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An Empirical Research on IPO Exit Performance of ChiNext

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Abstract

By virtue of correlation analysis and regression analysis, this paper empirically studies influencing factors of venture capital exit return based on IPO through Shenzhen ChiNext Market over the 2015 to 2016 period, and combines the empirical findings with the development status of venture capital industry in China to present some suggestions and countermeasures. The research results show: The rate of return is significantly positively correlated with operation period, investment industry and issuance price, and significantly negatively correlated with investment cycle. In addition, there is no significant correlation between rate of return and remaining variables (average price-earnings ratio of ChiNext, stock cycle, amount of management capital, investment scale and location of venture capital institutions). Based on the fresh data of the ChiNext, this paper presents the investment environment of small and medium-sized enterprises in China, which can provide good references and advices for the development and investment of the venture capital institutions. However, there may be some deviation in the conclusion of this paper due to certain subjectivity in the sample selection.

Keywords

Venture Capital, IPO, ChiNext, Exit Performance

1. Introduction

As a special kind of investment tools, venture capital can promote the progress of science and innovation in technology, which would accelerate the transformation from scientific achievements into effective productivity, improving the international competitiveness and comprehensive national strength. On the other hand, it involves high risks inevitably. Fan, Shen & Chen (2001) has found out that 10% to 30% of venture capital would end up with a complete failure, 60%

are not able to get expected returns, and only 5% to 20% would succeed. The success of VCs depends mainly on whether the investment exit can go well (Lu & Li, 2008). Although China's venture capital industry is developing rapidly, its exit mechanism is not sound yet.

According to the data (Cheng, 2014), equity transfer is still the main exit channel of venture capital in China. Its proportion reached 80.52% in 2013, creating a new record. As for IPO exit, its proportion has fluctuated around 30% and dropped for the influence of complex economic situations in recent years (15.58% in 2013). In comparison with high-profit and high-return IPO exit, equity transfer is superior in exit thresholds and relevant laws and regulations, thereby being a better choice (**Table 1**).

Venture capital industry in China has fully recovered and rapidly developed since 2004. Although the proportion of IPO exit has been increasing, it is significantly lower than that of equity transfer. With the sustained recovery of overseas IPO stock market and the introduction of ChiNext, listed investment projects of enterprises with the VC/PE background have significantly increased in both quantity and amount of financing. In the meantime, listing on ChiNext has gradually become the mainstream IPO exit channel (**Table 2**). In 2012, 48 of the 103 enterprises that successfully went public and had a VC/PE background were listed on ChiNext, accounting for 46.60% of the total number and involving a total financing amount of RMB 23.587 billion (Cheng, 2013).

Venture capital industry in China has a history of more than 20 years. In the process of rapid development, domestic venture capital exit is still faced with severe challenges for the complex domestic and international economic situations and these problems run through the entire process of venture capital investment. Therefore, the exploration into venture capital exit is of great significance to the development of the venture capital industry.

The main contents of the chapters are as follows: Part 1 describes the withdrawal status of venture capital projects in China. Part 2 introduces the domestic and foreign empirical literature on venture capital withdrawal performance. Part

Table 1. Exit modes of venture capital between 2006 and 2013 (Unit: %).

Exit Mode	Equity Transfer	IPO Exit	Liquidation	Total
2013	80.52	15.58	3.90	100
2012	75.53	21.28	3.19	100
2011	66.67	31.41	1.92	100
2010	65.88	33.53	0.59	100
2009	65.90	28.32	5.78	100
2008	75.32	23.28	1.30	100
2007	53.85	42.31	3.58	100
2006	62.07	31.90	6.03	100

Data source: Statistics section of China Venture Capital Yearbook 2014.

Table 2. IPO market of venture capital enterprises in 2012.

Exchange	Number of IPO Enterprises	Proportion	Total Financing Amount (RMB Billion)	Proportion	Average Financing Amount (RMB Billion)
Main Board of A-Share Market	14	13.59%	225.10	30.04%	16.08
SME Board of A-Share Market	29	28.16%	218.65	29.14%	7.54
ChiNext Board of A-Share Market	48	46.60%	235.87	31.48%	4.91
Main Board of Hong Kong Stock Exchange	8	7.77%	59.48	7.49%	7.44
New York Stock Exchange	1	0.97%	4.50	0.60%	4.50
NASDAQ	1	0.97%	5.15	0.69%	5.51
Frankfurt Stock Exchange	2	1.94%	0.64	0.09%	0.32
Total	103	100%	749.38	100%	7.28

Data source: Statistics section of China Venture Capital Yearbook 2013.

3 summarizes the relevant literature, puts forward the research hypothesis and selects the variables. In Part 4, the model is established, and the proposed hypothesis is verified. Finally, Part 5 draws the conclusions and gives suggestions based on the empirical test results. Since the data of equity transfer withdrawal and liquidations withdrawal are generally considered as commercial secrets of venture capital institutions, there are certain difficulties in data acquisition. In IPO withdrawal, the withdrawal income data of venture capital projects can be obtained through the growth enterprise market. Therefore, this paper only studies the venture investment projects listed in Shenzhen GEM in China, and carries out an empirical analysis of the factors influencing the investment performance based on the available data.

2. Literature Reviews

The development of venture capital has been relatively mature abroad, and there is more relevant literature. Bygrave and Timmons (1992) selected US venture capital fund from 1969 to 1985 as the empirical sample, which covered 383 investment projects. Empirical research shows that the investment of venture enterprises had higher success rate in early stage (initial stage, growth period) than other stages. Das et al. 2003) found that the probability of successful withdrawal of private equity investment was related to industry, and there were great differences between different industries. For example, investment projects in the new economy fields, such as biotechnology and the Internet, have a higher probability of successful withdrawal than other industries. Mason and Harrison (2002) conducted an empirical study of angel investment in the UK, and concluded that there was no significant difference between investment scale and the return on

investment. The empirical study by Ljungqvist and Riehardson (2003) found that the withdrawal performance of venture capital institutions was related to the investment experience. Venture institutions with abundant investment experience have core competitive power that cannot be easily imitated. As a result, the withdrawal performance of venture capital institutions with abundant investment experience is obviously better than those with no investment experience in the same industry. In addition, economic operation model has its operating cycle. Economic participants are affected in different economic operation stages to different degrees. Gottschalg (2004) studied the correlation between business cycle, stock market cycle and venture capital performance. The results demonstrate that business cycle and stock cycle are related to venture capital performance.

Chinese scholars have been exploring and studying the withdrawal performance of venture capital. Based on the data about the withdrawal projects of 139 Chinese venture capital institutions from 2009 to 2015, Jing (2016) analyzed the return on investment withdrawal of China's GEM IPO and its influencing factors, finding that the cycle of venture capital has significantly negative effects on the annual return rate of IPO withdrawal and the investment industry has significantly positive influence on IPO withdrawal annual return rate of capital investment. Moreover, there is no significant correlation among investment size, investment cycle, average price-earnings ratio, location of investment institution and return on investment.

3. Research Hypotheses and Selection of Influencing Factors

3.1. Research Hypotheses

This paper combines domestic and international related researches (Hellmann, 2000; Cumming & Macintosh, 2001; Kaplan & Stromberg, 2004; Phalippou & Zollo, 2006), with the institutional background of venture capital investment in China to propose the following hypotheses:

1) The return rate of venture capital projects is positively correlated with the amount of management capital and the operation period of venture capital institutions.

2) The return rate of venture capital projects is negatively correlated with the investment cycle.

3) The return rate of venture capital projects is positively correlated with the investment scale.

4) The return rate of venture capital projects is closely related to the location of venture capital institutions. Venture capital institutions in areas with highly developed commerce, culture and market tend to enjoy a high rate of return.

5) The return rate of venture capital projects is correlated with the industry that venture enterprises belong to. Generally, investment projects in high-tech enterprises have higher rate of return.

6) The return rate of venture capital projects is positively correlated with business cycle and stock cycle.

3.2. Selection of Influencing Variables and Data Specification

This paper mainly measures exit performance of venture capital by virtue of exit returns (Mason & Harrison, 2002). It takes annual rate of return of each sample project as the evaluation index for return on investment and the explained variable. Based on the research hypotheses and the actual situation of domestic venture capital industry, this paper selects explanatory variables from the perspective of macroscopic and microscopic factors respectively: it selects stock cycle (ChiNext composite index on the IPO day) and average price-earnings ratio from macroscopic factors and selects operation period, amount of management capital, investment cycle, investment scale, investment industry, location of venture capital institutions and issuance price from microscopic factors. Specific description of the various variables is shown in the following **Table 3**:

This paper takes venture capital enterprises listed on Shenzhen ChiNext between 2015 and 2016 as the research objects. After eliminating enterprises without VC background and with small amount of investment (hold less than 5% of the shares), it selects 90 IPO enterprises with the VC/PE background, involving a total of 140 venture capital institutions and 148 venture capital projects with well-documented data. During data collection, investment of the same venture capital institution in different venture enterprises is deemed as different investment projects, so is the investment of different venture capital institutions in the same venture enterprise. In order to ensure authenticity and reliability of the research data, all data used in the empirical research comes from Wind database and IPO prospectus of the ChiNext of Shenzhen Stock Exchange. The prospectus is downloaded from the website designated by China Securities Regulatory Commission to disclose information of listed companies—
http://www.cninfo.com.cn/cninfo-new/index.

4. Empirical Analysis of Exit Performance of Venture Capital through ChiNext

4.1. Correlation Analysis

Since the annual rate of return is obtained by adjusting investment cycle of venture capital institutions, it is used as the explained variable in both correlation analysis and regression analysis of this paper.

According to **Table 4**, annual rate of return is significantly negatively correlated with the amount of management capital at the 5% level and the correlation coefficient is −0.034, which is inconsistent with the expectation. The reasons are mainly as follows: firstly, samples of this paper are manually collected and screened. Since the selection criteria are subjective to a certain extent, the calculation of variables may differ from the reality. Secondly, the venture capital industry in China is still in its infancy. Even venture capital institutions with a large amount of management capital have a short history and enjoy insufficient management experience related to venture capital investment. At the present stage, projects with large investment scale are less likely to produce errors. In

Table 3. Description of related variables.

Variable	Name	Description
Y	Annual rate of return	Multiples of average annual returns of venture capital institutions, which is represented as total rate of return/(investment cycle ÷ 12)
X_1	Average Price-earnings ratio	Average price-earnings ratio in the IPO year of venture enterprises
X_2	Stock cycle	ChiNext composite index of venture enterprises on the IPO day
X_3	Operation period	Time span between established time of venture capital institutions and project investment (unit: month)
X_4	Amount of management capital	Initial registered capital of venture capital institutions is used as the proxy variable (unit: RMB 10,000)
X_5	Investment cycle	Time span between project investment and time to market (unit: month)
X_6	Investment scale	Initial investment in the project (unit: RMB 10,000)
X_7	Investment industry	Dummy variable: "1" indicates that the investment project is targeted at high-tech industries; "0" indicates that the investment project is targeted at traditional industries.
X_8	Location of venture capital institutions	Dummy variable: "1" indicates that the venture capital institution is registered in economically developed areas such as Shenzhen and Shanghai; "0" indicates that the venture capital institution is registered in other regions
X_9	Issuance price	Transaction price of IPOs of venture enterprises (unit: RMB)

Table 4. Correlation coefficients.

Explanatory Variable	Number of Samples	Y
X_1	148	0.139**
X_2	148	0.088*
X_3	148	0.026
X_4	148	−0.034*
X_5	148	−0.009*
X_6	148	−0.223**
X_7	148	0.193*
X_8	148	0.017
X_9	148	0.141**

Note: *indicates that the variable is significantly correlated at the 0.05 level (two-tailed); **indicates that the variable is significantly correlated at the 0.01 level (two-tailed).

addition, annual rate of return is significantly positively correlated with stock cycle and investment industry at the 5% level, significantly positively correlated with average price-earnings ratio and issuance price at the 1% level and significantly negatively correlated with investment cycle and investment scale at the 5% level, which is consistent with the hypotheses. Annual rate of return shows no correlation with operation period and location of venture capital institutions.

4.2. Regression Analysis

The multiple regression model adopted is as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + e_i \quad (1)$$

Based on the 148 project samples, paper employs STATA software for White Inspection, thereby examining the heteroscedasticity of data. The inspection results are as follows (Table 5):

It's revealed in the table that p value is 0.0095, strongly rejecting the homoscedastic hypotheses. In other words, there is heteroscedasticity. In order to eliminate the impact of heteroscedasticity on models, robust standard errors are introduced for OLS regression. The regression results are described below (Table 6):

Based on the regression results, the following conclusions can be drawn:

- Firstly, there is no significant correlation between annual rate of return and average price-earnings ratio and stock cycle, which is mainly attributed to the following reasons: both average price-earnings ratio and ChiNext composite index are macroscopic indices. In addition, return rate of venture capital projects varies with venture capital enterprises. Therefore, average price-earnings ratio and ChiNext composite index have a limited impact on venture capital performance macroscopically.

Table 5. White inspection results.

Statistics	White Statistics	P Value
Value	77.66	0.0095

Table 6. Regression results.

Variable	Regression Coefficient	P Value
X_1	0.1243	0.0880
X_2	0.0004	0.2600
X_3	0.0045*	0.0296
X_4	3.48E−08	0.9850
X_5	−0.0057*	0.0170
X_6	−0.0002	0.0880
X_7	1.7144**	0.0080
X_8	0.2754	0.7670
X_9	0.0934*	0.0159
	$R^2 = 0.3097$	

Note: *indicates that the variable is significantly correlated at the 0.05 level (two-tailed); **indicates that the variable is significantly correlated at the 0.01 level (two-tailed).

- Secondly, annual rate of return is significantly positively correlated with operation period, which is consistent with the expectation. Operation period of venture capital institutions affects exit performance of venture capital through IPO. The longer the operation period is, the richer market experience venture capital institutions shall have. In the meantime, venture capital institutions with long operation period and good reputation are more preferred by venture enterprises, thereby enjoying greater chances of winning successful venture capital projects.
- Thirdly, there is no significant correlation between annual rate of return and amount of management capital. On one hand, venture capital institutions in the samples have short operation period and insufficient investment insight and management experience. As a result, blind investment and investment error shall inevitably occur if they perform large-scale investment in a short period of time. On the other hand, due to the limited data sources, registered capital tends to proceed from a legal point of view and emphasize on the security of creditors. The results shall be inaccurate if registered capital is used as a proxy for the amount of the management capital. Therefore, the empirical results show that the amount of management capital has no significant impact on annual rate of return.
- Fourthly, annual rate of return is significantly negatively correlated with investment cycle, which is consistent with the expectation and attributed to the following reasons: when investing initial capital in projects, venture capital institutions bring institutional innovations and advanced management experience to venture enterprises, thereby optimizing inner structure of venture enterprises, improving their production processes and helping them make and implement strategies decisions. Therefore, short-term investment is characterized by strong marginal value-adding capability and high rate of return. With the extension of investment cycle, however, marginal value-adding capability of venture capital institutions gradually decreases and exit environment of investment projects gradually deteriorates. As a result, the exit possibility is reduced and the rate of return is lowered.
- Fifthly, there is no significant correlation between annual rate of return and investment scale. When the investment amount is large, risks of venture capital institutions shall overly concentrate and prevent them from decentralizing risks by virtue of multiple projects, thereby exerting a positive impact on investment returns. The reduction of investment scale does not necessarily result in an increase in investment performance.
- Sixthly, annual rate of return is significantly positively correlated with investment industry. High-tech industry has been the focus of venture capital investment both at home and abroad. It enjoys long-term and excellent growth prospects and provides venture capital institutions with a high rate of return.
- Seventhly, there is no significant correlation between annual rate of return and location of venture capital institutions. The venture capital industry in

China is still in its infancy. Although both Shenzhen and Shanghai are concentrated areas for domestic venture capital investment, neither of them has formed significant regional differences or unique geographical advantages in the operation of venture capital projects. Therefore, the empirical research identifies no correlation between annual rate of return and location of venture capital institutions.

- Eighthly, annual rate of return is significantly positively correlated with issuance price. Stock issuance price is influenced by market mechanisms, investment value and changes in supply and demand to a great extent. If a project has high stock issuance price, the listed company enjoys stronger operating capability and greater profitability. Therefore, venture capital samples with high issuance price are more likely to obtain high investment returns.

The nine explanatory variables selected explain 30.97% of the entire model. Although the number is significantly larger than that of empirical researches of other scholars in China, the explanatory power is still weak, which is mainly attributed to two reasons. On one hand, explanatory variables are inaccurate when they are used as measurement indexes (use the registered capital as a proxy for the amount of management capital and represent investment experience and management capability with operation period). On the other hand, the venture capital market in China is not mature and the rate of return on investment is influenced by multiple factors. In addition, obvious regularity has not yet been formed. The limited explanatory variables in this paper cannot cover all factors that lead to the difference in venture capital returns.

5. Conclusions and Suggestions

Since the success of venture capital investment relies on the achievement of expected rate of return within the expected time frames, exit mode and exit channel are crucial for the development of the venture capital industry. Based on IPO exit of venture capital through Shenzhen ChiNext, this paper empirically studies IPO exit performance of venture capital in China and draws the following conclusions:

- Firstly, annual rate of return is significantly positively correlated with operation period, investment industry and issuance price, and significantly negatively correlated with investment cycle. In addition, there is no significant correlation between annual rate of return and average price-earnings ratio, stock cycle, amount of management capital, investment scale and location of venture capital institutions.
- Secondly, the opening up of ChiNext stock market not only widens the channels for venture capital exit, but also reduces exit costs, improves exit timeliness and expands market capacity, thereby significantly influencing venture capital returns.

Therefore, to promote the steady development of venture capital industry in China, it is necessary to start from the ChiNext. Firstly, it is important to improve laws and regulations related to venture capital exit. Secondly, it is recom-

mended to encourage businesses to introduce venture capital and increase investment. Finally, it is necessary to cultivate high-quality venture capital talents and improve the service quality of venture capital institutions and other intermediaries.

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