Effect of Venture Capital on the Pass Rate of IPO Review

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ABSTRACT

The effect of venture capital on the pass rate of IPO review is studied in this paper. First, we select the venture capital and financial data from 710 firms to be listed on the SME board and GEM from 2014 to 2018. Then, we use Logistic regression models for empirical analysis. We find that: (1) The average level of introduced venture capital of firms on GEM is higher than that of firms on SME board; (2) The introduction of venture capital can improve the pass rate of IPO review. Overall, Chinese venture capital has been fully utilized its pre-selection function. However, the supervision effect is not significant; (3) Venture capital raises the pass rate of IPO review of GEM firms mainly because of its pre-selection of invested firms. And the improvement of the pass rate of IPO review of SME board firms mainly lies in the supervision and help of invested firms.

Keywords: Venture capital, the pass rate of IPO review, SME board, GEM

1. INTRODUCTION

With the rapid development of China's Small and Medium Enterprise (SME) Board and Growth Enterprise Market (GEM), venture capital has become an increasingly crucial force in capital market. China currently implements an approval system on the GEM and SME board, and GEM has begun to experience the institutional change from approval system to registration system. The approval system is a standardized market principle in which the lead underwriter recommends enterprises based on market needs, China Securities Regulatory Commission(CSRC) conducts preliminary compliance checks, and the issue review committee independently reviews and votes. According to the opinions of the issuance review committee, CSRC shall decide whether to approve or disapprove the issuance application of the issuer. If approve, CSRC issue the approval of the public offering of documents, that is, IPO review. The introduction of venture capital can standardize the management, guide the benign development, and foster the rapid growth of firms. After a few years, venture capital will withdraw their investments through IPO, mergers or other equity transfers to obtain high returns.

The research on the influence of venture capital on IPO mainly forms a series of hypotheses such as supervision hypothesis, screening hypothesis, and grandstanding hypothesis. The supervision hypothesis considers Venture Capital as an "outside supervisor". Bloom[1]finds that the higher performance of invested enterprises is mainly due to the post-monitoring effect of venture capital. Campbell

[2] and Suchard[3] show that venture capital will actively participate in the governance and operation of the invested enterprises, and the supervision function of venture capital will be recognized by intermediaries and external investors. The screening hypothesis believes that venture capital can select high-quality and promising companies for investment. Brav[4] shows that enterprises with venture capital support have significantly better IPO performance than that of companies with no venture capital support. The grandstanding hypothesis means that venture capital is eager to establish its reputation through investment performance, which includes successful listing, successful exit, and sufficient returns to fund providers.

The factors that affect the pass rate of IPO review can be divided into external and internal factors. In terms of the research on the external factors, Shen et al. [5] find that venture capital does not help improve the pass rate of IPO review at all. Dai [6] finds that the lead underwriters with high reputation can improve the pass rate of IPO review to a greater extent. Zeng [7] finds that venture capital investment increased the probability of success in IPO review. Lin et al. [8] find that the higher the reputation of the underwriters hired, the easier it is to pass the IPO review while the auditor's reputation has no significant effect on the pass rate. Salma Ben Amor and Maher Kooli [9] propose that reputable venture capital makes the possibility of IPO exit significantly higher than the possibility of exit through merger.

In terms of the research on the internal factors affecting the pass rate of IPO review. Hu [10] finds that the low-risk prospective issuers with large asset size, low asset-liability ratio and high industry ranking are more "favoured" by the securities issuance review committee.

The contribution of every author to this article is equal

There are many factors affecting the IPO review. Therefore, it is of great significance to study the effect of venture capital on the pass rate of IPO review.

2. RESEARCH DESIGN

In this section, we make four assumptions based on some famous hypotheses. Then, we define relevant variables to quantify them. At the end, we establish a binary logistic regression model to study the effect of venture capital on the pass rate of IPO review on SME board and GEM.

2.1. Hypothesis

Chemmanur et al. [11] find that the overall efficiency of firms introduced venture capital in the United States is higher than that of firms without introducing venture capital, and the efficiency advantages of the former come from the screening effect. So we make assumption H1.

H1: Firms that bring in venture capital have a higher pass rate of IPO Review

Barry et al. [12] show that the higher the shareholding ratio of Venture Capital, the stronger the supervision effect on the invested enterprises. As the number of introduced venture capital increases, the proportion of venture capital holdings always increases. So we make assumption H2 and H3.

H2: The number of venture capital institutions at the time of IPO has a positive effect on the pass rate of IPO review.

H3: The proportion of venture capital holdings at the time of IPO has a positive effect on the pass rate of IPO review.

Yang et al. [13] find that before IPO, firms with better financial performance are less willing to attract venture capital, especially experienced venture capital. Based on this, we make the following assumption:

H4: The level at the introduction of venture capital of firms on GEM are higher than those of firms on SME board.

2.2. Sample Selection

We originally use the data of 731 firms submitted to SME board and GEM for review in 2014-2018. After screening, 710 firms are selected as sample data after removing the firms that lack data due to incomplete information disclosure. Venture capital institutions are defined as followed: The non-first largest shareholder whose business scope is venture capital investment, equity investment, investment management and shareholding ratio is less than 30%. The number of introduced venture capital and the proportion of venture capital shareholdings of listed firms are derived from the firm's IPO announcement, and the total assets, weighted return on net assets, total asset turnover, and asset-liability ratio are from Resset Economic and Financial Research Database. The number of introduced venture capital, the proportion of venture capital shareholdings, total assets, weighted return on equity, total asset turnover and asset-liability ratio of unlisted firms come from the prospectus. The underwriter's reputation of all firms comes from the Wind Financial Data and Analysis Tool Service Provider, and the ranking of accounting firms comes from the official website of the Chinese Institute of Certified Public Accountants.

2.3. Variable Setting and Measurement

Whether the firm successfully passes the IPO review (APPROVE)is defined as the explained variable. APPROVE takes value 1 if the firm passes the IPO review, otherwise it takes value 0.

The following variables are defined as explanatory variables. Whether the firm is backed by venture capital is defined as VC_Backed. VC_Backed takes value 1 if the firm is supported by venture capital, otherwise it takes value 0. The number of venture capital institutions introduced before IPO is defined as VC_Num. In the process of empirical analysis, in order to slow down the volatility trend of data, we take the number of venture capital institutions before IPO (VC_Num) as natural logarithm: $\ln(VC-Num+1)$. The total shareholding ratio of the venture capital institutions before the IPO is defined as VC_Ratio.

The following variables are defined as control variables. The total assets one year before IPO(TotAss) reflects the size of firms. The weighted return on equity of the year before IPO(WROE)can help investors make judgments about the firm's future profitability. The total asset turnover rate for the year before IPO(Totassrat) indicates comprehensive evaluation of the operating quality and utilization efficiency of all assets of the firm. The debt to asset ratio of the year before IPO(Dbastrt) measures a firm's ability to use creditor's funds for business activities. The goodwill of the lead underwriter one year before IPO(REP) refers to the market share of the lead underwriter of each firm listed or planned to list. Based on the ranking of the accounting firms that were listed or planned to be held in the year, the reputation of accounting firms(AccFir) is quantified.

2.4. Model Settings

We use Logistic regression model to study the effect of venture capital backed, number of venture capital institutions and total shareholding ratio of venture capital institutions on the pass rate of IPO review on SME board and GEM. We use $APPROVE=1$ to represent successful IPO, while use $APPROVE=0$ to represent unsuccessful IPO. Based on this, we construct the following regression model:

$$\ln\left\{\frac{P(APPROVE)}{1-P(APPROVE)}\right\} = \beta_0 + \beta_1 VC\_Backed$$
$$+ \beta_2 \ln(VC\_Num+1) + \beta_3 VC\_Ratio + \beta_4 TotAss + \beta_5 WROE \quad (1)$$
$$+ \beta_6 Totassrat + \beta_7 Dbastrt + \beta_8 REP + \beta_9 AccFir + \varepsilon$$

3. EMPIRICAL ANALYSIS

3.1. Descriptive Statistical Analysis

In this section, we describe the data characteristics of variables statistically, as is shown in Table 1. Panel A is the characteristics of venture capital of the full sample. Panel B is for GEM and panel C is for SME board.

From Table 1, in the full sample, we can see that the average value of venture capital backed is 0.8493, indicating that venture capital is introduced to most of firms. The average value of proportion of shares held by venture capital institutions before IPO is 15.7271%, showing that venture capital generally occupies a relatively small proportion of the shares of firms. The proportion is much lower than that of firms in the United States and Europe. We conclude that it may because the United States and Europe have more developed capital markets and their venture capitals started much earlier than China. The mean value of VC_Backed, ln(VC_Num+1) and VC_Ratio of GEM are 0.8695,1.2105 and 16.8910%, which are all higher than those of SME board. Hypothesis 4 has been verified and it is in line with the reality that high-growth emerging firms on GEM need more venture capital exploration and cultivation.

3.2. Regression Analysis

We use Logistic regression model(1)to run regression analysis on the full sample. VC_Backed, $\ln(VC\_Num+1)$ and VC_Ratio are substituted in order in the model to verify hypothesis 1 to hypothesis 3. The results of regression analysis are shown in Table 2.

Several conclusions are given according to the results of Table 2:

(1) The regression coefficient of venture capital backed indicates that the venture capital backed will increase the pass rate of proposed IPO firms. The regression coefficient of ln(VC_Num+1) means that more numbers of venture capital introduced to firms will increase the pass rate of the proposed IPO firms. Regression coefficient of shares held by venture capital institutions is 0.4970 but is not significant. It at least shows that the increase in the proportion of venture capital holdings will not have a negative effect on the pass rate of proposed IPO firms. Our result is consistent with Brav[4] , Zeng [7], Chemmanur et al. [11] ,but is opposite to Shen et al[5]. We mainly explain the above regression results from the role of venture capital in the process of cultivating entrepreneurial firms.

Table 1 Descriptive Statistics

	Mean	Median	Max	Min	Std. Dev.
A:Full Sample					
VC_Backed	0.84	1	1	0	0.358
Ln(VC_Num+	1.16	1.099	3.664	0	0.710
VC_Ratio	0.15	0.125	0.757	0	0.143
B:GEM					
VC_Backed	0.86	1	1	0	0.337
ln(VC_Num+1	1.21	1.386	3.664	0	0.706
VC_Ratio	0.16	0.134	0.757	0	0.150
C:SME board					
VC_Backed	0.80	1	1	0	0.394
ln(VC_Num+1	1.06	1.099	2.708	0	0.709
VC_Ratio	0.13	0.1	0.620	0	0.123

Table 2 Regression Results of Model

	(1)	(2)	(3)
Constant	0.068 (0.506)	0.321 (0.488)	0.656 (0.461)
VC_Backed	0.763*** (0.261)		
ln(VC_Num+1)		0.328** (0.156)	
VC_Ratio			0.497 (0.777)
TotAss	0.055* (0.026)	0.048** (0.024)	0.0510** (0.0243)
WROE	0.953 (1.231)	1.018 (1.233)	0.742 (1.223)
Totassrat	1.003***(0.339)	1.005** (0.339)	0.981*** (0.339)
Dbastrt	-0.936 (0.730)	-0.802 (0.720)	-0.771 (0.722)
REP	0.030 (0.032)	0.031 (0.032)	0.032 (0.032)
AccFir	-0.404* (0.226)	-0.425* (0.226)	-0.430* (0.225)
Pseudo R²	0.059	0.053	0.047

***p<0.01, **p<0.05, *p<0.1(With standard deviation in parentheses)

According to screening hypothesis and supervision hypothesis, venture capital helps to discover and cultivate excellent entrepreneurial firms. The significant positive coefficient of venture capital backed shows that venture capital in China has achieved prior selection of qualified firms. The higher the number of venture capital institutions and shareholding held by venture capital institutions are, the greater the supervision effect of venture capital should be. But the former is less significant, and the latter is not significant to the pass rate of IPO review. It is probably

because most venture capital in China has not effectively exerted its supervisory effect on venture business, which can be explained by the own national conditions in China.

First, firms in China are faced with underdeveloped direct financing channel, which makes their external financing costs high. Second, the issuance review committee conducts a strict IPO review system for capital markets including GEM and SME board. So inferior firms tend to attract venture capital with special resources, and then this kind of venture capital has no intention of assuming the functions of supervision and assistance to the firms after IPO. This kind of behaviour can induce adverse selection problems.

(2) For the control variables, the conclusion is consistent with previous research. Total assets and the total asset turnover rate are significantly positively correlated with the pass rate of IPO review. The coefficient of debt to asset ratio is negative and WROE is positively correlated with the pass rate of IPO. The small and insignificantly positive coefficient of REP means that the underwriter's reputation is not an important factor of whether the firm can pass the IPO review.

3.3. Robustness Tests

In order to further verify the accuracy of the above conclusions, this section divides the full sample into two sub-samples of SME board and GEM, and uses Logistic regression model (1) to run regression analysis on the two sub-samples. Table 3 shows the regression results of explanatory variables.

The results in Table 3 show that in the two sub-samples of SME board and GEM, venture capital backed, numbers of venture capital institutions and shares held by venture capital institutions have a positive correlation with the pass rate of IPO review, which is consistent with the results of the full sample. venture capital backed of GEM is more significant than the that of SME board. This may because the GEM IPO threshold is lower, and the GEM listed firms are mainly high-tech and new-type firms. This kind of firms value their future growth, so it is conducive for venture capital to play the role of pre-screening, and the screening effect is more obvious. Number of venture

capital institutions of SME board is more significant than that of GEM, which may due to the generally higher quality of the firms that will be reviewed on the submission of the SME board. These firms have generally entered a mature period and their business conditions are stable. The main function of venture capital invested in these firms is to supervise the operation and management of the firm rather than screening, so the supervision effect is more significant.

4. CONCLUSIONS

The effect of venture capital described by explanatory variables on the pass rate of IPO review is investigated in this paper by using a sample of 710 IPO issued between 2014 and 2018 in China. The results of regression analysis show that:

(1)The average level of venture capital introduced by GEM firms is higher than that of SME board firms .

(2)The introduction of venture capital will improve the pass rate of IPO review, and venture capital has fully played its pre-selection function, but the supervision effect is not significant enough. The screening hypothesis is well verified

(3)The effect of venture capital on the pass rate of IPO review of GEM firms is mainly reflected in the pre-selection function, while the effect on SME board firms is mainly reflected in the supervision and assistance function. The former supports screening hypothesis and the latter supports supervision hypothesis.

There are still some deficiencies in data selection and research methods. The three explanatory variables set in this paper just characterize the shareholding of venture capital. In further study, it is necessary to expand the explanatory variables, such as the reputation of venture capital itself, the duration of its existence, whether it is a foreign venture capital, etc. to comprehensively study the effect of the introduction of venture capital on the pass rate of IPO review. In addition, the effect of earnings management due to the introduction of venture capital on the pass rate of IPO review can be further explored.

Table 3 Regression Results of Robustness Tests (Explanatory Variables)

	GEM			SME board		
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	0.576 (0.572)	0.885 (0.541)	1.189** (0.511)	-4.429*** (1.621)	-5.388*** (1.834)	-4.583*** (1.666)
VC_Back	0.725** (0.316)			1.006 (0.794)		
ln(VC_Num+1)		0.271 (0.180)			1.087** (0.548)	
VC_Ratio			0.089 (0.843)			4.849 (3.005)
Pseudo R^2	0.039	0.033	0.028	0.571	0.588	0.579

*** $p<0.01$, ** $p<0.05$, * $p<0.1$(With standard deviation in parentheses)

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