Venture Capital and First-Month IPO Underpricing Rate: An Empirical Study Based on the Up and Down Limits of China GEM

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ABSTRACT. Under the limit of upward and downward movement, the closing price of IPO on the first day often fails to reflect the real price of IPO companies, while VC can have an impact on the pricing of IPO companies by alleviating the asymmetry of market information; this paper, in the background of China's Growth Enterprise Market (GEM) upward and downward movement limit, conducts empirical research on venture capital and the first-month IPO underpricing rate, and uses the PSM to carry out a robustness test on the regression results, and the research shows that: 1) there is a significant negative correlation between the existence of VC in the GEM IPO firms and the first-month IPO underpricing rate; 2) venture capital syndication insignificantly increases the first-month IPO underpricing rate, and there exists a degree of grandstanding motivation to help companies go public more easily by reducing the IPO offering price, or from a market perspective, investors are more favourable to IPO companies where syndication exists, leading to a higher first-month IPO underpricing rate.

Keywords: venture capital, IPO underpricing, syndication, information asymmetry

1 Introduction

VCs often invest in small and medium-sized enterprises(SMEs) in the start-up or growth stage, providing them with advisory and management services while solving their financing difficulties, so the essence of venture capital institutions is intermediary institutions, and in this process, venture capital institutions rely on the equity appreciation of investee companies and exit to obtain income, which is a kind of endogenous growth, in which the exit method includes mergers and acquisitions and listing, and the GEM facilitates the listing of investee companies. The IPO underpricing rate is a measure of the pricing efficiency of IPO companies, and a high IPO underpricing rate reflects the information asymmetry between equity issuers and capital market investors, which is prone to speculative behaviour and is not in favour of the healthy development of the market. The syndication of venture capital refers to multiple venture capital

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institutions investing in one enterprise together, which can enhance information communication and alleviate information asymmetry to a certain extent compared to independent venture capital.

China GEM has also made many attempts to guard against irrational market behaviour. From 1 January 2014, a 44% up limit and a 36% down limit were set for the first day of IPO. In order to avoid unstable market sentiment in the early stages of the policy and the impact of the COVID-19 epidemic from 2020 onwards, this paper selects China GEM IPO data from 2015 to 2019 for empirical study.

A number of Chinese scholars have conducted empirical studies on the syndication of venture capital and IPO underpricing rate (e.g. Cao et al. (2023), Liu (2021), Li&Xu (2016) [1-3]), who define IPO underpricing rate as the return on the first day of IPO listing, unlike most of the authors, this paper considers the impact of China GEM up/down limit on the reasonable IPO pricing, refer to Lowry (2010) [4], define the IPO underpricing rate as the return on the 21 trading days after IPO listing, and conduct an empirical study by screening IPO companies with venture capital through CSMAR and PEDATA database, combined with IPO prospectus.

2 Literature review and research hypothesis

There are two perspectives on how venture capital affects the IPO underpricing rate. Barry et al. (1990) and Megginson&Weiss (1991) point out that VC can have a certification [5] and monitoring role [6] for investee companies, and in dealing with market information asymmetries, can be more effective in identifying more promising investment targets and supervising investee companies in order to achieve reasonable IPO pricing and thus reduce IPO underpricing. Amit et al. (1990) and Compers (1996), on the other hand, argue that VCs need to raise new capital based on their own reputation, and that IPO listings by investee companies can enhance the reputation of VCs, so VCs will help their investee companies to reduce their difficulty in listing at a lower offering price (grandstanding motivation), thus increasing the IPO underpricing rate [7,8].

Regarding the syndication of venture capital and IPO underpricing rate, Cao et al. (2023) and Liu (2021) found that the syndication can significantly reduce IPO underpricing rate compared to single venture capital [1,2]; Guo et al. (2021) studied IPO data of China GEM from 2009 to 2018 and found that the syndication of venture capital as a mediator variable enhances the positive effect of corporate R&D investment on IPO underpricing rate and does not play its role in reducing market information asymmetry [9].

However, at present, most researchers define IPO underpricing rate to be the return on the first day of IPO listing, however, since 2014, China GEM has reformed and set a limit on the first day of IPO listing, according to the data derived from CSMAR database, almost all GEM IPOs have reached a 44% increase from 2015 to 2019; because the change of IPO first-day return caused by the unsustainability of the policy makes the IPO not reasonably priced on the first day and does not reflect the fair price of the IPO. Based on Lowry (2010), who used data from 21 trading days after the IPO in the United States to study stock volatility [4], this paper fully considers both artificial and policy factors when calculating the rate of IPO underpricing, and the IPO underpricing rate is defined as the return on the 21st trading day after the IPO of GEM from 2015 to 2019.

In summary, this paper proposes two hypotheses:

H1a: GEM IPO firms with VC have higher the first-month IPO underpricing rate.

H1b: GEM IPO firms with VC have lower the first-month IPO underpricing rate.

H2a: Venture capital syndication can increase the first-month IPO underpricing rate compared to a single VC.

H2b: Venture capital syndication can reduce the first-month IPO underpricing rate compared to a single VC.

3 Research Development

3.1 Data sources and processing

This paper selects the IPO data of China GEM from 2015 to 2019, the data is obtained from CSMAR database, PEDATA database, and IPO prospectus, for the data processing process mainly includes: firstly, the data of 386 IPO stocks listed in GEM from January 1, 2015, to December 31, 2019, is exported from CSMAR database, which including the IPO issue price, the top 10 shareholders in the IPO prospectus, and the existence of VC among the top 10 shareholders, etc. Secondly, the syndication of VC is defined as the existence of two or more VCs among the top 10 shareholders in the IPO prospectus; the processing process is as follows: 1. Using keywords, search for the top 10 shareholders with names containing " investment", "venture", "equity" and other keywords; 2. use the database of PEDATA to manually compare the information of the institutions, if the investment institution, although the name of the institution contains keywords, the shareholders of the institution exist the legal person or actual controller of the IPO company, it is judged that it is not a venture capital institution independent of the IPO company, or if the VC institution has already exited through equity transfer and other ways before the IPO of the company, it is not considered that it will have an impact on the pricing of the IPO of the company, and these two cases are not included in the evaluation of VCs; 3. If the top 10 shareholders include two or more professional VCs, it is judged that the IPO company has venture capital syndication.

For the data of the 21st trading day after IPO listing, this paper uses AKShare database to derive the trading day of the Chinese stock market, and Python is used to do data processing to get the 21st trading date after IPO listing, and then CSMAR database is used to match to get the corresponding closing price data.

3.2 Variable selection

3.2.1. Dependent Variable.

Referring to the study of Lowry (2010) [4], IPO underpricing is measured using the IPO issue price and the closing price of the 21st trading day after the IPO listing, in addition, considering the time span and the existence of the problem of compounding stock returns, the natural logarithm of first-month IPO underpricing rate (FM_Return) is taken:

$$FM\_\text{Return} = \ln\left(\frac{Closing\ price\ on\ the\ 21st\ trading\ day\ after\ IPO\ listing}{IPO\ issue\ price}\right) \quad (1)$$

3.2.2. Independent Variables.

The independent variables in this paper are Venture Capital (VC) and Venture Capital Syndication (Syn), both defined as dummy variables, for Venture Capital (VC): it takes the value of 1 if there are professional VC institutions independent of IPO firms among the top ten shareholders in the prospectus, and 0 if they do not exist, and for Venture Capital Syndication (Syn): it takes the value of 1 if there are two or more professional VC institutions independent of IPO firms among the top ten shareholders in the prospectus, and 0 if they do not exist.

3.2.3. Control Variables.

To control the influence of other factors on the regression results, referring to Cao et al. (2023), Liu (2021), and Li&Xu (2016) [1-3], this paper selects Firm Size (Size), Firm Age (Age), Asset-liability Ratio (Lev), Issuance Cost per Share (CS), Firm Type (Gov).

The details are shown in Table 1:

Table 1. Variables

Variables			Definition
Dependent Variables	First-Month IPO Underpricing Rate	FM_Return	Specific calculations refer to Equation (1)
Independent Variables	Venture Capital	VC	Dummy variable, 1 if venture capital exists, 0 if it doesn't
	Venture Capital Syndication	Syn	Dummy variable, for IPO firms with venture capital, 1 if venture capital Syndication exists, 0 if it doesn't
Control Variables	Firm Size	Size	Number of staff at the time of IPO
	Firm Age	Age	Number of years from the establishment of the company to the IPO of the company
	Asset-liability Ratio	Lev	Total liabilities/total assets of the company in the year before the IPO
	Offering Cost per Share	CS	Total cost of corporate IPO offering/number of shares issued
	Firm Type	Gov	Dummy variable, 1 if the IPO firm is state-owned, 0 otherwise

3.3 Model

In order to investigate whether venture capital will have an impact on the first-month IPO underpricing rate, to test hypotheses H1a & H1b, the model is shown as follows:

$$FM\_\text{Return} = \beta_0 + \beta_1 VC + \beta_2 Control_i + \varepsilon \quad (2)$$

Regressing Equation (2), if $\beta 1$ turns out to be significantly positive, it indicates that there is a significant positive correlation between VC investment and the first-month IPO underpricing rate, and vice versa.

In order to investigate whether venture capital syndication will have an impact on the first-month IPO underpricing rate for IPO firms where venture capital already exists, to test hypotheses H2a & H2b, the model is shown as follows:

$$FM\_\text{Return} = \beta_0 + \beta_1 Syn + \beta_2 Control_i + \varepsilon \quad (3)$$

Regressing Equation (3), if β_1 turns out to be significantly positive, it indicates that there is a significant positive correlation between venture capital syndication and the first-month IPO underpricing rate, and vice versa.

4 Result

4.1 Descriptive Statistical Analysis

Table 2 shows the analysis results of descriptive statistics for the main variables. The mean value of the first-month IPO underpricing rate (FM_Return) is 140.99%, the minimum value is 9.86%, and the maximum value is 227.34%; the mean value of the dummy variable 'Venture Capital' (VC) is 0.81, which indicates that 81% of GEM listed companies had venture capital during the study period; the dummy variable 'Venture Capital Syndication' (Syn) is 0.71, which indicates that among the IPO companies with venture capital, 71% of them had venture capital syndication. Firm size is measured by the number of staff in the enterprise, with the minimum value of 95 and the maximum value of 82,396, which shows that there is a big difference in the number of staff in the IPO firms; the mean value of offering cost per share (CS) is 1.88, indicating that the financing cost of IPO is high; the mean value of the dummy variable 'Firm Type' (Gov) is 0.05, indicating that most of the IPO firms are not state-owned.

Table 2. Variable descriptive statistics

Variables	N	Min	Max	Mean	Std.
FM_Return	386	9.86%	227.34%	140.99%	51.80
VC	386	0	1	0.81	0.40
Syn	311	0	1	0.71	0.50
Size	386	95	82395	1233.63	4432.93
Age	386	4	32	13.54	4.84
Lev	386	5.67	85.41	35.79	15.22
CS	386	0.47	8.82	1.88	0.95
Gov	386	0	1	0.05	0.22

4.2 Regression Analysis

The regression results of the first-month IPO underpricing rate and the existence of venture capital and venture capital syndication are shown in Table 3, the regression results show that in equation(2), the regression coefficient of the venture capital (VC) is -0.084, and it is significant at the 10% level, which implies that there is a negative correlation between the existence of VC and the first-month IPO underpricing rate, i.e., if there is a VC in GEM IPO firms, then the first-month IPO underpricing rate is significantly lower, proving that VC has certification and monitoring effect on IPO companies, which can make the pricing of IPOs more reasonable, verifying the hypothesis H1b of this paper.

In Equation (3), the regression coefficient of venture capital syndication is 0.068; though it is not significant, to a certain extent, it shows that venture capital syndication does not reduce the rate of first-month IPO underpricing, and verifies the hypothesis H2a which shows that the increase of IPO venture capital institutions does not make their certification and monitoring role more apparent. On the contrary, there is a certain degree of grandstanding motivation, which will help companies to go listed more easily by reducing the IPO offering price, or from the market perspective, investors are more favourable to IPO companies with syndication, resulting in a higher first-month IPO underpricing rate.

Table 3. Regression results

Variables	Equation (2) FM_Return	Equation (3) FM_Return
VC	-0.084*(-1.707)	
Syn		0.068(1.261)
Size	-0.091*(-1.845)	-0.189***(-3.432)
Age	-0.174***(-3.554)	-0.157***(-2.856)
Lev	-0.082*(-1.677)	-0.035(-0.636)
CS	-0.298***(-6.013)	-0.254***(-4.591)
Gov	0.065(1.351)	0.045(0.830)
Adj_R2	0.105	0.102

Note: The value of t is in brackets; *, **, *** indicate significance at the 10%, 5% and 1% level, respectively.

4.3 Robustness Test

Considering that there is an endogeneity problem between VC and IPO firms, i.e., VC will invest according to enterprise growth, and quality companies with growth receive extensive attention from the market, and the information asymmetry of the market is low, and thus the IPO underpricing rate is relatively low, this paper refers to the methodology of Xu&Zhao (2022) [10], and Propensity Score Matching (PSM) is used to test the endogeneity problem. By using the dummy variable venture capital (VC) as the dependent variable and the control variables in this paper as the independent variables, the matched samples are obtained by using PSM radius matching and passed the balance test; then the matched samples are regressed, and the result is that the coefficient of VC is -0.131, and it is significant at the 10% level, which is in accordance with the previous regression results, so the results are robust.

5 Conclusion

In this paper, in the context of China's Growth Enterprise Market (GEM) upward and downward limitations, China's GEM IPO data were selected from 2015 to 2019, and an empirical study was conducted on venture capital investment and first-month IPO underpricing rate, which showed that: 1) there is a significant negative correlation between the existence of VC in the GEM IPO firms and the first-month IPO underpricing rate, i.e., the venture capital institution plays a role in certification and monitoring for IPO firms, and 2) venture capital syndication insignificantly increases the first-month IPO underpricing rate, and there exists a degree of grandstanding motivation to help companies go public more easily by reducing the IPO offering price, or from a market perspective, investors are more favourable to IPO companies where syndication exists, leading to a higher first-month IPO underpricing rate.

REFERENCES

1. Cao, Q., Tao, J., Yang, T. (2023). Venture Capital Syndication, Market Atmosphere and IPO Underpricing: Empirical Evidence from the Growth Enterprise Market. Financial Science, 419(02):15-27.
2. Liu, W. (2021). Does Venture Capital Syndication Reduce IPO Underpricing Rate More Than Individual Venture Capital? Empirical Evidence from Chinese GEM Listed Companies 2009-2019. Western Forum, 31(5):112-124.
3. Li, J., & Xu, C. (2016). The Impact of Venture Capital Characteristics on IPO Underpricing of Investee Firms. Business Research, (8):73-82.
4. Lowry, M., Officer, M. S., & Schwert, G.W. (2010). The variability of IPO initial returns. The Journal of Finance, 65(2):425-465.
5. Barry, C. B., Muscarella, C. J., Peavy Iii, J. W., & Vetsuypens, M. R. (1990). The role of venture capital in the creation of public companies: Evidence from the going-public process. Journal of Financial Economics, 27(2):447-471.
6. Megginson, W.L., Weiss, K.A. (1991). Venture capitalist certification in initial public offerings. The Journal of Finance, 46(3):879-903.
7. Amit, R., Glosten, L., Muller, E. (1990). Entrepreneurial ability, venture investments, and risk sharing. Management Science, 36(10):1233-1246.
8. Gompers, P. A. (1996). Grandstanding in the venture capital industry. Journal of Financial Economics, 42(1):133-156.
9. Guo, X., Li, K., Yu, S., & Wei, B. (2021). Enterprises' R&D investment, venture capital syndication and IPO underpricing. Sustainability, 13(13):7290.
10. Xu, H., Zhao, T. (2022). The Impact of Venture Capital Involvement Timing on IPO Underpricing of GEM Enterprises: "Spring Breeze and Rain" or "Pulling Up Seedlings to Grow"? Accounting and Economic Research, 36(02): 72-93.