151***	0.160***
	(7.17)	(6.31)	(6.86)	(6.26)	(5.44)	(5.95)
$MAIN_t$	0.041*	0.039*	0.042*	0.039	0.037	0.042
	(1.86)	(1.75)	(1.92)	(1.34)	(1.27)	(1.46)
SOE_t	0.008	0.019	0.015	0.016	0.029	0.022
	(0.38)	(0.95)	(0.73)	(0.54)	(1.01)	(0.78)
Year	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.554	0.543	0.553	0.514	0.509	0.517
F	33.72	33.71	38.22	26.04	25.95	30.35
N	472	458	472	472	458	472

We present the relation between real EM 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 relation between real EM 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 5. 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 4 and 5 show that institutional investors bid lower in t if an IPO firm engages in accrual-based or real EM in pre-IPO in t-1. Institutional investors can recognize EM despite the information asymmetry in the IPO process in China. In addition, the results on real EM and institutional investors bid price are weaker. We contend that they react more to accrual-based EM than to real EM, suggesting that real EM is harder to recognize, a result that is consistent with the work of Cohen and Zarowin (2010) and Kothari et al. (2015).

Table 6
Earnings management and retail investor online oversubscription.

This table presents the relation between accrual-based and real EM and the online subscription of retail investors. The variables DTA_{t-1}, $DTCA_{t-1}$, and $DREV_{t-1}$ measure the extent of accrual-based EM. The variables $DCFO_{t-1}$, $DPROC_{t-1}$, and $DEXP_{t-1}$ measure the extent of pre-IPO real EM. 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 EM			Real EM		
	(1)	(2)	(3)	(4)	(5)	(6)
INTERCEPT	6.512***	5.694***	5.925***	6.141***	7.702***	6.202***
	(6.70)	(5.91)	(6.11)	(6.08)	(6.65)	(6.08)
DTA_{t-1}	−1.117**					
	(−2.44)					
$NDTA_{t-1}$	−1.573**					
	(−2.49)					
$DTCA_{t-1}$		−0.191				
		(−0.65)				
$NDTCA_{t-1}$		−0.415				
		(−1.29)				
$DREV_{t-1}$			−0.429			
			(−1.09)			
NDREV			−1.100*			
			(−1.67)			
CFO_{t-1}	−1.810***	−1.403***	−1.263***			
	(−4.74)	(−5.06)	(−4.68)			
$DCFO_{t-1}$				1.032***		
				(3.39)		
$NDCFO_{t-1}$				−0.468		
				(−0.80)		
$DPROC_{t-1}$					0.345**	
					(2.07)	
$NDPROC_{t-1}$					0.167**	
					(2.25)	
$DEXP_{t-1}$						0.789***
						(2.90)
$NDEXP_{t-1}$						0.638
						(1.10)
ROA_{t-1}				−1.670**	−3.029***	−2.890***
				(−2.28)	(−4.49)	(−4.36)
$LNOVER_t$	0.271***	0.315***	0.306***	0.290***	0.252***	0.254***
	(4.20)	(4.89)	(4.77)	(4.54)	(3.86)	(4.03)
$AMIDIF_t$	0.134	0.169	0.168	0.167	0.0276	0.108
	(0.49)	(0.61)	(0.60)	(0.61)	(0.10)	(0.39)
$LNNUM_t$	0.178	0.138	0.156	0.162	0.168	0.213*
	(1.51)	(1.15)	(1.32)	(1.38)	(1.47)	(1.80)
$LNREV_{t-1}$	−0.299***	−0.269***	−0.281***	−0.279***	−0.344***	−0.289***
	(−6.77)	(−5.96)	(−6.26)	(−6.22)	(−6.02)	(−6.59)
LEV_{t-1}	0.255	0.301	0.463*	0.109	−0.119	0.121
	(0.96)	(0.99)	(1.81)	(0.37)	(−0.41)	(0.41)
$FIXRAT_{t-1}$	0.178	0.359**	0.312*	0.234	0.119	0.117
	(0.95)	(2.09)	(1.80)	(1.33)	(0.70)	(0.67)
$RANGE_t$	0.657	0.890	0.758	0.740	0.836	0.549
	(1.15)	(1.58)	(1.31)	(1.31)	(1.43)	(0.99)
$LNLAG10_t$	0.582***	0.583***	0.579***	0.583***	0.605***	0.603***
	(6.98)	(6.96)	(6.85)	(6.99)	(7.23)	(7.42)
$INDACT_t$	−0.012	−0.013	−0.001	−0.013	−0.011	−0.009
	(−0.31)	(−0.31)	(−0.02)	(−0.31)	(−0.27)	(−0.22)
$REPU_t$	0.026	0.010	0.014	0.017	0.021	0.028
	(0.42)	(0.17)	(0.22)	(0.27)	(0.34)	(0.46)
$REFORM_t$	−0.420***	−0.446***	−0.426***	−0.445***	−0.446***	−0.447***
	(−3.12)	(−3.29)	(−3.14)	(−3.30)	(−3.36)	(−3.37)
$MAIN_t$	−0.194	−0.211*	−0.196	−0.203	−0.151	−0.185
	(−1.55)	(−1.65)	(−1.53)	(−1.61)	(−1.17)	(−1.47)
SOE_t	0.182	0.250**	0.210*	0.200	0.209	0.153
	(1.41)	(2.03)	(1.65)	(1.54)	(1.59)	(1.17)
Year	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.470	0.462	0.461	0.468	0.478	0.467

(continued on next page)

Table 6 *(continued)*

	Dependent variable = $ONLINEOVER_t$					
	Accrual-based EM			Real EM		
	(1)	(2)	(3)	(4)	(5)	(6)
F	45.46	44.37	40.10	45.34	28.95	36.45
N	472	472	472	472	458	472

5.2.2. Earnings management and retail investor IPO subscription

Are retail investors able to recognize EM 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 retail investors to recognize EM. If retail investors are also able to see through the EM in pre-IPO and do not believe that the issue price has fully adjust to such manipulation, they will subscribe less in t for firms with more EM in t-1 at the online stage of the IPO and vice versa. In contrast, if retail investors are able to see through the EM in pre-IPO and believe that the issue price has fully adjust to such manipulation, we will find no relation (or negative relation) between pre-IPO EM and their oversubscription rate. Table 6 presents the results of accrual-based and real EM.

For accrual-based EM, in columns (1) to (3), only the coefficient of DTA_{t-1} in column (1) is negative and significant at 1% level, suggesting that retail investors subscribe less to IPO shares if a firm engages in EM in terms of DTA_{t-1}. For columns (2) and (3), the coefficients of $DTCA_{t-1}$ and $DREV_{t-1}$ are not significant; showing that retail investors do not relate to accrual-based EM. Thus, the relation between retail investor oversubscription and accruals-based EM is not there, or it is negative. This suggests that they actually see through accrual-based EM, just like institutional investors.

The results for real EM 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 retail investors subscribe to more IPO shares online in t after the IPO firm engages in real EM in t-1.[11] The coefficients are also economically significant. For instance, in column (4) of Table 6, the estimated coefficient of $DCFO_{t-1}$ is 1.032, indicating that when an IPO firm puts up an additional 1% in discretionary cash flow in t-1, the oversubscription rate of retail investors increases 1.032%, corresponding to 89.8% of the online supply of offerings. These results suggest that, on average, IPO firms' real EM misled retail 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 retail 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, retail 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 retail investors do not have the capability for recognizing real EM but they can recognize accrual-based EM. Similar to the interpretations in Section 5.2.1, we need to be cautious because real EM may simply reflect a change in firm fundamentals. However, institutional investors and retail investors face the same noisy measure of real EM by the same IPO firm. Therefore, when we compare the reactions of institutional investors and retail investors, it is fair that both groups of investors react to the same set of real EM (and some of them are due to changes of fundamentals). Hence, the *different* impact of real EM on the *reaction* of institutional investors and retail investors are not likely due to the distortion of real EM resulting from changes in fundamentals.

5.3. Additional results

5.3.1. 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 EM in t-1, we should observe a lower IPO offering price for firms with higher pre-IPO EM. We present the relation between EM 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 EM variables are negative and significant at the 5% or 1% level. The coefficients are also economically significant. For instance, in column (1) of Table 7, the estimated coefficient of DTA_{t-1} is −0.217, indicating that when an IPO firm puts up an additional 1% in discretionary cash flow, the offering price drops −0.217% below the midpoint of the IPO proposed price range, corresponding to a 1.94% 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 EM, 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 EM in the P/E era, EM 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 EM to be significantly lower since China switched from a P/E to an auction process. In addition, the results in Table 7 are consistent with the summary statistics in Table 2, which

[11] It is possible that when $DCFO_{t-1}$, $DPROC_{t-1}$ or $DEXP_{t-1}$ are high, it means that retail investors may consider these firms to be good investments and thus oversubscribe the IPO shares.

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 EM 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 EM while $DCFO_{t-1}$, $DPROC_{t-1}$, and $DEXP_{t-1}$ measure the extent of real EM. 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 EM			Real EM		
	DTA_{t-1} (1)	$DTCA_{t-1}$ (2)	$DREV_{t-1}$ (3)	$DCFO_{t-1}$ (4)	$DPROC_{t-1}$ (5)	$DEXP_{t-1}$ (6)
INTERCEPT	0.0150	−0.0462	0.0361	0.0785	0.0465	0.0115
	(0.08)	(−0.26)	(0.20)	(0.43)	(0.22)	(0.06)
DTA_{t-1}	−0.217***					
	(−2.82)					
$NDTA_{t-1}$	−0.0263					
	(−0.23)					
$DTCA_{t-1}$		−0.076				
		(−1.46)				
$NDTCA_{t-1}$		−0.0782				
		(−1.38)				
$DREV_{t-1}$			−0.200**			
			(−2.35)			
$NDREV_{t-1}$			−0.208			
			(−1.63)			
CFO_{t-1}	−0.089	0.001	0.005			
	(−1.46)	(0.01)	(0.11)			
$DCFO_{t-1}$				−0.139**		
				(−2.37)		
$NDCFO_{t-1}$				−0.0670		
				(−0.61)		
$DPROC_{t-1}$					−0.022	
					(−0.56)	
$NDPROC_{t-1}$ $*10^{-1}$					0.022	
					(0.17)	
$DEXP_{t-1}$						−0.117**
						(−2.11)
$NDEXP_{t-1}$						0.101
						(0.84)
ROA_{t-1}				−0.254*	−0.155	−0.205*
				(−1.84)	(−1.22)	(−1.70)
$LNREV_{t-1}$	−0.043***	−0.040***	−0.044***	−0.044***	−0.043***	−0.043***
	(−5.21)	(−4.83)	(−5.37)	(−5.42)	(−4.48)	(−5.23)
LEV_{t-1}	0.014	−0.005	0.050	0.009	−0.0048	−0.003
	(0.27)	(−0.09)	(1.01)	(0.16)	(−0.06)	(−0.05)
$FIXRAT_{t-1}$	−0.056	−0.073**	−0.071**	−0.083**	−0.065*	−0.067*
	(−1.39)	(−2.10)	(−2.02)	(−2.30)	(−1.81)	(−1.88)
$RANGE_t$	−0.022	−0.022	−0.022	−0.048	−0.018	−0.002
	(−0.19)	(−0.19)	(−0.19)	(−0.42)	(−0.15)	(−0.02)
$LNLAG10_t$	0.138***	0.140***	0.139***	0.137***	0.135***	0.137***
	(10.38)	(10.53)	(10.57)	(10.33)	(9.98)	(10.40)
$INDACT_t$	−0.002	0.000	0.023	−0.015	−0.003	0.001
	(−0.03)	(0.01)	(0.31)	(−0.21)	(−0.04)	(0.16)
$REPU_t$	0.022*	0.019	0.021	0.025*	0.020	0.021
	(1.69)	(1.48)	(1.62)	(1.95)	(1.50)	(1.63)
$REFORM_t$	0.112***	0.112***	0.113***	0.116***	0.103***	0.110***
	(4.53)	(4.47)	(4.53)	(4.60)	(3.90)	(4.29)
$MAIN_t$	0.055**	0.052**	0.055**	0.051**	0.051**	0.052**
	(2.35)	(2.20)	(2.35)	(2.18)	(2.13)	(2.20)
SOE_t	0.009	0.014	0.007	0.005	0.015	0.011
	(0.41)	(0.63)	(0.29)	(0.20)	(0.69)	(0.50)
Year	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.466	0.460	0.465	0.467	0.453	0.464
F	22.09	21.44	21.33	22.37	21.55	22.93
N	472	472	472	472	458	472

Table 8
Robust analyses: Using P/E ratio of clearing and offer price.

This table presents the findings using P/E ratio of average, clearing, and offer prices as the dependent variable to examine the response of institutional investors and the offer price in accrual-based and real EM (Panels A, Band Panel C). The variable AVG_BID2_t ($CLEAR\_BID2_t$) is the natural logarithm of P/E multiples corresponding to the average (marginal) institutional investor bidding price. The variable CHG_OFFER2_t is the natural logarithm of P/E multiples corresponding to the offer price. The variables DTA_{t-1}, $DTCA_{t-1}$, and $DREV_{t-1}$ measure the extent of accrual-based EM. The variables $DCFO_{t-1}$, $DPROC_{t-1}$, and $DEXP_{t-1}$ measure the extent of real EM. The definitions of all the variables are presented in Table 1 of our paper. 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.

Panel A: Accrual-based EM and the IPO bid price (expressed as the natural logarithm of P/E multiples) of institutional investors.

	Dependent variable = AVG_BID2_t			Dependent variable = $CLEAR\_BID2_t$		
	(1)	(2)	(3)	(4)	(5)	(6)
INTERCEPT	6.5553***	6.4113***	6.6332***	6.9864***	6.8511***	7.0820***
	(15.33)	(15.67)	(15.47)	(16.16)	(16.56)	(16.46)
DTA_{t-1}	−0.4759**			−0.4534**		
	(−2.27)			(−2.08)		
$NDTA_{t-1}$	−0.0717			−0.0755		
	(−0.24)			(−0.25)		
$DTCA_{t-1}$		−0.2775**			−0.2885**	
		(−2.22)			(−2.27)	
$NDTCA_{t-1}$		−0.3448**			−0.3423**	
		(−2.48)			(−2.40)	
$DREV_{t-1}$			−0.5145***			−0.5436***
			(−2.69)			(−2.88)
$NDREV_{t-1}$			0.2620			0.2086
			(0.94)			(0.72)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.564	0.564	0.567	0.565	0.566	0.570
F	39.10	38.48	39.34	41.51	41.45	41.76
N	472	472	472	472	472	472

Panel B: real EM and the IPO bid price (expressed as the natural logarithm of P/E multiples) of institutional investors.

	Dependent variable = AVG_BID2_t			Dependent variable = $CLEAR\_BID2_t$		
	(1)	(2)	(3)	(4)	(5)	(6)
INTERCEPT	6.7303***	6.7514***	6.6773***	7.1572***	7.2427***	7.1046***
	(15.59)	(13.96)	(15.74)	(16.51)	(14.93)	(16.67)
$DCFO_{t-1}$	−0.2296			−0.1616		
	(−1.62)			(−1.17)		
$NDCFO_{t-1}$	0.1969			0.1724		
	(0.69)			(0.61)		
$DPROC_{t-1}$		−0.0052			0.0039	
		(−0.06)			(0.05)	
$NDPROC_{t-1}$		0.0085			0.0162	
		(0.23)			(0.46)	
$DEXP_{t-1}$			−0.3837***			−0.3625**
			(−2.68)			(−2.56)
$NDEXP_{t-1}$			0.3425			0.3970
			(1.26)			(1.46)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.569	0.568	0.574	0.571	0.572	0.577
F	40.02	36.89	41.21	42.51	39.19	43.60
N	472	458	472	472	458	472

(continued on next page)

Table 8 *(continued)*

Panel C: EM and the IPO offer price relative to the proposed price range

	Dependent variable = CHG_OFFER2_t					
	Accrual-based EM			Real EM		
	DTA_{t-1} (1)	$DTCA_{t-1}$ (2)	$DREV_{t-1}$ (3)	$DCFO_{t-1}$ (4)	$DPROC_{t-1}$ (5)	$DEXP_{t-1}$ (6)
INTERCEPT	6.2803*** (14.91)	6.1567*** (15.08)	6.3798*** (15.10)	6.4493*** (15.25)	6.4743*** (13.60)	6.4015*** (15.30)
DTA_{t-1}	−0.4307** (−2.09)					
$NDTA_{t-1}$	−0.0264 (−0.09)					
$DTCA_{t-1}$		−0.2010 (−1.60)				
$NDTCA_{t-1}$		−0.2509* (−1.79)				
$DREV_{t-1}$			−0.5188*** (−2.72)			
$NDREV_{t-1}$			0.1437 (0.51)			
$DCFO_{t-1}$				−0.2050 (−1.48)		
$NDCFO_{t-1}$				0.1399 (0.50)		
$DPROC_{t-1}$					−0.0168 (−0.21)	
$NDPROC_{t-1}*10^{-1}$					0.0070 (0.20)	
$DEXP_{t-1}$						−0.3644*** (−2.62)
$NDEXP_{t-1}$						0.2983 (1.13)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.535	0.533	0.539	0.539	0.541	0.545
F	32.87	32.28	32.74	33.52	31.49	34.63
N	472	472	472	472	458	472

shows only moderate mean values of EM. An average IPO firm engages in less EM since implementing the auction IPO process. We attribute the lesser EM and the negative relation between EM and the IPO offer price to institutional investors' recognition of EM.

5.3.2. Analyses using P/E ratio of the clearing and offer price

For robustness, we reexamine the results in Tables 4, 5, and 7 using P/E ratios of the bid and offer prices. The findings are presented in Panels A to C of Table 8. For brevity, we do not report the coefficients of control variables. In Panel A, the coefficients of accrual-based earning management variables are consistently negative and significant in columns (1) to (6). In Panel B, only two out of six columns show the coefficients of real EM variables are negative and significant. In Panel C, we find two out of three accrual-based EM measures and one out of three real EM measures are negative and significant.

Taking together, our conclusion that institutional investors are able to recognize accrual-based EM but the results are weaker for real EM is robust to using P/E ratio of the average and clearing prices. Similarly, for the impact on IPO offer price, the results using P/E ratios in Panel C are similar to those in Table 7. That is, using P/E ratio of corresponding prices does not change the results.

5.3.3. Earnings management and long-run IPO performance

Teoh et al. (1998a) explain that the generally negative long-run IPO performance is due to EM. When an IPO engages in EM, 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-run IPO performance is negative. If our Chinese environment shows institutional investors can recognize pre-IPO EM and bid lower IPO prices accordingly, then the extent of long-run negative IPO performance should be less pronounced.

We present the findings in Table 9 using risk-adjusted IPO long-run 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

Table 9
Earnings management and long-run IPO performance.

This table presents the relation between accrual-based and real EM and long-run IPO performance. The variables DTA_{t-1}, $DTCA_{t-1}$, and $DREV_{t-1}$ measure the extent of accrual-based EM while $DCFO_{t-1}$, $DPROC_{t-1}$, and $DEXP_{t-1}$ measure the extent of real EM. 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 EM			Real EM		
	DTA_{t-1} (1)	$DTCA_{t-1}$ (2)	$DREV_{t-1}$ (3)	$DCFO_{t-1}$ (4)	$DPROC_{t-1}$ (5)	$DEXP_{t-1}$ (6)
INTERCEPT	2.017**	1.905**	1.925**	1.936**	2.377**	1.811**
	(2.36)	(2.27)	(2.15)	(2.26)	(2.38)	(2.15)
DTA_{t-1}	−0.284					
	(−1.16)					
$NDTA_{t-1}$	−0.434					
	(−0.90)					
$DTCA_{t-1}$		−0.365**				
		(−2.07)				
$NDTCA_{t-1}$		−0.276				
		(−1.43)				
$DREV_{t-1}$			−0.010			
			(−0.03)			
$NDREV_{t-1}$			−0.182			
			(−0.38)			
$DCFO_{t-1}$				−0.247		
				(−1.02)		
$NDCFO_{t-1}$				0.410		
				(1.06)		
$DPROC_{t-1}$					−0.056	
					(−0.40)	
$NDPROC_{t-1}$					0.0202	
					(0.41)	
$DEXP_{t-1}$						−0.274
						(−1.27)
$NDEXP_{t-1}$						1.146***
						(3.17)
$ONLINEOVER_t$	−0.085**	−0.080**	−0.089**	−0.083**	−0.092**	−0.091**
	(−2.37)	(−2.26)	(−2.47)	(−2.26)	(−2.45)	(−2.51)
$LNOVER_t$	−0.005	−0.004	0.004	−0.001	0.011	−0.008
	(−0.10)	(−0.09)	(0.10)	(−0.03)	(0.23)	(−0.18)
AVG_BID_t	−0.192	−0.192	−0.179	−0.191	−0.136	−0.203
	(−0.99)	(−1.00)	(−0.93)	(−0.99)	(−0.68)	(−1.06)
$LNNUM_t$	0.138*	0.125	0.136*	0.133*	0.109	0.132
	(1.76)	(1.57)	(1.73)	(1.69)	(1.35)	(1.65)
ROA_{t-1}	−0.229	−0.197	−0.321	−0.726	−0.560	−0.838*
	(−0.46)	(−0.41)	(−0.64)	(−1.42)	(−1.06)	(−1.71)
$LNREV_{t-1}$	−0.097***	−0.089**	−0.093**	−0.093**	−0.110**	−0.094**
	(−2.65)	(−2.45)	(−2.40)	(−2.50)	(−2.44)	(−2.57)
LEV_{t-1}	−0.145	−0.302	−0.163	−0.188	−0.166	−0.181
	(−0.77)	(−1.51)	(−0.79)	(−0.97)	(−0.87)	(−0.95)
$FIXRAT_{t-1}$	−0.114	−0.127	−0.0648	−0.108	−0.115	−0.0234
	(−0.81)	(−1.00)	(−0.50)	(−0.82)	(−0.91)	(−0.19)
$RANGE_t$	0.742*	0.726*	0.779**	0.774**	0.724*	0.919**
	(1.96)	(1.92)	(2.05)	(2.03)	(1.82)	(2.40)
$LNLAG10_t$	−0.043	−0.040	−0.046	−0.046	−0.034	−0.029
	(−0.70)	(−0.65)	(−0.75)	(−0.74)	(−0.56)	(−0.47)
$INDACT_t$	−0.038	−0.041*	−0.036	−0.039	−0.045*	−0.024
	(−1.52)	(−1.66)	(−1.42)	(−1.56)	(−1.79)	(−0.97)
$REPU_t$	0.008	0.003	0.007	0.008	0.005	0.002
	(0.19)	(0.06)	(0.16)	(0.18)	(0.10)	(0.04)
$REFORM_t$	−0.214**	−0.196**	−0.220**	−0.215**	−0.192**	−0.227**
	(−2.36)	(−2.18)	(−2.45)	(−2.37)	(−2.13)	(−2.50)
$MAIN_t$	−0.106	−0.0960	−0.114	−0.107	−0.0652	−0.0814
	(−1.32)	(−1.23)	(−1.41)	(−1.32)	(−0.81)	(−1.00)
SOE_t	0.029	0.032	0.034	0.030	0.031	0.045
	(0.35)	(0.37)	(0.40)	(0.35)	(0.35)	(0.53)
Year	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes

(continued on next page)

Table 9 *(continued)*

	Dependent variable = $LRET_{t+2}$					
	Accrual-based EM			Real EM		
	DTA_{t-1} (1)	$DTCA_{t-1}$ (2)	$DREV_{t-1}$ (3)	$DCFO_{t-1}$ (4)	$DPROC_{t-1}$ (5)	$DEXP_{t-1}$ (6)
Adj. R^2	0.125	0.130	0.121	0.124	0.106	0.140
F	3.766	4.038	3.815	3.921	3.514	4.377
N	472	472	472	472	458	472

all six columns in Table 9, 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), suggest that EM does not adversely affect long-run IPO performance.

The findings in Table 9 can also be interpreted as IPO firms that engage in more EM do not perform worse in the long-run than the ones that engage in less. Then, why do institutional investors "underprice" these IPO firms in the offline stage of the IPO? We notice that these IPO firms do not perform worse *only* after institutional investors recognize EM in these firms in the IPO process. That is, institutional investors submit a lower bid ("underprice" the IPO) in order to protect themselves and pressure underwriters to lower the IPO offer price. In other words, institutional investors are able to discount the proposed price of the IPO shares when facing EM. Thus, the IPO shares engaging in EM are not performing worse in the long-run is partially attributed to the lower IPO bids from institutional investors. From the retail investors' perspective, the results in Table 9 suggest that, on average, the IPO firms engaging in more EM are good deals because their long-run performance is not significantly different from those of engaging in less EM while they are discounted more by institutional investors. That is, after institutional investors recognizing IPO firms with high pre-IPO EM, underwriters lower the IPO offer price so that retail investors are able to pay less for the IPOs.

6. Conclusions

We examine if institutional investors can recognize pre-IPO EM 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-run IPO performance, on average, is worse than 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 EM during the IPO process due to the unavailability of detailed bid data in the process. Leveraging the unique 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 EM 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 institutional investors to pre-IPO EM from retail investors. Our findings suggest that institutional investors' IPO bid prices in t are negatively correlated with EM in t-1. The finding is robust to a battery of different bid prices and it is stronger in accrual-based than real EM.

We document that the relation between retail investor oversubscription ratio and accrual-based EM is not there or negative; suggesting that retail investors also recognize such EM in pre-IPO. However, we report that retail investor oversubscription ratio is positively correlated with pre-IPO real EM.

Our additional results show that the IPO offer price (relative to the proposed price range) is negatively correlated with pre-IPO EM, suggesting that institutional investors' ability to recognize pre-IPO EM pressures the IPO issuing firm into setting a lower offer price. Lastly, we find that long-run IPO performance is mostly unrelated to pre-IPO EM.

Our findings reinforce the notion that an auction-like IPO system, besides revealing institutional investor bidding information, allows these investors to recognize EM to help lower the IPO offering price and reduces the IPO long-run poor performance. In addition, the inability of retail investors to recognize EM suggests that security regulators can enhance policies and practices to mitigate the adverse impact of EM among IPO firms.

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