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INVESTOR SENTIMENT, VENTURE CAPITAL, R&D INVESTMENT, AND IPO UNDERPRICING: AN EMPIRICAL ANALYSIS OF CHINESE STAR MARKET

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Abstract

The Shanghai Science and Technology Innovation Board (STAR) led the Chinese capital market revolution with a registration system and showed a high Initial Public Offering (IPO) underpricing rate. This study investigates the impact of the research & development ratio, venture capital, and investor sentiment, on the IPO underpricing rate. The study utilizes STAR data from July 2019 to Dec 2022 listing 457 companies and employing the Ordinary Least Squares (OLS) model to conduct the analysis. The results indicate that venture capital and investor sentiment are positively related to IPO underpricing, while R&D investment negatively influences IPO underpricing. The examination of the determinants shaping IPO underpricing within the Chinese STAR market constitutes a valuable endeavor that facilitates a comprehensive and methodical comprehension of this specific facet of the capital market.

Keywords: IPO underpricing, Venture capital, R&D investment, Investor sentiment, Chinese STAR market.

1. INTRODUCTION

The phenomenon of Initial Public Offerings (IPOs) inevitably gives rise to distinctive anomalies, as articulated by Ritter and Welch (2002), notably manifesting as the first-day underpricing. In developed markets, an exploration by Loughran, Ritter, and Rydqvist (2020), building upon antecedent empirical data elucidated by Ibbotson, Sindelar, and Ritter (1988), revealed that the mean inaugural return for IPOs in the United States stood at 16.9% during the temporal spectrum from 1960 to 2019. In the context of China, Ritter (2023) underscored an average initial return of 169.5% during the period from 1990 to 2019. Additionally, Gu and Qin (2000) ascertained an even higher average initial return of 256.9% within the Chinese IPO landscape in the period 1990 to 2000. The discernible outcome from these empirical inferences

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positions China as exhibiting a markedly elevated level of underpricing when juxtaposed with the US market.

The establishment of the Shanghai Stock Exchange Science and Technology Innovation Board (STAR) on November 5, 2018, and its formal commencement of operations on July 22, 2019, signifies a strategic initiative aimed at fostering the growth of China's scientific, technological, and innovative enterprises. A salient divergence between STAR and other domestic boards lies in its utilization of a registration system, in contrast to the approval systems adhered to by its counterparts (Ma, Liu, & Qi, 2022). Noteworthy is STAR's inclusive stance towards the admission of unprofitable entities and Red Chip companies hitherto listed abroad within the Chinese jurisdiction. This unique feature has prompted Chinese technology firms to reestablish their market presence within China, a trend notably accentuated against the backdrop of ongoing trade tensions between China and the United States. Entities such as TikTok and Huawei, emblematic of the Chinese technological landscape, have faced formidable constraints and encumbrances arising from the policies of the US government. The STAR market trading mechanism is different from other markets in China, employing a T+0 trading mechanism, allowing investors to buy and sell shares on the same day. Thus, the STAR market has no daily price limit, which can result in higher volatility compared to other Chinese stock exchanges. According to this unique trading mechanism, the STAR market has strict requirements on individual investors' capital and stock market participation experience, which are 500,000 RMB (Around 68,000 USD) and more than 24 months of investment experience (Sun, Yin, Zhou, & Zhu, 2022).

The examination of the determinants shaping IPO underpricing within the Chinese STAR market constitutes a valuable endeavor that facilitates a comprehensive and methodical comprehension of this specific facet of the capital market. This study yields a dual contribution, both in terms of academic and practical insight into the evolution of the STAR market and China's broader capital markets. In terms of academic contribution, this study makes a noteworthy stride by supplementing the current corpus of literature with an empirical dataset derived from IPOs within the Chinese STAR market, specifically those conducted between the years 2019 and 2022. The practical contribution of this study extends to regulators, policymakers, investors, and other stakeholders, offering insights into the transformative potential of the STAR board reform on the Chinese stock market. It also equips investors with the tools they need to navigate the intricacies of IPO investments within the STAR market, thereby fostering a climate of informed decision-making and contributing to the broader growth and development of China's capital market ecosystem. This study undertakes an investigation into the influence of R&D investment, venture capital, and investor sentiment, on the underpricing phenomenon observed in Initial Public Offerings (IPOs) within the Chinese Shanghai Stock Exchange Science and Technology Innovation Board (STAR) market.

2. LITERATURE REVIEW

2.1 Investor Sentiment and IPO Underpricing

Baker and Wurgler (2000) believe that investor sentiment can influence investors'

speculative tendencies. High sentiment leads investors to have higher expectations of the future valuation of stocks, which makes stock prices rise. In contrast, panic makes investors look down on expectations of future valuations of stocks, thus causing stock prices to fall. Wang and Wang (2021) studied the influence of investor sentiment on China's SSE IPO underpricing rate between 2014 to 2018. They found that investor sentiment is the main factor impacting the IPO underpricing rate and that it is positively related to the IPO underpricing. The reform of STAR Board's IPO system is likely to also affect the phenomenon of IPO underpricing by affecting investor behavior. The investor sentiment involved here is that investors will have different psychological expectations and investment behaviors due to different policies and systems, mainly reflected in stock trading. Using the investor sentiment index (ISI) Wei, Xia, and Sun (2014) summarized a formula to describe China's stock market investor sentiment, while this paper will use ISI to explain the influence of investor sentiment on IPO underpricing. ISI includes closed-end fund discounts, average first-day returns, the number of IPOs, new accounts, turnover rate, and the consumer confidence index. Therefore, we can further analyze how the IPO system affects STAR Board IPO underpricing by analyzing the relationship between the IPO system and investor sentiment. Thus, the following is hypothesized:

H1: The investor sentiment index (ISI) is positively related to the IPO underpricing level of the Chinese STAR market.

2.2 Venture Capital and IPO Underpricing

IPO in the US or other mature capital markets has accurate evaluation criteria for venture capital institutions and can play a specific role in certification. Venture capital can improve corporate governance and reduce the level of IPO underpricing. However, Chunya's (2017) research study of the China Growth Enterprise Market (GEM) from 2009 to 2012 found that venture capital only plays a signaling role in the IPO but does not play an influential role in information, improving the IPO underpricing rate. Moreover, venture capital in China is still in the early stages. Small size and un-standardization are characteristics of venture capital in China. The influence of venture capital on IPO companies in China still lacks literature support, and is worth studying further. There is a lack of evaluation criteria for venture capital institutions in the STAR Board market. Investors often evaluate the performance standards of venture capital institutions by the number of venture capital institutions participating in the listing and the rate of returns on investment, so venture capital institutions will choose to issue stocks underpricing to speed up the IPO process and obtain a good reputation, which leads to higher IPO underpricing in companies with venture capital participation. According to Pinheiro's (2018) research, venture capital-backed IPO companies have a higher IPO underpricing level than non-VC-backed companies since they have lower offer prices than IPO companies without venture capital. Thus, increasing venture capital will enhance China's STAR Board market IPO underpricing. The following is hypothesized accordingly:

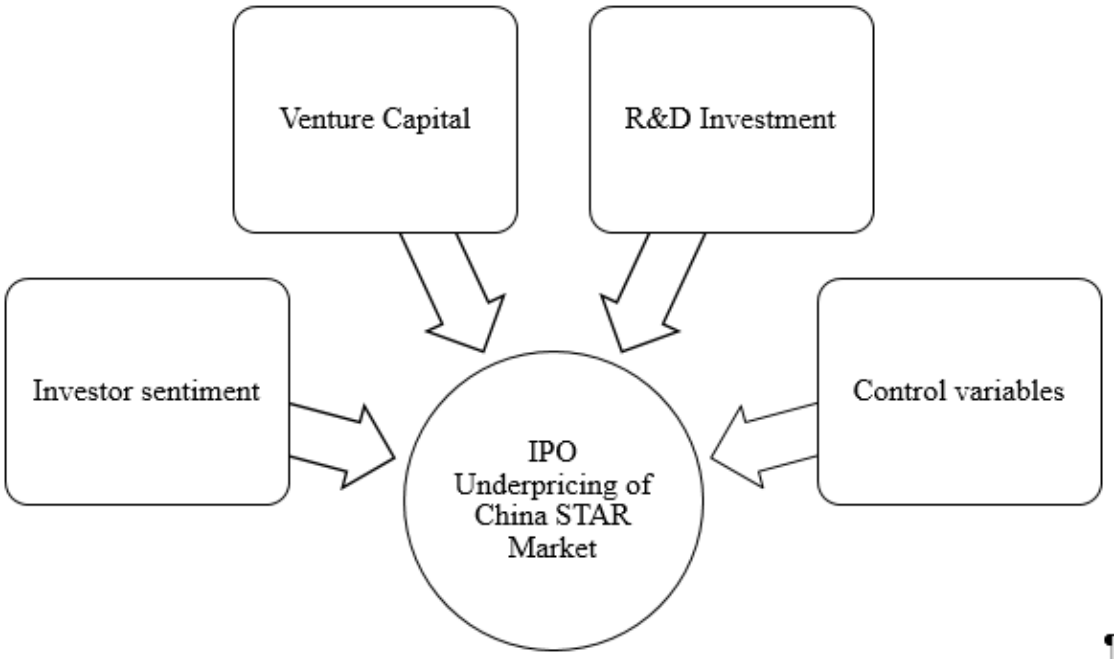
H2: Venture capital is positively related to the IPO underpricing level of the Chinese STAR market.

2.3 R&D Investment and IPO Underpricing

Rahman and Yang's (2021) research found that R&D was not related to IPO underpricing under the whole A-share market sample but was related with R&D-related technology companies' IPO underpricing under the GEM board sample. STAR Board allows companies that have not yet made a profit but are technologically leading in the industry to IPO in STAR Board. The STAR Board pays more attention to the IPO company's core technology and expected growth ability than other stock markets, such as the main board and small and medium-sized boards. Research on the influencing factors of IPO underpricing is mainly realized by analyzing the causes of the uncertainty of the intrinsic value of the enterprise. Among them, high cost, long cycle, and high risk of R&D investment have become essential factors that interfere with company valuation and IPO pricing (Eberhart, Maxwell, & Siddique, 2004). After the implementation of the registration system, STAR Board's information disclosure system became stricter. However, to prevent competitors from obtaining the company's critical technical information, the issuer's senior management will keep important R&D information strictly confidential, such as the latest process and direction of scientific research investment. From the above analysis, it is evident that R&D investment will raise the amount of confidential R&D information involved in listed companies, heightening the information asymmetry between issuers and investors, impeding investors' ability to accurately determine the intrinsic value of enterprises, and ultimately enhancing the degree of STAR Board IPO underpricing. Therefore, the following is hypothesized:

H3: The R&D investment ratio is positively related to the IPO underpricing level of the Chinese STAR market.

Figure 1 The Concept Framework of IPO Underpricing of China SSE STAR Market



3. METHODOLOGY

3.1 Data and Sampling

The focal point of this study resides within the Chinese STAR market sample. The empirical scope of this study encompasses all enterprises that successfully secured listings on the STAR market during the period spanning from June 2019 to December 2022, comprising a total of 500 entities. To ensure methodological rigor, the IPO underpricing sample was meticulously refined, excluding enterprises for which the requisite research data were unavailable, ultimately yielding a dataset encompassing data from 457 enterprises. This study harnesses secondary data from the CSMAR database, given its enhanced accessibility vis-à-vis primary data. Drawing from Creswell's (2014) work, it is established that scientific research can be approached through qualitative and quantitative methodologies. Given the numerical nature of this study and the utilization of statistical techniques for data analysis, the methodology employed aligns with quantitative analysis principles.

3.2 IPO Underpricing

The level of IPO underpricing is measured by the index of IPO underpricing rate. This method is from Ritter (1991), who first calculated the IPO underpricing rate or initial returns. The STAR market is different from other Chinese markets, as it has no daily price limit; it can use the first-day closing price to calculate the IPO underpricing rate. The calculation formula is as follows:

$$UP = \frac{P_{ij} - P_i}{P_i}$$

UP = IPO underpricing rate P_{ij}= First-day closing price $P_i =$ Offer price

3.3 Variable Definition

The variables discussed in this research are summarized in Table 1. This includes the 3 independent variables and 5 control variables.

3.3.1 Investor Sentiment Index

The investor sentiment index (ISI) from Wei, Xia, and Sun (2014) is a formula to describe China's stock market investor sentiment. This study will use ISI to explain investor sentiment's influence on IPO underpricing. This study uses the ISI index directly from the CSMAR database. The ISI calculation formula is as follows:

$$\text{ISI} = 0.64\text{NA} + 0.521\text{TURN} + 0.229\text{CCI} + 0.351\text{DCEF} + 0.227\text{NIPO} + 0.463\text{RIPO}$$

Where NA is a new account, TURN is the turnover rate, and CCI is the consumer confidence index. The China National Bureau of Statistics compiled the Consumer Confidence Index in December 1997. This database comprehensively reflects consumers' evaluation of the current economic situation and their subjective feelings about the economic outlook, income

level, income expectations, and the psychological state of consumption. DCEF is a closed-end fund discount.

3.3.2 Venture Capital

Rahman and Yang (2021) studied the effect of venture capital on IPO underpricing, measuring venture capital by the proportion of the investment amount of the risk institution to the owner's equity of the company. Risk institutions are recognized by comparing the top 10 shareholders in the CSMAR database with the list of "Chinese Venture Capital and Private Equity Investment Association". If the top 10 shareholders do not appear in the list above, but the company is named "venture capital" or "equity investment", it is also recognized as a venture capital institution (Rahman & Yang, 2021).

3.3.3 R&D Investment Ratio

According to Yanping and Linxin's (2021) study, the output of R & D input is uncertain, the cycle of R & D input to R & D output is long, and the impact of R & D activities on enterprise value is not immediately observed, thus the R & D situation of enterprises in the three years before listing was chosen for the study. This study selected the ratio of R&D investment to operating income in the financial statements of STAR market-listed companies three years before listing. The average value of the ratio data was then taken as an index to measure the R&D investment.

3.3.4 Company Age

The age of the enterprise represents the maturity and degree to which the enterprise is well-known. The longer the enterprise has been established, the more detailed the relevant information is, and the lower investor uncertainty regarding the value of its stock. The associated calculation formula is as follows:

$$\mathrm{LNA} = \mathrm{Ln}\ (1 + \text{the age of the company})$$

3.3.5 Company Size

The size of a company reflects its comprehensive strength and development prospects. Due to the scale effect, the larger the size of a company, the higher the utilization of resources and the lower the cost, which is more conducive to the company's long-term development. For investors, company size contains signals related to future profitability, and the larger the size of an IPO company, the more confidence investors have in it. The relevant calculation formula is as follows:

$$LNSIZE = Ln\ (Total\ company\ assets\ one\ year\ prior\ to\ IPO)$$

3.3.6 Return on Assets

As an index to measure the profitability of a company, the return on assets reflects the ability of a company to obtain income from total assets. The higher the return on assets, the more profits shareholders can get from the company, and the better the quality of the company. The relevant calculation formula is as follows:

ROA = Net Income / End of Period Assets

3.3.7 High Technology Industry

This study uses a high technology industry dummy variable as a proxy following Rahman and Yang's (2021) model. High technology industry (HITECH) equals 1 if an IPO company is a high technology based industry in the "Industry Classification for Listed Companies in China", such as pharmaceutical manufacturing, electrical machinery, and equipment manufacturing or aerospace industry; otherwise this variable equals 0. Due to the STAR market characteristics, the investment risk of high-tech enterprises is high, and the market easily overreacts regarding IPO pricing. Thus, choosing high-tech industry as a control variable is necessary.

3.3.8 Market Condition

This study uses the cumulative return of the SSE index (Shanghai Stock Exchange) in the first 30 days of IPO, referring to the recent literature from Qian, Ritter, and Shao (2022). The market environment of corporate IPO can reflect the market condition. When the stock market is in a hot market, the issuance of new shares is more likely to be recognized by investors, while when the stock market is in a cold market, the overall macro environment is poor, which is not conducive to the performance of the IPO market.

The variables discussed in this research are summarized in Table 1.

Table 1 Measurement of the Independent Variables and Control Variables

Variable types	Variable Name	Definition of variables	Abbreviations
Independent variables	Investor sentiment index	ISI includes closed-end fund discounts, average first-day returns, the number of IPOs, new accounts, turnover rate, and the consumer confidence index.	ISI
	Venture capital	The proportion of the investment amount of the risk institution to the owner's equity of the company.	VC
	R&D investment ratio	The average of the ratio of R&D investment and total operating revenue in the three years before listing.	RD
Control Variables	Company age	LNA = Ln (1+the age of the company). The age of the company = the number of days between the company's establishment and its listing/365	LNA
	Company size	Ln (Total company assets one year before IPO)	LNSIZE
	Return over Assets	Net Income / End of Period Assets	ROA

Table 2 (Continued)

Variable types	Variable Name	Definition of variables	Abbreviations
	High technology Industry	An IPO company is classified as a hi-tech industry equal to 1, otherwise it is 0.	HITECH
	Market Condition	The cumulative return of the SSE index in the first 30 days of IPO	MAR

3.4 Research Methodology

Prior studies from Guo, Li, Yu, and Wei (2021), Wang and Wang (2021), and Rathnayake, Louembe, Kassi, Sun, and Ning (2019), studying IPO underpricing of newly issued stocks have used an Ordinary Least-Squares (OLS) regression model in their estimation method. According to this literature, the Ordinary Least-Squares (OLS) regression statistical technique will be used for data analysis.

3.5 Model Construction

This study focuses on how IPO underpricing is affected by R&D ratio, venture capital, and investor sentiment, in the Chinese STAR market. Following previous literature (Qin & Xiao, 2023; Wang & Wang, 2021) other control variables were also added to the model to make the model more reasonable. The following multiple regression model was constructed:

$$UP = \beta_0 + \beta_1 ISI + \beta_2 VC + \beta_3 RD + \beta_4 \mathrm{LNA} + \beta_5 LNSIZE + \beta_6 ROA + \beta_7 HITECH + \beta_8 MAR + \varepsilon$$

Here β_0 is a constant, β_1 to β_8 are the coefficients of interest, and ε is an error term. Definitions of the variables are provided in Table 1.

4. EMPIRICAL FINDINGS

4.1 Descriptive Statistics

Table 2 presents the T-test results categorized by the dummy variable for high-tech industry, to compare the significance of the difference between the means of the two groups. The average IPO underpricing level of non-high technology companies (153.91%) is 15.31%, higher than that of high technology companies (138.59%). Due to technical innovation and disruption, high-technology enterprises are frequently associated with the possibility of rapid growth. Compared to non-high technology companies, investors may have lower underpricing and more conservative pricing due to their higher expectations for future growth and earnings from these companies. Nevertheless, there is no statistically significant difference between the two groups for any of the variables, negating the need for a separate analysis of the two groups.

Table 3 provides the descriptive statistics of the IPO underpricing model variables; it includes 9 variables and 457 observations. As shown in Table 3, the STAR market IPO listed an average underpricing level of 140.13%, while highest underpricing rate is 1273.98%. The underpricing level of the STAR market also has a lower IPO underpricing rate compared to the A-share market's 179% underpricing rate (Qian et al., 2022). The venture capital ratio average rate is 7.72% indicating that the venture capital participation IPO in the STAR market is not so high. The R&D ratio average is 31.80%, but the maximum is 9405% indicating that most of the STAR listed companies have a reasonable R&D ratio, while a few high-tech listed companies invested too much money in Research and Development. The ISI index average is 67.43, the higher ISI index proves the market is hot, and investors are eager to participate in the stock market. The logarithm company age average is 2.7 and the logarithm company size is 20.7, the listed companies in the STAR market are young and have a small size compared to other markets. The cumulative return of the SSE index average is 0.14%, while the market return shows a positive but low market return from 2019 to 2022.

Table 3 The T-test categorized by High-technology Industry

Variables	Non-hi-tech industry (N=46)		Hi-tech industry(N=411)		Difference between group	
	Mean	Std. Deviation	Mean	Std. Deviation	Mean Difference	T
UP	153.91%	155.72%	138.59%	148.49%	-15.31%	0.66
ISI	66.81	12.01	67.50	13.65	-0.69	-0.33
VC	7.87%	7.32%	7.70%	9.64%	0.18%	0.12
RD	5.87%	2.36%	34.71%	463.63%	-28.83%	-0.42
LNA	2.73	0.37	2.66	0.38	0.07	1.22
LNSIZE	20.70	0.84	20.67	0.98	0.04	0.24
ROA	0.10	0.06	0.13	0.13	-0.02	-1.18
MAR	0.04%	3.76%	0.15%	4.42%	-0.11	-0.16

Table 4 Descriptive Statistics

	N	Minimum	Maximum	Median	Mean	Std. Deviation
UP	457	-30.34%	1273.98%	102.43%	140.13%	149.13%
ISI	457	44.47	96.73	67.3600	67.43	13.49
VC	457	0%	71.73%	5.15%	7.72%	9.42%
RD	457	0.95%	9405.98%	8.22%	31.80%	439.71%
LNA	457	1.61	3.69	2.71	2.67	0.38
LNSIZE	457	18.64	25.47	20.5012	20.669	0.965
ROA	457	-1.74	0.686	0.11	0.13	0.13
HITECH	457	0	1	1	0.90	0.30
MAR	457	-7.65%	10.90%	-0.58%	0.14%	4.36%

4.2 Pearson Correlation Matrix

Table 4 presents the IPO underpricing, which was found to be negatively related to the R&D ratio (-0.02), company size (-0.03), ROA (-0.06), and hi-tech industry (-0.03). However, these values are all less than 0.1, indicating no linear correlation. These variables can be included in the same regression model. All the correlations between variables are less than 0.5, indicating that all variables can be included in the same regression model with IPO underpricing. All the variables have a VIF less than 10, so the collinearity of the model is not obvious (Yoo et al., 2014).

Table 5 Pearson Correlation Matrix

	UP	ISI	VC	RD	LNA	LNSIZE	ROA	HITECH	MAR
UP	1								
ISI	0.32**	1							
VC	0.09*	-0.01	1						
RD	-0.02	0.03	-0.03	1					
LNA	0.10*	0.14**	0.01	0.02	1				
LNSIZE	-0.03	-0.06	0.06	0.02	0.01	1			
ROA	-0.06	0.02	-.039	-0.18**	-0.01	-0.29**	1		
HITECH	-0.03	0.02	-0.01	0.02	-0.06	-0.01	0.06	1	
MAR	0.21**	0.29**	-0.06	0.02	0.02	0.04	-0.05	0.01	1
VIF		1.12	1.01	1.04	1.03	1.10	1.14	1.01	1.11

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

4.3 Regression Results

The results shown in table 5 indicate that the model can explain 12% of the variance in IPO underpricing. The F-value and P-value suggest rejecting the null hypothesis, confirming the validity of this model. Both the White test and Breusch-Pagan p-value of more than 5% indicate that heteroskedasticity does not exist in this model. From the results, the investor sentiment ($\beta = 3.00$) and venture capital ($\beta = 1.51$) are both significantly and positively related to IPO underpricing, whereas the R&D investment ratio (RD) is not significantly related to IPO underpricing ($\beta = -0.02$). Therefore, hypotheses 1 and 2 cannot be rejected, while hypothesis 3 is rejected.

The results indicate that irrational investor sentiment and behaviors cause the IPO price to rise in the STAR market. It also demonstrates the strong speculative atmosphere in China's IPO market, which triggers a herding effect driven by herd psychology. This leads to the abnormal phenomenon of stock prices deviating from their true value. A high venture capital investment ratio leads to a higher IPO underpricing rate. This indicates that venture capital firms select companies with high expected returns in the STAR market to achieve their goal of

abnormal return income. Venture capital influences the behavior of investors in new shares, creating a speculative market atmosphere and exacerbating the phenomenon of IPO underpricing. While the R&D is not significant with IPO underpricing, the reason maybe that investors are not concerned about the R&D ratio from the financial report. This result is also consistent with previous research by Rahman and Yang (2021), where the R&D disclosure level was found to be insufficient in the STAR market.

Table 6 Regression Results

Variables	B	Std. Error	T	Sig.
(Constant)	52.41	161.71	0.32	0.75
ISI	3.00	0.52	5.82	0.00***
VC	1.51	0.70	2.16	0.03**
RD	-0.02	0.02	-1.02	0.31
LNA	20.76	17.48	1.19	0.24
LNSIZE	-7.62	7.13	-1.07	0.29
ROA	-91.55	55.68	-1.64	0.10*
HITECH	-13.84	21.83	-0.63	0.53
MAR	4.63	1.58	2.93	0.00***
N	457			
Adjusted R-square	0.12			
F-value	8.80			
P value	0.00			
White-test p-value	0.78			
Breusch-Pagan p-value	0.28			

* P-value is significant at the 10% level.

** P-value is significant at the 5% level.

*** P-value is significant at the 1% level.

4.4 Robustness Test

Considering the influence of the market return rate on IPO underpricing, a robustness test was conducted to measure the IPO underpricing rate adjusted by the market return rate (Hoque & Mu, 2021), using the following formula:

$$Adj\_UP = \frac{P_{ij} - P_i}{P_i} - R_m$$

Adj_UP = Adjusted IPO underpricing rate P_{ij}= First-day closing price P_i = Offer price R_m = The first-day market return rate of new listed stock

The regression results are shown in Table 6, with the investor sentiment, and venture capital, which are also significant at a 5% level. The coefficients for investor sentiment (β=3.01) and venture capital (β=1.54) have slightly increased, and the adjusted R-square is 12%. This

result indicates that when changing the measurement method of IPO underpricing, investor sentiment and venture capital are still positively correlated with IPO underpricing in the Chinese STAR market. Overall, after changing the dependent variable, the robustness test results are consistent with the regression results mentioned above, confirming hypotheses 1 and 2 proposed in this study.

Table 7 Robustness Test using Adjusted IPO underpricing

	B	Std. Error	T	Sig.
(Constant)	51.93	161.34	0.32	0.75
ISI	3.01	0.51	5.86	0.00***
VC	1.54	0.70	2.21	0.03**
RD	-0.02	0.02	-1.04	0.30
LNA	20.67	17.44	1.19	0.24
LNSIZE	-7.63	7.12	-1.07	0.28
ROA	-92.40	55.55	-1.66	0.10*
HITECH	-13.68	21.78	-0.63	0.53
MAR	4.37	1.58	2.77	0.01***
N	457			
Adjusted R-square	0.12			
F-value	8.72			
P-value	0.00			

* P-value is significant at the 10% level.

** P-value is significant at the 5% level.

*** P-value is significant at the 1% level.

5. CONCLUSION

This study examined how R&D investment, venture capital, and investor sentiment influence IPO underpricing in the Chinese STAR market. It is clear from synthesizing earlier study findings that investor sentiment plays a significant role in the underpricing of IPOs. The empirical findings of the paper further support this conclusion. Therefore, it is essential to continuously improve investor education. Enhancing the learning and investment skills of individual investors and bolstering the pricing and professional expertise of institutional investors is crucial. There are some suggestions for various stakeholders. Investors who aim to mitigate the high IPO underpricing rate should manage irrational investments and acquire knowledge of more rational investment strategies. Most of the investors in China are individual investors, with a low-risk tolerance. However, they are typically optimistic when investing in stocks. The regulatory authorities should enhance investment promotion and guidance, alert investors to the risks of the STAR market, and urge investors to assess their investment decisions based on fundamental enterprise data. Chung, Kim, and Park (2017) also found that

investor sentiment is positively related to IPO underpricing in the Korean market, suggesting rational investment by investors.

Although the initial results of this research did not support all hypotheses, rejecting hypothesis 3 based on the data indicating that R&D expenditure is not significantly associated with IPO underpricing of the Chinese STAR market. In contrast to Yanping and Linxin (2021) and Guo et al. (2021), whose research focused on other Chinese stock markets and had longer time periods than this one, the outcomes of this study are different. In comparison to other markets, the listed businesses in the STAR market are nonprofit, smaller, and belong to concentrated industries. As a result, the R&D findings of this study differ from those of other studies.

This research is especially focused on venture capital and is important for institutional investors in the STAR market. Consequently, venture capital must develop a long-term value investment plan and strengthen the function of certification and monitoring. The global market should also be covered in the professional investor training curriculum. Investors in venture finance should up their ethical game and submit to ongoing oversight by outside observers. It is recommended that policymakers improve the evaluation criteria used by Chinese venture capital firms, limit speculative short-term investments in venture capital, and strengthen the disclosure rules for listed companies in the Chinese STAR market.

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