

The Effect of Investor Sentiment on IPO Pricing: Evidence From China

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ABSTRACT

Previous literature mainly investigates the effect of investor sentiment in the bookbuilding, and little evidence proves the role of investor sentiment in the hybrid auction. In this paper, I provide empirical evidence to answer how pre-IPO investor sentiment affects the IPO pricing process in the hybrid auction mechanism. Empirical results show that underwriters tend to raise the mid-point of the price range when investor sentiment is high. As a result, higher investor sentiment leads to higher offer prices and lower underpricing. The results highlight the important role of investor sentiment in the hybrid auction and have implications for regulators.

Keywords: *Initial public offering (IPO), hybrid auction, investor sentiment, offer price, underpricing*

1. INTRODUCTION

A larger body of IPO literature focuses on investor sentiment in bookbuilding. Little evidence is available to prove the role of investor sentiment in the hybrid auction mechanism. Some literature indicates that auction is an alternative to bookbuilding (e.g., Degeorge et al., 2010 [1]), some, however, worry about the IPO pricing in the auction since discretions are restricted (e.g., Benveniste and Wilhelm, 1990 [2]). In this paper, I investigate whether irrational factors (i.e., investor sentiment) will influence IPO pricing. Specifically, I firstly investigate whether pre-IPO investor sentiment affects underwriters' judgment before the IPO bidding process in the current IPO. Next, I explore whether investor sentiment affects the determined offer price. Finally, I test whether investor sentiment has an effect on IPO underpricing.

Investor sentiment is a market-wide phenomenon (e.g., Neal and Wheatley, 1998 [3]; Baker and Wurgler, 2006 [4]). Many researchers believe that investor sentiment is also a significant factor in the IPO market. For example, literature proposes that more firms choose to go public when investor sentiment is high (e.g., Lee et al., 1991 [5]; Loughran et al., 1994 [6]). Lowry (2003) [7] also highlights that investor sentiment is an important determinant of IPO volume. As for IPO pricing, theoretical literature shows that investor sentiment is important for IPO pricing, and underwriters will consider investor sentiment when determining the offer price (e.g., Derrien, 2005 [8]; Cornelli et al., 2006 [9]; Ljungqvist et al., 2006 [10]). Based on this point, Cook et al. (2006) [11] find evidence that underwriters have an incentive to promote an IPO to induce sentiment investors, and the promotional efforts of investment bankers will influence the valuation of IPOs. Dorn (2009) [12] explores investor sentiment based on retail data in Germany. Jiang and Li (2013) [13]

examine sentiment's impact on IPO pricing in a two-stage framework.

However, previous literature is mainly based on bookbuilding. Although a series of theoretical literature explores the pros and cons of bookbuilding and auction, little literature empirically investigates the auction due to lack of data (e.g., Degeorge et al., 2010 [1]). Recently some researchers test the bidding behavior in the auction (e.g., Chiang et al., 2010 [14]), but little focuses on the role of investor sentiment. I fill this gap by providing evidence to answer the effect of sentiment in the hybrid auction mechanism. Based on comprehensive IPO data, I find that when pre-IPO investor sentiment is high, underwriters' judgment on IPO value before the bidding process will increase. After the IPO bidding process, I find that the final determined IPO offer price will increase compared with the expected offer price when investor sentiment is high. Eventually, it will lead to low underpricing in the secondary market. These findings are consistent with the expectation mentioned in Ljungqvist et al. (2006) [10] that "...it seems plausible that the presence of sentiment investors could lead to higher offer prices and a lower level of underpricing as rational issuers take advantage of them...".

This paper contributes to the literature on investor sentiment in IPO pricing from the following two parts. First, it highlights the importance of investor sentiment in different IPO mechanism. Previous literature focuses on investor sentiment under the bookbuilding. Instead, I shed lights on investor sentiment in the hybrid auction and show that investor sentiment in the auction also strongly influences the IPO pricing process. Second, previous literature mainly explores the effect of sentiment on offer price adjustment, underpricing, and post-IPO performance. However, it still remains an unexplored question of whether sentiment can influence underwriters setting the price range in their valuation reports. The paper fills this

gap by showing that underwriters set higher price range when investor sentiment is higher. These findings have great implications for regulators that it is important and necessary to constrain underwriters since they may inflate offer price with the help of optimism.

The rest of the paper is organized as follows. Section 2 describes the IPO mechanism. Section 3 shows the data and summary statistics. Section 4 presents the empirical results, and section 5 concludes.

2. IPO MECHANISM

Before June 2009, there was window guidance on IPO pricing. To let the market determine final offer prices, the China Securities Regulatory Commission implemented reforms to increase IPO pricing efficiency. During the sample period, underwriters only had pricing discretion and no allocation discretion in the hybrid auction. Specifically, underwriters solicited investors' demand in the bidding process. Once it was closed, underwriters constructed the demand curve and determined the offer price. All investors with bid prices over the offer price were eligible for allocations. Before November 2010, the allocation rule was pro-rata. After that, it was switched to the lottery. After May 2012, the three-month lockup requirement was removed. The main difference between hybrid auction and traditional bookbuilding is allocation discretion. In the US IPO market, for example, underwriters have the right to allocate shares to certain investors, which is regarded as a tool to induce information production and increase IPO pricing efficiency. After the sample period, underwriters lost IPO pricing discretion, and the IPO mechanism changed to the fixed-price mechanism. In conclusion, no matter before or after the sample period, it was not proper to exploring IPO pricing.

There were two stages in the IPO mechanism in the Shanghai Stock Exchange, the first step was designed for the price range, and the second step, which was also called bookbuilding, was for the offer price. Investors' sentiment in bookbuilding has been widely discussed (e.g., Wang and Yao, 2020 [15]), but no literature provides evidence in the hybrid auction. Therefore, this paper mainly focuses on IPOs in the hybrid auction in the Shenzhen Stock Exchange.

3. DATA AND SUMMARY STATISTICS

3.1. Sample and Data

I select all 783 Chinese IPOs listing in Shenzhen Stock Exchange from July 2009 to November 2012 and delete two IPOs in the financial industry. Specifically, I obtain stock code, IPO daily return in the secondary market, demand and allocated shares in the bidding process, price range, expected proceeds, offer price, reform, board, and

financial data from the China Stock Market and Accounting Research Database (CSMAR).

3.2. Variable Construction

3.2.1. Independent variable definition

As for pre-IPO investor sentiment, I follow Derrien (2005) [8] and Jiang and Li (2013) [13] to use the oversubscription ratio as a proxy and expect that higher demand indicates higher sentiment. The detailed construction is as follows:

$$\text{LogPastOversub}_n = \log\left(\frac{\sum_{i=1}^N \text{Oversubscription}_i}{N}\right) \quad (1)$$

where LogPastOversub_t is the natural logarithm of past average oversubscription in the past six months before the current IPO n , $\text{Oversubscription}_n$ is the oversubscription ratio of each IPO in the past six months before the current IPO n , which is calculated as the total demand to total supply in auction tranche of each IPO. N is the number of IPOs in the past six months before the current IPO n . For robustness, I also construct the oversubscription ratio based on retail demand in the fixed-price tranche.

In the spirit of Lowry (2003) [7], I also use past average initial returns in the IPO market to measure investor sentiment. The construction is as follows:

$$\text{PastFirstDayReturn}_n = \log\left(\frac{\sum_{i=1}^N \text{FirstDayReturn}_i}{N}\right) \quad (2)$$

where $\text{PastFirstDayReturn}_n$ is the past average initial return of IPOs in the past six months before the current IPO n . FirstDayReturn_n is the initial return of each IPO in the past six months before the current IPO n .

3.2.2. Dependent variable definition

Before IPO pricing, underwriters will provide an indicative price range for consideration. I use the scaled mid-point to measure underwriters' pre-IPO valuation on the offer price. The construction is as follows:

$$\text{ScaledMidpointPrice}_n = \frac{\text{MidPoint of price range}_n}{\text{Expected price}_n} - 1 \quad (3)$$

where $\text{ScaledMidpointPrice}_n$ is scaled mid-point of the price range. $\text{MidPoint of price range}_n$ is the mid-point of the price range. Expected price_n is the expected offer price implied by IPO prospectuses. Specifically, I calculate the expected price as the expected raising capital divided by the total number of shares offered.

In the spirit of Loughran and McDonald (2013) [16], I construct offer price adjustment as follows:

$$\text{OfferPriceAdjust}_n = \frac{\text{Offer price}_n}{\text{MidPoint of price range}_n} - 1 \quad (4)$$

where $\text{OfferPriceAdjust}_n$ is the offer price adjustment of the current IPO n . Offer price_n is the determined offer price.

Finally, I compute the first-day return (ReturnFirstDay), which equals the return from the offer price to the first-day closing price. As for control variables, I control

underwriters' reputation, the board where each IPO is listed, support from VC/PE, market performance, IPO reforms, and accounting indicators such as asset, ROE, and firm age. Controls are defined in detail in Table 1.

3.3. Summary Statistics

Table 2 reports the summary statistics of variables defined previously. For each variable, "N" represents the number of observations, "Mean" represents the equal-weighted mean value, "SD" represents its standard deviation, "Min", "Median", and "Max" separately represent minimum, median, and maximum value. The average scaled midpoint price (*ScaledMidpointPrice*) is 1.603, suggesting that underwriters in the sample period set a valuation range much higher than the expected price. As the average of offer price adjustment from the mid-point price (*OfferPriceAdjust*) is almost zero, implying that underwriters set the offer price close to the mid-point. Also, the underpricing of the IPOs is high, the average of which is 36.8%. The average natural logarithm of oversubscription in the bidding process is 4.592, indicating that the pre-IPO investor sentiment during the sample period is very high.

Table 1 Definitions of IPO-Specific Controls.

Variables	Description
<i>LogPastUnderwriteSize</i>	Natural logarithm of 1 plus the total size of IPOs the current underwriter has underwritten before.
<i>BoardDummy</i>	A dummy variable equals one if the firm is listed in the Shenzhen ChiNext Board, and zero otherwise.
<i>VentureCapitalDummy</i>	A dummy variable equals one if the firm is backed by VC or PE, and zero otherwise.
<i>LogAssetBeforeIPO</i>	Natural logarithm of the firm's average total assets before IPO.
<i>LogIPOFirmAge</i>	Natural logarithm of 1 plus years of firm's age before IPO.
<i>ROEBeforeIPO</i>	IPO firm's average return on equity before IPO.
<i>IndexReturnBeforeIPO</i>	One month Shenzhen A-share index return before IPO.
<i>Reform1</i>	An indicator variable equal to one if an IPO is under lottery rule.
<i>Reform2</i>	An indicator variable equal to one if an IPO is restricted in a three-month lockup.

Table 2 Summary statistics of variables

	N	Mean	SD	Median
Panel A: Main variables				
<i>ScaledMidpointPrice</i>	781	1.603	1.018	1.406
<i>OfferPriceAdjust</i>	781	-0.014	0.199	-0.014
<i>ReturnFirstDay</i>	781	0.368	0.454	0.271
<i>LogPastOversub_off</i>	781	4.592	0.767	4.627
<i>LogPastOversub_on</i>	781	5.009	0.455	4.900
<i>PastFirstDayReturn</i>	781	0.353	0.200	0.321
Panel B: Control				
<i>LogPastUnderwriteSize</i>	781	9.670	1.943	10.165
<i>BoardDummy</i>	781	0.455	0.498	0.000
<i>VentureCapitalDummy</i>	781	0.499	0.500	0.000
<i>LogAssetBeforeIPO</i>	781	5.860	0.822	5.777
<i>LogIPOFirmAge</i>	781	2.066	0.613	2.220
<i>ROEBeforeIPO</i>	781	0.290	0.129	0.271
<i>IndexReturnBeforeIPO</i>	781	-0.003	0.075	-0.003
<i>Reform1</i>	781	0.524	0.500	1.000
<i>Reform2</i>	781	0.083	0.276	0.000

4. EMPIRICAL RESULTS

4.1. The Effect of Investor Sentiment on Underwriter's Valuation Range

First, I start with the regression analysis to explore the relation between investor sentiment and scaled midpoint price, and the analyses are based on specifications of the following form:

$$ScaledMidpointPrice_n = \alpha_1 + \beta_1 \times LogPastOversub_n + \sum(\gamma \times Controls_n) + \varepsilon_n \quad (5)$$

where *ScaledMidpointPrice_n* is scaled midpoint price of IPO *n*, *LogPastOversub_n* is the natural logarithm of past average oversubscription ratio based on demand in auction tranche (e.g., *LogPastOversub_off*) and demand in fixed-price tranche (e.g., *LogPastOversub_on*) in the past six months before IPO *n*. For robustness, I also use the past average initial return to measure pre-IPO investor sentiment in the past six months before the current IPO *n*. *Controls_n* contains a series of control variables about firm characteristics that I describe in Table 2. I also introduce industry fixed effects and year fixed effects to capture unobservable industry-level and year-level characteristics. Following previous IPO literature, standard errors are clustered by industry. T-statistics are reported in parentheses below the regression coefficients. I use ***, **, and * to denote significance at the 1%, 5%, and 10% level (two-sided), respectively.

I present empirical results in Table 3. The coefficient of interest is β_1 , which is an estimator of the relation between recent oversubscription and scaled mid-point price. The

coefficients in Column (1) show that higher IPO demand is associated positively to higher mid-point without control variables. After adding controls, the coefficient of *LogPastOversub_off* is robust and statistically significant. In Column (3)-(4), I use demand in fixed-price tranche and find that the coefficients are still positive. Using past average IPO returns as the proxy for investor sentiment, I find that the results are robust and concrete. All evidence is consistent with the expectation that underwriters will set price range at a higher level when pre-IPO investor sentiment is higher.

4.2. The Effect of Investor Sentiment on Offer Price Adjustment

Then, I test the relation between investor sentiment and offer price adjustment. The regression model is as follows:

$$OfferPriceAdjust_n = \alpha_1 + \beta_1 \times LogPastOversub_n + \sum(\gamma \times Controls_n) + \epsilon_n \tag{6}$$

where *OfferPriceAdjust* is offer price adjustment from the mid-point of IPO *n*.

I present the regression results in Table 4. The coefficient of interest is β_1 , which is an estimator of the relation between recent oversubscription and offer price adjustment. No matter I use the natural logarithm of recent average oversubscription in the bidding process, recent average oversubscription in the fixed-price tranche, or recent average first-day returns to measure investor sentiment, the coefficients are positive and highly significant. Also, the results hold after I include a series of IPO-specific controls. The concrete results suggest that underwriters will go with the flow of the recent investor sentiment and adjust the offer price higher.

Table 3 Investor sentiment and underwriter’s valuation range

Dependent =	<i>ScaledMidpointPrice</i>					
	(1)	(2)	(3)	(4)	(5)	(6)
<i>LogPastOversub_off</i>	0.447*** (5.87)	0.586*** (4.80)				
<i>LogPastOversub_on</i>			0.372*** (4.08)	0.431*** (4.19)		
<i>PastFirstDayReturn</i>					0.378* (2.12)	0.491** (2.72)
<i>LogPastUnderwriteSize</i>		0.012 (1.22)		0.012 (1.29)		0.010 (1.06)
<i>BoardDummy</i>		0.331*** (4.47)		0.332*** (4.25)		0.325*** (3.99)
<i>VentureCapitalDummy</i>		0.107* (2.05)		0.102* (2.01)		0.098* (2.02)
<i>LogAssetBeforeIPO</i>		-0.033 (-0.44)		-0.033 (-0.44)		-0.038 (-0.50)
<i>LogIPOFirmAge</i>		-0.016 (-0.31)		-0.019 (-0.38)		-0.014 (-0.27)
<i>ROEBeforeIPO</i>		1.767*** (12.66)		1.806*** (14.24)		1.787*** (15.45)
<i>IndexReturnBeforeIPO</i>		0.147 (0.55)		0.098 (0.38)		-0.157 (-0.68)
<i>Reform1</i>		0.352*** (5.91)		0.147*** (4.31)		0.071** (2.53)
<i>Reform2</i>		-0.296* (-1.91)		-0.151 (-0.90)		-0.252 (-1.60)
Industry FE?	Yes	Yes	Yes	Yes	Yes	Yes
Year FE?	Yes	Yes	Yes	Yes	Yes	Yes
Number of obs.	781	781	781	781	781	781
Adjusted R-squared	0.115	0.192	0.107	0.179	0.102	0.174

Table 4 Investor sentiment and offer price adjustment

Dependent =	<i>OfferPriceAdjust</i>					
	(1)	(2)	(3)	(4)	(5)	(6)
<i>LogPastOversub_off</i>	0.104*** (11.21)	0.141*** (9.45)				
<i>LogPastOversub_on</i>			0.097*** (7.39)	0.149*** (7.55)		
<i>PastFirstDayReturn</i>					0.586*** (18.07)	0.657*** (9.90)
<i>LogPastUnderwriteSize</i>		0.005* (2.15)		0.005* (2.22)		0.005 (1.63)
<i>BoardDummy</i>		0.006 (0.54)		0.008 (0.71)		0.016 (1.30)
<i>VentureCapitalDummy</i>		0.002 (0.44)		0.002 (0.46)		0.008 (1.69)
<i>LogAssetBeforeIPO</i>		-0.028*** (-3.58)		-0.027*** (-3.29)		-0.023*** (-3.22)
<i>LogIPOFirmAge</i>		-0.001 (-0.57)		-0.003 (-1.48)		-0.007* (-2.19)
<i>ROEBeforeIPO</i>		-0.148*** (-5.13)		-0.137*** (-4.72)		-0.143*** (-5.65)
<i>IndexReturnBeforeIPO</i>		-0.013 (-0.25)		0.016 (0.25)		0.061 (0.80)
<i>Reform1</i>		0.125*** (9.56)		0.088*** (7.75)		0.100*** (9.93)
<i>Reform2</i>		0.095*** (3.90)		0.142*** (7.13)		0.122*** (5.96)
Industry FE?	Yes	Yes	Yes	Yes	Yes	Yes
Year FE?	Yes	Yes	Yes	Yes	Yes	Yes
Number of obs.	781	781	781	781	781	781
Adjusted R-squared	0.353	0.393	0.344	0.384	0.414	0.455

4.3. The Effect of Investor Sentiment on First-day Return

Finally, I test the relation between investor sentiment and first-day return. The regression model is as follows:

$$ReturnFirstDay_n = \alpha_1 + \beta_1 \times LogPastOversub_n + \sum(\gamma \times Controls_n) + \epsilon_n \tag{7}$$

where *ReturnFirstDay* is the first-day return of IPO *n*. Other specifications are the same as previously.

I present the regression results in Table 5. The coefficient of interest is β_1 , which is an estimator of the relation between recent oversubscription and first-day return. Not surprisingly, the coefficients on the natural logarithm of recent average oversubscription in the bidding process are highly significantly negative in Column (1)-(2). After using recent average oversubscription in fixed-price tranche and recent average first-day return as proxies for investor sentiment, results remain robust. Combined with the positive relation between recent average oversubscription and offer price adjustment, negative relations in Table 5 indicate that underwriters adjust the offer price upward and set an overpriced offer price when recent investor sentiment is high.

Table 5 Investor sentiment and first-day return

Dependent =	ReturnFirstDay					
	(1)	(2)	(3)	(4)	(5)	(6)
<i>LogPastOversub_off</i>	-0.183*** (-9.40)	-0.093*** (-5.95)				
<i>LogPastOversub_on</i>			-0.206*** (-10.05)	-0.057*** (-4.77)		
<i>PastFirstDayReturn</i>					-0.328*** (-8.50)	-0.063** (-2.73)
<i>LogPastUnderwriteSize</i>		-0.008** (-2.99)		-0.008** (-3.04)		-0.008** (-2.84)
<i>BoardDummy</i>		-0.077** (-3.01)		-0.077** (-3.10)		-0.076** (-3.07)
<i>VentureCapitalDummy</i>		-0.012 (-0.48)		-0.011 (-0.44)		-0.011 (-0.41)
<i>LogAssetBeforeIPO</i>		-0.106*** (-15.03)		-0.105*** (-15.21)		-0.105*** (-14.85)
<i>LogIPOFirmAge</i>		0.013* (1.89)		0.013* (1.93)		0.012 (1.78)
<i>ROEBeforeIPO</i>		-0.639*** (-18.36)		-0.645*** (-18.39)		-0.643*** (-18.51)
<i>IndexReturnBeforeIPO</i>		1.810*** (20.47)		1.828*** (20.11)		1.862*** (20.04)
<i>Reform1</i>		0.020 (1.70)		0.055*** (3.98)		0.065*** (4.95)
<i>Reform2</i>		0.012 (0.26)		-0.008 (-0.16)		0.006 (0.12)
Industry FE?	Yes	Yes	Yes	Yes	Yes	Yes
Year FE?	Yes	Yes	Yes	Yes	Yes	Yes
Number of obs.	781	781	781	781	781	781
Adjusted R-squared	0.196	0.353	0.194	0.351	0.187	0.350

5. CONCLUSION

Because of the lack of IPOs in the hybrid auction, the effect of sentiment in the hybrid auction mechanism remains unclear. In this paper, I use recent average oversubscription and recent average first-day return as proxies for pre-IPO investor sentiment and investigate whether investor sentiment affects IPO pricing. Specifically, the higher sentiment is associated with higher IPO valuation of underwriters, higher offer price adjustment, and lower first-day return, suggesting that underwriters will anticipate and eventually set overpriced offer prices when recent investor sentiment is high. The results highlight the important role of investor sentiment in IPO markets and have strong implications for regulators.

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