On the Relationship between Holding Time and Exit Returns of Venture Capital Firms – A Case Study of a Venture Capital Firm in China

Jia, Wei

UNIVERSITÉ DE GENÈVE

GENEVA FINANCE RESEARCH INSTITUTE

On the Relationship between Holding Time and Exit Returns of Venture Capital Firms — A Case Study of a Venture Capital Firm in China

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Wei JIA

(FCO N° 65206)

Dissertation Supervisor : Professor Tony BERRADA
University of Geneva

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Abstract

Despite more than two decades of development at a meaningful scale, China's venture capital (VC) industry has not accumulated sufficient historical experience, and no clear pattern of investment styles regarding preferences for investment stages has emerged. Many firms prefer pre-IPO (initial public offering) projects, while the government tries to shift funds to earlier stages to support the development of technological innovation and small and medium-sized enterprises. From fund managers' perspective, are there significant differences in the returns when VC investments are made at different stages of projects? This issue is of critical relevance to both the development of the VC industry and policymaking.

Due to the complexity and inaccuracy of industry data, it is difficult to quantify this issue. Based on existing literature and using the historical data of a company in China, this research attempts to ascertain the relationship between VC firms' project holding time and the returns on the investment. The author formerly worked with S company, which was established in 1999; the firm has by far the largest number of investment projects and most prominent performance among all native Chinese VC firms. As of March 2021, S company had invested in 1,244 projects, including 183 projects that had been publicly listed via IPOs or listed through M&A. These investments are spread across the entire country, cover various industries, and involve all stages of project development. As such, S company offers the best Chinese case for this study.

In this study, multiple regression analyses are performed using the following parameters: absolute return (multiple) and relative return (annualized average return) are the dependent variables; project holding time (from investment to IPO) is the independent variable; and a variety of variables, i.e., IPO board, exit method, project characteristics, and stock issuance intensity (the number of issuances in the year the VC investment was made and went public via an IPO), are used as control variables. The analyses lead to the following conclusions. Absolute return is positively correlated with holding time, and relative return is negatively correlated with holding time; given the projects' relatively high rates of return, in a time of low interest rates, it would be a sound choice for fund investors to entrust experienced fund managers to invest in early stages of projects and hold the investments for a reasonable amount of time; additionally, IPO board has a significant impact on return, and project size, geographic area in which the project is located, and capital market environment do not have a significant impact on exit return, indicating that the VC industry is insensitive to short-term macro factors and that, to some extent, its operations can transcend investment periods. In addition to the regression analyses, this study reviews other indicators of S company, for example, the historical exit rate and the current value of projects that have not gone public, to examine the relationship between a fund's overall rate of return and holding time. This study also performs a supplemental analysis using data on peer VC firms, and the results support the above findings.

Key words: Venture Capital Investment; Holding Time; Exit Return; Chinese Case Company

Table of Contents

List of Tables

List of Figures

1. Introduction

1.1 Background and Significance of the Research

As a form of organizing capital, modern venture capital (VC) investments first emerged in the US in 1946. VC nurtured the growth of American innovation startups; played a major role in promoting the development of emerging industries, such as information technology and biomedicine; and has been instrumental in enhancing the vitality of the US economy and fostering the nation's leadership in science and technology. In 1985, the Chinese government elected to introduce VC investments, which marked the beginning of learning and exploration in this field in China. Development of this industry at a meaningful scale started around 2000, and after over two decades, China has seen the emergence of an active VC market second only to that in the US in terms of size. In 2020, total funds raised in the VC industry in China was 1,197.2 billion Yuan, or approximately 70% of the amount raised in the US; total VC investment was 887.1 billion Yuan. During the first three quarters of 2021, total investment exceeded 1,000 billion Yuan. VC investments played a critical role in enhancing the industrial transformation and independent innovation of Chinese firms and have become the driving force of most initial public offering (IPO) projects as well as public discourse in Chinese society.

Via investing in startup firms, especially technology-oriented startups, VC helps enhance firms' technological innovation and improve their management capacity, gains value appreciation through firms' endogenous growth, and harvests the return by way of exiting projects. Most research indicates that investing in the initial and growth stages of a firm is significantly more valuable in increasing the firm's number of patents, helping the firm build a stronger technological team, and improving its management capacity. Compared to investing in a firm's mature stage, early investment can play a greater role in growing the firm's value and can also create a more significant innovation effect for society. As such, both the government and public opinion encourage VC firms to invest in initial and growth stages of startup firms. In practice, however, it is evident that more funds are concentrated in firms that have matured. This has become a concern to public opinion and the government alike. Voluminous research has examined the causes of this phenomenon, including taxation, sources of funds, regulatory policies, and the general atmosphere of society. The author proposes that a quantitative study on the differences in the actual returns from investments in different project stages, and on the intrinsic causes of the differences, would add an innovative perspective to research. This case study has practical value in guiding the VC industry in selecting investment stages and can also inform policy development. If, based on the research findings, VC firms can better understand the intrinsic causes of the differences in returns, adjust their investment strategies, and invest funds in more appropriate project stages, thereby reconciling firms' own economic interests with broader societal goals, industry and society as a whole will be presented with long-term, viable solutions.

1.2 Research Methodology

Due to the nonpublic nature of VC institutions' fundraising, the specific data on their returns are confidential commercial information and difficult to come by. This study conducts an empirical analysis of the historical data of a representative Chinese VC firm; the results are supplemented by an analysis of information on peer VC firms, thus arriving at conclusions and policy recommendations.

The firm for the case study (S company) was established in 1999. As of March 2021, it had invested in 1,244 firms. Via IPOs in China or abroad or through mergers and acquisitions (M&As) by listed companies, 183 investments have exited. A review of the above information indicates that data on projects that S company invested in during its early operations are incomplete and inaccurate and that the performances of these projects exhibit certain anomalies; further, returns to investments made in overseas projects are also instable. As such, only IPO projects invested in within China after 2000 are included in the study, thus yielding a sample with 135 valid observations. This dataset is verified multiple times and is considered accurate and complete, meeting the requirements of a case study. The data in this study consist of the following components: 1. private data, i.e., time of investing in the project, investment amount, price of the investment, holding time, and conditions of the M&A transaction by a listed company; 2. project-specific public data, i.e., IPO time, proportion of equity held by the VC firm, 30-day average share price after the IPO, 30-day average market capitalization and price-earnings ratio (PE) after the IPO, industry and geographic area of the project, and IPO board; 3. macro public data, i.e., total number of A-share IPOs in the year the investment was made and the total number of A-share IPOs in the year the firm went public through the IPO; and 4. other private data related to S company, i.e., current value of other projects that the firm has exited through other means or has not exited – other than the exited investments through IPOs or M&As discussed above – amount and number of investments made by S company over the past years, and information about investment exits.

Multiple regression analyses are performed for the above data to determine the relationship between holding time and returns. In the VC industry, there are no objective and uniform criteria for defining the investment stages of a project. Due to differences across industries as well as differences in the historical development of projects, neither the time between a project's inception and VC investment nor the financial indicators at the time of investing can be used as objective measures to assess investment stages. Project holding time (from investment being made to the IPO) can essentially represent the degree of maturity of a project, and it is reasonable to use this as an indicator for investment stages; further, the data for this indicator are relatively easy to obtain. Therefore, holding time is chosen as the independent variable for the regression. Two indicators are selected as dependent variables to measure the returns of IPO projects: multiple and annualized average returns (representing the absolute return and relative return, respectively). The control variables are selected from the

following dimensions: exit method (IPO or M&A), IPO board (different A-share market boards), characteristics of the project (area, market capitalization, and PE at share issuance), IPO environment, and industry intensity at project investment and exit (the number of A-share IPOs in the year of investment and exit, respectively). In addition, two variables—IPO or M&A time of the project and industry in which the project operates—are introduced as fixed effects. Through gradually adding control variables, the model is tested for overall validity and multicollinearity; a statistical model is finally derived, and the hypotheses are tested. Based on the above tests as well as the author's understanding of the VC industry, the regression results are interpreted and summarized. In addition to the analyses of the IPO projects, the study provides some supplemental information on non-IPO projects of S company and discusses the relationship between the overall return and holding time of funds. Data on peer firms in the VC industry are also analyzed to further test and substantiate the hypotheses proposed in this study.

1.3 Content and Structure of the Research

There are two main components to the rationale whereby the VC industry gains returns. The first is that a VC institution invests in a firm to drive the firm's development and the endogenous growth of the firm increases the value of the VC institution' equity in the firm. The second is the liquidity premium between the primary and secondary markets brought about by an IPO. In emerging capital markets, the second component is more prominent. Regardless of the component in which values appreciate, there might exist an internal correlation between holding time and returns. As such, this relationship will be the main subject of the study and will be examined from both theoretical and practical perspectives. More specifically, the contents and structure of the study are as follows:

1. Introduction. This chapter provides an overview of the background and significance of the case study, the research methods and main contents, and the novelties that this study contributes to the existing research.

2. Literature Review. The first section of this chapter introduces four basic theories on the sources of return to VC investments, namely, corporate lifecycle theory, growth contribution theory, principal-agent theory, and the capital asset pricing model. The second section reviews the literature on VC investment returns and on the factors that influence the returns. The third section summarizes the conclusions in the literature reviewed and the limitations of the existing literature.

3. Overview of the VC Industry Development in China and the Research Methodology. The first section of this chapter discusses the historical development and the current situation of China's VC industry as well as the factors that affect its development. The second section presents the literature related to returns and the selection of investment stages of the VC industry in China. Drawing from the literature review, the third section proposes the research methods for the case study.

4. Empirical Case Study. This is the core chapter of the study. The first section briefly discusses the investments of the company that are the subject of this study. The second section comprises regression analyses and hypothesis tests. Based on the research methodology, the study proposes six core hypotheses, which are empirically tested by gradually adding control variables. The third section expands the research by extending the study from only examining the IPO projects of S company to reviewing all the investment projects of the company. The fourth section provides supplemental data on peer VC firms to remedy the limitations of the case study. The fifth section summarizes the basic findings of this chapter.

5. Conclusions and Outlook. The first section summarizes the main research findings. The second section develops recommendations for the VC industry and for policy makers. The third section discusses the limitations of the case study and offers suggestions for future research.

1.4 Novelties of This Study

The impact of VC investment stage selection on firms' innovation and economic development is a trending topic. Most existing research focuses on the degree of VC investments' impact on firms' innovation and on the overall enhancement of social progress. In terms of the relationship between holding time and investment returns, certain descriptive statistics do exist; however, diligent research on this topic is scarce. The main reason for this paucity of research lies in the fact that industry data are difficult to obtain and have a low degree of accuracy. Overseas, there exist certain studies based on public databases, but the data used in the research are granular. In China, the scarcity of research is more evident. This study selects the relationship between holding time and returns as the goal of the research, contributing the following novelties to this research field:

(1) Novelty of the research approach: This study focuses on the impact of holding time on the economic benefits of funds. In addition to the social benefit perspective, the research adopts the rationality assumption for fund managers and investors, sets maximizing investment returns as the goal, and examines the possibility of balancing economic benefits with social benefits.

(2) Novelty of the research method: This study selects one firm as the basis of the research, an approach that offers intrinsic advantages in terms of data accuracy and specification. Although the sample size is not large, it represents the maximum amount of accurate data that are currently attainable in China. The data span more than two decades, from 2000 to March 2021, and essentially cover the entire development cycle of the VC industry in China. It is sufficiently representative for the purpose of studying the development patterns of the industry.

(3) Novelty of the research analysis: Most existing studies are written by scholars or are graduation theses by university students. The author has many years of practical experience in the VC industry. Given the author's understanding of the industry and perception of its internal development patterns, the analyses and recommendations in this study have stronger interpretability and operability.

2. Review of Relevant Theories

In raising funds, VC firms commonly adopt a partnership form of business. Investors contribute funds to firms as limited partners and receive returns in accordance with partnership agreements. The duration of an investment fund comprises two stages – the investment stage and the exit stage. After the investment stage, investment in a fund can no longer occur; after exiting the project, the funds recouped are used for allocation and are usually not cycled for reinvesting. After the completion of the exit stage, the entire fund is settled. Although certain funds exist in perpetuity, most funds have a limited time period for existence. In the duration of the fund, its DPI (distribution to paid-in; the ratio between the return and the principal in a given year), the ultimate return multiple, and the internal rate of return (IRR) are core performance indicators of the fund and are also kept as core secrets. In calculating the overall return of a fund, the valuation of projects that have not been exited before settlement is somewhat difficult. As the main method of exit for VC funds, the performance of IPO projects plays a key role in determining the entire fund's performance, and data on the returns of IPO projects are relatively accurate. As such, this study focuses on the factors that affect funds' returns, with an emphasis on the relationship between the exit returns of IPO projects and the holding time.

Through a literature review, this chapter examines the factors that result in the differences in return performance in the VC industry.

2.1 Theories on Sources of Investment Returns

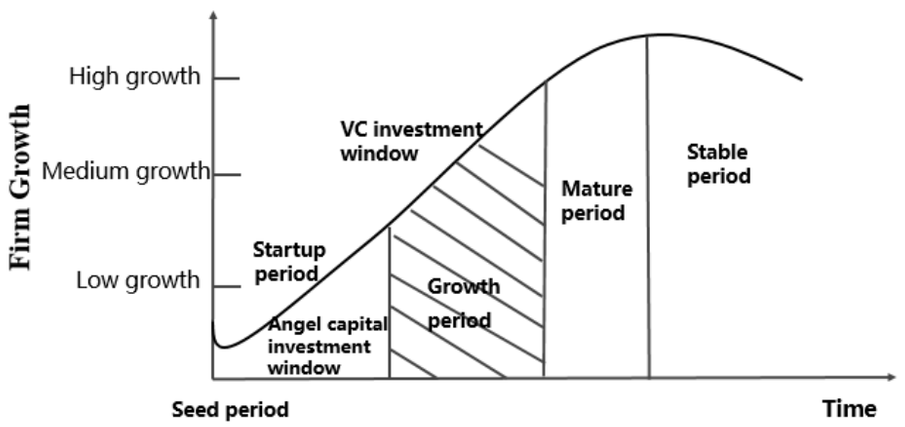
VC institutions invest in firms before they go public, and exit the investments through IPOs or M&As. VC institutions' investment returns stem from two sources: equity value appreciation as a result of firms' growth and the liquidity premium created by the IPO. In mature capital markets, the difference in valuations between primary and secondary markets is relatively minor; additionally, if a firm does not grow, it has a low chance of holding an IPO. As such, the source of investment return to VC institutions is essentially firms' growth, which is reflected in improvements to their financial indicators, technological competitiveness, management capacity, and normalization. Next, the main theories on the differences in growth and returns as a result of VC institutions investing in different stages of firms are discussed.

2.1.1 Corporate Lifecycle Theory

From startup to maturity and death, a firm has a lifecycle similar to that experienced by living organisms. At different stages of the cycle, a firm has different development characteristics and growth speed. In his book *Corporate Lifecycles*, published in 1988, Ichak Adizes proposed that a firm's lifecycle consists of ten stages: courtship, infancy, go-go, adolescence, prime, stability, aristocracy, recrimination, bureaucracy, and death. The investment community usually divides the investment stages into the startup stage, growth stage, mature stage, and stable stage. The stable stage is usually the target of M&A funds; for

VC funds, the startup stage, growth stage, and mature stage are the main stages of investments, and they correspond with the infancy and go-go stages, the adolescence stage, and prime stage, respectively, proposed by Adizes (1988). Scholars have further studied the pace of growth at each lifecycle stage. For example, in the book *Angel Investing: Principles And Practice* published in 2009, Manhong Shi summarized various views and proposed the curve model in Figure 1; the model suggests that a firm shows an upward growth trend from the seed period to the stable period, with the growth being exponential. The first derivative is positive, and the second derivative is negative. For various factors, such as the investment price and firms' need for capital, institutional investments need to be somewhat ahead of the curve; as such, the startup and growth periods are the best windows for angel investments and VC investments.

Figure 1



Firms' Lifecycle and Investment Windows

Source: Manhong Shi. Venture Capital Bible. Beijing: Economy & Management Publishing House, 2009:16-17.

2.1.2 Growth Contribution Theory

The main source of returns for VC investments is firms' endogenous growth as a result of investments, which enhances firms' value appreciation. Van Pottelsberge de la Potterie & Romain (2004) use the VC investment data of 16 OECD countries for the period 1990-2001 to perform an empirical analysis of VC investments' impact on innovation; in the research, total factor productivity is used as the output for innovation. The results indicate that VC investments can improve total factor productivity and that this influence is long-term. Research conducted by Tang & Chiy (2008) on VC investments in Taiwan, China, resulted in similar conclusions. Wang (2020) uses the VC investment projects of 287 manufacturing firms in China during the 1999-2015 period as the research sample and finds that VC investments can significantly increase the number of technological innovations and improve the quality of innovations by a firm. The results also indicate that VC investments' effects on a firm's technological innovations vary depending on the stage at which the VC enters the firm. VC invested in a firm during its growth stage can effectively enhance the firm's invention patents, while VC invested during a firm's seed stage can effectively improve its utility and design

patents. VC invested during other stages of a firm's development does not have an impact on patent output or may even have an inhibiting effect. Sun et al. (2020) uses A-share IPO firms during the 2000-2016 period as the research sample and finds that VC investments' influence on firms' innovation is not reflected in the difference in firms' innovation output after the IPO but in the fostering of firms' innovation capacity before the IPO; the results also indicate that the earlier the stage at which VC enters firms, the greater will be the enhancing effect on innovation capacity.

2.1.3 Principal-Agent Theory

The principal-agent problem refers to the deviation and conflicts of interests between the principal and agent due to information asymmetry. The critical point in resolving a principal-agent problem is the alignment of motivations for the principal and agent, which requires an agency cost. There is a principal-agent relationship and information asymmetry between VC firms and entrepreneurs. To secure VC investments, entrepreneurs have a tendency of concealing information. The degree of information transparency varies with the stage of investment in a firm. VC investments closer to the mature stage face less risk associated with information asymmetry. Most VC is invested in high-technology firms; in comparison with traditional industries, intangible assets account for a significant proportion of these firms' total assets. The high degree of information asymmetry within and outside firms increases investors' agency costs.

2.1.4 Capital Asset Pricing Model

The Capital Asset Pricing Model was proposed by American scholar William F. Sharp in 1964. The model enables the quantification and pricing of market risks. It proposes that the investment return is the sum of the risk-free rate of return and the market risk premium. VC institutions assume different risks while investing in different stages of a firm. As capital with different risks requires corresponding returns to compensate for the risk, investing in the startup stage and growth stage would require a higher return. As a firm matures, it faces increasingly less risk, and the required return also gradually decreases. After holding an IPO, the firm's liquidity and maturity further improve, and therefore, the return in the secondary market should be lower than that in the primary market. When capital flows freely and the market signal is fully communicated, the different natures of risks associated with assets make the rate of return on VC investments higher at the early stages and lower at the later stages of a firm's development.

The above literature analyzes the underlying logic of the sources of returns when VC firms invest in different stages of a firm's development from the perspectives of the development patterns of startup businesses, the matching contributions of capital, and risk bearing. Due to various factors that affect the VC industry, including a long exit cycle, information asymmetry, lagging market feedback, and changes to the economic environment, the actual market performance of VC investments might deviate from theoretical inferences. Next, to ascertain the actual performance of VC returns in the real world, as well as the factors

that directly influence the exit returns, a collection of practical studies is presented.

2.2 Practical Research Literature on Investment Returns and Influencing Factors

Robert et al. (2020) use H1 data for the 1980-2019 period; these are cash flow data sourced from large limited partners and cover 1,000 pension funds, endowments, and foundations. The data are considered relatively accurate and up-to-date. Considering the cycle of a fund's exit and settlement, the authors use data from 1984-2014 to analyze the returns to VC funds; the IRR derived from the sample is 5% per year. Overall, the performance of VC funds is superior to that of the open market. The average public market equivalent (PME, rate of return/return in the benchmark market; the S&P 500 Dividend Yield is used in this study) of the sample is 1.22. The performance of VC funds varies at different times. In the 1980s, the performance was inferior to that of the open market. During the 1990s, the performance was generally superior to that of the open market. Between 1999 and 2006, VC funds' performance was unsatisfactory. Beginning in 2007, VC funds again surpassed the open market in performance. Furthermore, since 2000, the average return to VC funds has decreased significantly. There is also a large difference in performance between the top quartile funds and bottom quartile funds. The average PME of the top quartile funds is 2.60, while that of the bottom quartile funds is a mere 0.41, and the return multiple of these two groups of funds is 4.53 and -0.7, respectively. The study by Huntsman and Hoban (1980) on 110 projects between 1960 and 1975 finds that the average annual return of the VC industry is 18.9%. Bygrave & Timmons (1992) analyzes the returns of 382 VC investment projects in the US and finds that less than 1/10 of the projects have a return multiple higher than 10 and that the failure rate is as high as 60%. Qian & Zhang (2007) study 56 A-share exit projects in China and find that the average annual return of private equity investments is 22.45% and that the rate of return is not significantly correlated with the investment experience, fund size, number of years of the investment, and exit method.

In terms of investment returns from different stages of project development, research by Wright & Robbie. (1998) indicates that VC investments in Europe have a lower return at the startup and growth stages than at other stages; studies by Burgel (2000) and Hege et al. (2003) also arrive at similar conclusions. These findings are also supported by a study by Das et al. (2003), who finds that the probability of a successful exit increases with the investment target shifting from the early stages to later stages: 44% of investments in later stages successfully exit, while the percentage for investments during early stages is 34%. Manigart et al. (2002) studies returns from over 200 VC institutions in five countries and finds that institutions whose investments are highly dispersed across investment stages have high-intensity investments and short-term investment horizons and have higher rates of return. Mason & Harrison (2002) perform an empirical analysis of the VC industry in the UK and find that investment size and the industry of the firm receiving the investment do not have a significant impact on investment returns. The research by Cumming and MacIntosh (2001) on VC investment projects in the US and Canada indicates that there is an inverse relationship between returns and the investment

period. Through empirical analyses, Gottschalg et al. (2004) finds that the investment institution's proportion of equity in the firm receiving the investment and the institution's experience are positively correlated with the IRR and that the length of the investment in the project is negatively correlated with the IRR. Torre & Aouni (2013) perform a study on European VC firms and propose that investing in later stages increases the chance of a successful exit and return multiplication.

Other studies have arrived at different conclusions. Research by Mason & Harrison（2002）indicates that there is not a significant difference in the returns to investments at different stages. Bygrave & Timmons (1992) study the returns of VC investments in the US based on a sample for the 1969-1985 period, and the results indicate that investments in the startup and growth stages of projects are more likely to succeed. Research by Bygrave & Timmons indicates that returns to investments at early stages are higher than those at later stages. Cumming & Walz (2004) perform analyses using data from the Center for Private Equity Research and propose that compared to investing in later stages that have relatively lower risks, investing in earlier stages will yield higher returns.

In terms of the factors that affect returns, in addition to the investment stage, some studies also offer other approaches to understanding this issue. Chaplinsky & Gupta-Mukherjee (2010) perform an empirical analysis using a sample of VC-backed companies that exited via an M&A or IPO during the 1985-2008 period; the "Exit-to-Failure Ratio" (EXF) is then employed to assess the strength of VCs' investment opportunities in an industry. EXF is the ratio of exited funds to lost funds, and it measures the coverage that exited funds provide to make up for failures. The results indicate that outside of the dot-com bubble period, new investments initiated under higher EXF levels result in significantly higher future returns and that higher EXF values also increase VCs' preference for risk and their willingness to fund early-stage companies. The research also finds that investments initiated at a time with many IPOs in the same industry will generate lower future returns. Using a sample of over 5,400 VC investments between 1980 and 2005, Achleitner et al. (2013) investigate the impact of factors related to supply and demand on returns to VC investments and find that rising demand for VC, namely, an increase in entrepreneurial activity, initially results in higher returns; however, overreaction on the supply side can destroy deal-level results. The above research also indicates that overfunding, especially overinvesting, seems to be a recurring characteristic of the VC industry and that, in fact, contra-cyclical investment strategies yield the highest deal-level returns. Research by Gompers (1995) indicates that the staging of VC investments is closely related to the overall economic development cycle; when the overall economy shows an upward trend and channels for holding IPOs are abundant, VC institutions tend to invest in later-stage firms to realize quick exits and returns; conversely, when the overall economic situation is less than ideal and channels for holding IPOs are tightened, VC institutions tend to invest in early-stage projects to avert the risk and reduce the competitive pressure caused by investments.

Despite the different research findings regarding the relationship between investment stage and returns, in practice, that significantly more funds are invested in later stages than in early stages is a common phenomenon. Ma (2002) points out that during the early years of the VC industry's development in the US, investments occurred mainly in the early stages of firms' development; however, since the 1980s, VC investments have gradually shifted toward the later stages. In 1983, VC investments during the early stages accounted for 35% of total investments in all stages; the average ratio was 29% for 1986-1987, 27% for 1991-1994, and 26% for 1997. In European countries, the proportion of VC invested during early stages has always been low: the UK, 2.5%; France, 2.3%; Germany, 10.2%; Italy, 15.6%; and the Netherlands, 13%. The proportion in Japan is even lower. To a significant extent, this phenomenon is associated with the sources of funding. In Europe and Japan, institutional investors, such as banks and insurance companies, constitute the main sources of VC funds; these institutions have a lower preference for risk, and technological innovations are also less active than in the US. The capital providers of early American VC investments were mainly rich individuals and families. As a result of the composition of investors, VC funds were actively invested during early stages of firms' development to earn higher returns and meet the need for allocating surplus funds to rich individuals and families. In 1978, the US revised the "prudent person" clause, allowing pension funds to enter the VC field and bringing about a major change to the existing structure of VC suppliers. As of 1984, institutional investors, such as pension funds, accounted for 53% of the total VC investment; this proportion reached 76% by 1994. The mature and prudent investment behaviors of institutional investors in the US have also made VC firms more prudent in investing.

2.3 Summary of the Literature Review and Limitations of the Existing Research

The literature review above provides the basic theoretical framework, analytical approach, and data for this study. VC investments play a significant role in enhancing the growth and technological innovations of startup businesses. Most research indicates that investing in the startup and growth stages has more evident effects on promoting technological innovations. In terms of the returns to investments at different stages, existing research has arrived at different conclusions. This may be related to the fact that the research samples are from different countries and different time periods; it may also be related to data accuracy. In general, data used in the studies above are for relatively early times. In addition to investment stage, factors that influence investment returns also include the economic cycle, year of investment, and behavioral finance. The literature reviewed provides support for the case study in this research and guidance for selecting control variables for the regression model and analyzing the research findings.

Although different conclusions have been drawn regarding the relationship between investment stage and investment returns, in practice, the tendency of investing in later-stage projects is evident, potentially resulting from the following factors: later-stage projects require

large amounts of capital; investor structure dictates that lower-risk investment targets be pursued; and the duration of a fund places constraints on the exit cycle of the investing firm. VC investing is a long-term business with a lagging feedback mechanism. Compared with the secondary market, this type of financial arrangement is unable to act as an effective market and rapidly allocate funds. As such, more research, especially research based on practical data, is required to provide effective information to the market so that market feedback and fund allocation efficiency can be improved. From the existing research, it can be seen that public databases in other countries offer convenience for conducting relevant research. In China, data scarcity is a common phenomenon. Due to the short history of the VC industry, there is a paucity of valuable research in this field. Based on the history of VC industry development in China and current practices, this topic will be investigated in the remainder of this study.

3. Overview of VC Industry Development in China and the Research Methodology

3.1 Overview of VC Industry Development in China and Influencing Factors

China's VC industry has experienced over two decades of development. However, compared with those in advanced capital markets, i.e., the US and Europe, China's VC industry is still rapidly evolving. The previous development of the industry can be divided into three phases.

(1) The 1992-2008 period represents the infancy phase during which active investment institutions increased from less than 10 to 500. During this phase, foreign-investment institutions dominated the sector, with IDG and Sequoia Capital being the most active firms at that time; it was only around the year 2000 that Chinese VC firms, represented by Shenzhen Capital Group and Fortune Venture Capital, began to emerge. Between 2007 and 2008, the financial crisis had a major impact on foreign-investment institutions; native Chinese VC institutions started to flourish, and RMB funds became increasingly active. (2) The 2009-2014 period represents the startup phase of China's VC industry. During those five years, the number of active VC institutions increased from 500 to 3,000. In 2009, the second-board market, ChiNext, officially opened. The Chinese government proposed the "Mass entrepreneurship and innovation" initiative in 2014, which drove the rapid development of China's VC industry. (3) The period from 2015 onward represents the development phase of the VC industry in China, during which the number of active VC institutions increased from 3,000 to more than 4,000. The participation of large-scale state-owned enterprises as funding sources and the implementation of a registration-based listing process for the Science and Technology Innovation Board (STAR Market) and ChiNext helped to generate a mature environment for China's VC market that covers fundraising, investing, and exiting.

In the development of China's VC industry, improvements to industry policies and capital market institutions played a critical role. In 1985, China's first VC institution, i.e., China High-Tech Venture Capital Corporation, was established, marking the beginning of theoretical and practical explorations in the VC sector. In 1998, Mr. Siwei Cheng submitted "No.1 Proposal" of the Ninth National Committee of the Chinese People's Political Consultative Conference. VC investments entered the perception of the general public, and governments at different levels began preparations for establishing VC funds. In May 2004, Shenzhen Stock Exchange established a small and medium enterprises (SME) board. In September 2005, share-trading business reform was fully implemented, providing

institutional investors a normal approach to exiting the market. It was not until this reform that China's VC industry established a normal business model. In October 2009, the second-board market was officially rolled out; the first batch of companies listed on the board had an average PE of 56.7. This market provided a greater possibility for VC investments to exit through IPOs and earn higher returns. The 28 companies acquired a total of close to 700 million Yuan in private equity investments and ultimately earned a return multiple of 5.76. Ever since, fundraising by RMB funds has grown rapidly. As of 2021, the total VC investments by RMB funds exceeded that of USD funds. In June 2019, the STAR Market was established, bringing about major changes and innovations to IPO conditions and, for the first time, allowing nonprofit businesses to arrange financing through IPOs, making it possible for technological innovation firms, such as firms in biomedicine and semiconductor industries, to hold IPOs at early stages. In August 2000, the registration-based listing process was implemented for STAR Market and ChiNext, and market pricing inquiry was instituted for setting the PER, providing the market with greater autonomy.

Through the changes and developments discussed above, China has evolved into an important VC investment market across the globe. In 2020, the total amount of funds raised by the VC industry was 1,197.2 billion Yuan, while the total amount of funds raised in the US during the same time period was $276.8 billion. The total investment by the VC industry was 887.1 billion Yuan, compared to the total investment of $864.6 billion in the US during the same period. During the first three quarters of 2021, the total investment in China's equity investment market exceeded 1,000 billion Yuan.

In terms of fundraising, in 2020, the total fundraising for RMB funds was 1,008.6 billion Yuan, and the amount raised by USD funds was 118.6 billion Yuan. In terms of stage, 13 billion Yuan was raised during the early stages, an increase of 9.4% over 2019; VC funds raised a total of 243.7 billion Yuan, or an increase of 12.4% over the amount in 2019, and private equity funds raised a total of 940.4 billion Yuan, a decrease of 7.4% from 2019. In terms of sources of funding, stated-owned investors accounted for 44.7% of the amount raised by early funds, 54.8% of the amount raised by VC funds, and 60.5% of the amount raised by private equity funds. Governments and large state-owned enterprises became the main sources of funding; certain sources that are important in fundraising in other countries, such as insurance companies, pension funds, university endowments, and commercialized funds, were still immature in China.

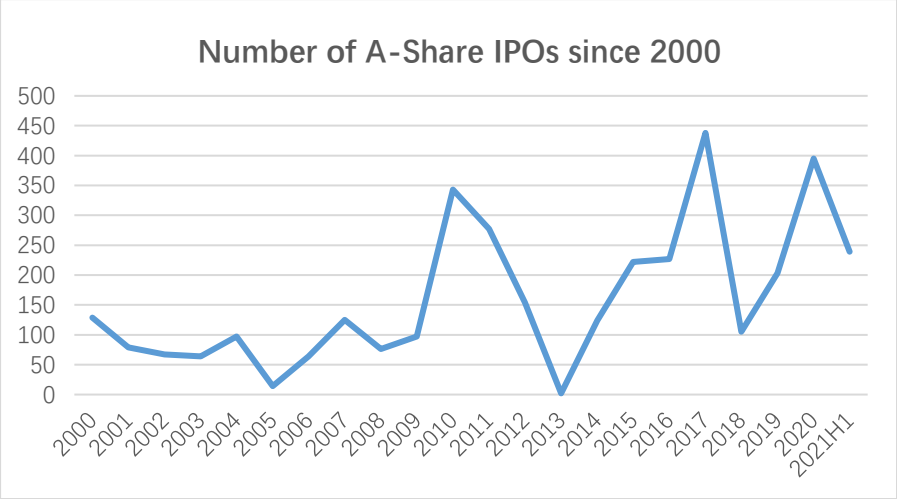
In terms of investments, capital invested during the growth stage accounted for 64%, VC accounted for 15.3%, angel capital accounted for 1.2% of total investments. There is a clear trend of funds being concentrated in leading institutions. In 2020, the top 30 early-investment institutions accounted for 81% of total investments; the top 50 VC institutions

accounted for 56% of total investments; and the top 50 private equity institutions accounted for 39% of total investments.

In terms of exits, in 2020, there were 535 IPO firms, 348 of which were supported by VC/PE. Investment institutions have become an important force that participates in and drives IPOs. Based on a standard for counting these institutions, in 2020, there were 3,842 exit cases. There was a total of 2,434 IPOs, and they have become the main method of exit. In 2020, the book return upon IPO exits (calculated using the closing price of the opening day) was 9.27 times for shares listed in China and 8.82 times for shares listed abroad.

As IPOs are the dominant method of exit, the efficiency with which investment institutions exit greatly depends on the pace of IPOs. In the past, the pace of security issuance via IPOs was extremely unstable. The number of new stocks issued through IPOs between 2000 and the first half of 2021 is shown in the figure below. The fluctuations in exits through IPOs also caused fluctuations in investment institutions' fundraising and investment activities; excessive fluctuations are not conducive to the stable and continuous development of the industry. During recent years, the trend has taken a turn for the better. Since 2020, share issuance via IPOs has gradually normalized, with the total number of new stocks being maintained at approximately 500 per year. The improvements to the SSE STAR Market and ChiNext, as well as the recent opening of the Beijing Stock Exchange, have enabled firms of all types and sizes to anticipate exits.

Figure 2: Number of A-Share IPOs since 2000



Two other important factors also affect the VC industry's development environment. The first is taxation policies. Currently, there are no explicit favorable tax policies for VC institutions. After paying multiple levels of taxes, investors' actual tax burden is over 40%, which significantly reduces investors' enthusiasm to invest. The other factor is related to the demand of state-owned investors. Starting in 2006, various levels of governments in China established venture capital guiding funds as a means of supporting the VC industry,

and this initiative greatly enhanced fundraising and investments for RMB funds. Under this arrangement, the government as an investor proposed to invest in early-stage projects. At the development stage, the VC guiding funds offered VC institutions favorable business conditions. For example, the guiding funds did not collect CARRIE returns, and VC funds were offered certain options – for instance, VC funds may choose the favorable provision of buying back by paying the principal plus interest; as a result, the two sides became an integrated entity with their interests aligned, and the risk of investing during early stages was decreased to a certain degree. After several years of development, however, the favorable policies offered by the governments' guiding funds were canceled one after another, and more stringent conditions were imposed on VC funds, such as management fees and thresholds for returns. To a certain extent, these changes have reduced VC institutions' room for earning returns.

3.2 Investment Stage Selection and Returns of China's VC Industry

According to research by Jiang (2013), between 1998 and 2000, during which China's VC industry started to grow, investments in the seed stage and startup stage of firms accounted for 60% of all investments. In the 2001-2005 periods, investments gradually shifted to the growth stage and mature stage, and this investment stage configuration has since been maintained. In 2011, the total VC invested in the growth stage and mature stage accounted for over 70% of all VC investments. Li (2013) studies data of listed A-share companies and finds that VC institutions with an average investment cycle of 3.4 years - from investing capital to exit – account for 35.24%; those with a cycle of 2-3 years account for 31.43%; and VC institutions with an investment cycle of less than 1 year or over 5 years account for 0.95% and 4.76%, respectively. As of February 2011, a total of 231 VC-supported firms had held IPOs on the second-board market; they had an average return multiple of 9.63; the highest was 152.62, and the lowest was 3.69. The average duration of VC investments in these firms was 2.29 years. Li (2018) conducts statistics of the book returns for VC institutions that exited through IPOs during the eight years of 2009-2017 and finds that the average book return multiple is 5.2, with the highest being 75.4 and the lowest being 0.2. Overall, the returns are relatively high but lower than the returns based on the 2011 data discussed above. Cheng & Zou (2020) analyze data of firms that went public through IPOs on the second-board market during the 2009-2014 period and finds that of VC-supported firms, 125 received VC investments within three years prior to the IPO, accounting for 70% of all VC-supported firms.

Yan (2018) uses data from a Zero2IPO Research database to analyze the relationship between the IRR and holding time based on 134 exits that occurred between January 2017

and August 2018; the research finds that there are no significant correlations between the two. Ni & Sun (2008) collect data on VC investment exits for the 1997-2005 period by administering questionnaire surveys among approximately 300 active VC institutions in China and obtain a sample of 66 valid records. The research finds that (1) the median IRR is 0.94 (mean, 1.58) and that the median return multiple is 3.40 (mean, 7.98). These findings indicate that the VC investments that successfully exited provided abundant returns to investors. (2) The mean and median of investment durations are 2.82 years and 3 years, respectively, indicating that the average holding time of VC investments is approximately 3 years. Further, the authors calculate the weighted average of investment duration based on investment amount and find that in China, each Yuan of investment will exit after only 1.97 years, significantly shorter than the 4.2 years of average VC capital holding time in the US; this finding indicates that VC investments in China are not intended for long-term projects, which may be related to the immature investment environment, higher project risk, and VC institutions' propensity to zealously pursue short-term returns. (3) The average IRRs of VC invested in the startup period, expansion period, and mature period are 0.92, 2.02, and 2.43, respectively.

China's capital market had a late start, and it has only been little over two decades since the VC industry began developing at a meaningful scale. Many major changes have occurred in the capital market during this period, and no stabilized patterns have emerged. Empirical research based on the practices of China's VC industry is rare. The data discussed above are mainly from Zero2IPO Research or information disclosed by listed companies. In terms of access to data, as data on original investments by VC firms are not public information, they can only be obtained through questionnaire surveys or secondary sources, and it is difficult to ensure data accuracy. The research samples are generally small, and data may not be available for all the years of the study period; as such, it is difficult to obtain a full and complete picture of the issue being studied. Of the existing research on the returns of VC institutions in China, the article published by Ni and Sun (2008) is by far the most valuable because Dr. Zhengdong Ni is the founder of Zero2IPO Research, the most authoritative institution specializing in data investigation and industry research in China's VC sector. Regrettably, the data are only available up to 2007, presenting a relevance issue for this type of research. China's VC market has been in an era of rapid transition. Since 2007, multiple policy changes and industry transformations have occurred in this sector, and the main avenue for exiting the capital market has also shifted from the US to China' A-share market. Furthermore, data from Zero2IPO Research are collected via questionnaire surveys and therefore may also have accuracy issues.

3.3 Research Methodology and Design

This research will select a representative VC firm in China to conduct a case study. The research sample contains 135 investment projects exited between 2000 and March 2021 via IPOs in China's A-share market or via M&As. The dependent variables of the regression analysis are the return multiple and annualized average return (representing the absolute return and relative return, respectively, analyzed through two separate regressions). The dependent variable is the holding time of a project. Considering findings in the literature and the characteristics of China's VC industry, the control variables include exit method (IPO or M&A), IPO board, project characteristics (area, market capitalization, and PE at IPO), and industry intensity at project investment and exit (the number of A-share IPOs in the year of investment and exit). With the gradual addition of control variables, six basic hypotheses are tested; further, the model is established through tests of overall validity and multicollinearity. Building on this, the research further incorporates factors such as estimated values of projects that have not been exited and the exit rate to perform an extended investigation of the overall return of the case company. Given the limited sample size, information is collected from peer VC firms as supplemental data to substantiate the generality of the findings from the case study.

The research methodology discussed above is based on the most fundamental and valid data; the interpretation and analysis are supported by the author's understanding of the industry, which has been acquired through many years of work. It is hoped that the research will use the least granular data, take into account the transformation of the industry, find explainable and inspirational results, and offer recommendations for the continued development of the industry.

4. Empirical Case Study

4.1 Investments and Overall Return of the Case Company

S company was established in 1999 and the earliest native firm in China that engaged in VC investment; by far, the firm has the largest number of investment projects and most prominent performance among all native Chinese VC firms. Of all the VC firms in the China Venture Capital & Private Equity Annual Ranking conducted by Zero2IPO during the 2001-2020 period, 21 currently still exist. S company was placed on the list for 20 consecutive years and topped the list six times. As of November 2021, S company had a total of 200 IPO and M&A projects; of the VC firms in China, S company has had the most investment projects and the best IPO performance. These investments spread across the entire country, cover all industries, and involve all stages of project development. Moreover, S company has not had any major changes to its investment styles since inception. As such, it constitutes the best native Chinese case for this study. Different from partnership-based funds, S company is an incorporated investment firm; it does not have a specific settlement period and can be viewed as a perpetual fund. Additionally, it has established many subfunds. The cutoff time for the data used in this research is March 2021, as of which S company had invested in 1,244 projects, including 183 that had gone through IPOs or M&As. The above data are reviewed and filtered so that only projects that went through IPOs or M&As within China after 2000 were retained; records with missing information or abnormal projects are eliminated from the dataset. As a result, a sample that contains 135 valid records is obtained. Furthermore, data on projects involving multiround investments or joint investments by multiple subfunds are adjusted by way of weighted averaging. After treatment, it is assumed that the data are unbiased and accurate and constitute a good sample for regression analyses. Overall, the sample shows that the average time between investment and the IPO is 3.74 years; the highest book return on exit is 74 multiples, with the lowest being 1.07 multiples and the average being 9.83 multiples. The highest annualized average return is 1,330%, with the lowest being 1.6%, and the average being 276%. The firm leads the industry in investment performance.

4.2 Regression Analyses and Hypothesis Tests

4.2.1 Definitions of Variables

(1) Dependent Variables

Return multiple: Multiple; Annualized average return: Return

Returns are measured using two indicators that represent the absolute return and relative return, respectively; investors can consider these indicators based on their capital cost and

opportunity cost, respectively. The simple rate, instead of the IRR, is used for the rate of return; this is because the simple rate is commonly used to evaluate stocks and funds in China's secondary market or in the long-term loan market. To enable comparisons, this study also uses the simple rate.

(2) Independent Variable

Holding time, the time between investment and the IPO (year).

For multiround investments, a weighted average is calculated for the different durations of investments based on the investment amounts; the actual exit time varies with the stock lock-up period and the firm's sales strategy. This study uses the IPO listing time as the exit time, thus eliminating the personalized differences in the sales. Although this is not the actual exit time, it is appropriate to use it for relative comparisons.

(3) Control Variables

- IPO Board: Main board – 1; SME board – 2; ChiNext – 3; STAR Market – 4. This indicator measures the impact of different IPO boards.
- Exit method: IPO is assigned a value of 1, and M&A is assigned a value of 0.
- Project characteristics

Area: Values of 1, 2, and 3 are assigned to each project based on the size and economic vitality of the city in which the project is located.

IPO PE: At certain times, the PE at issuance was set at a fixed number and therefore does not represent the market price; this study uses the 30-day dynamic PE after the IPO. The PE of a project can essentially reflect the market's pursuit of the project's industry segment.

Value: This is the average market capitalization within 30 days of the IPO, representing the scale of the project.

Issuance policy and market intensity (number of A-share issuances in the year of the investment, Inv issue number; and number of A-share issuances in the year of the IPO, IPO issue number): They represent how relaxed the issuance policies are. As fundraising and investment enthusiasm in the primary market of private equity are affected to a large extent by the number of IPOs in the year, this indicator can essentially represent the intensity of the primary market.

(4) Fixed effects

- Exit time: the year in which the project went through the IPO or M&A.
- Industry: the industry is divided into information technology, environmental protection, biomedicine, manufacturing, consumption, chemicals and new materials, and others

Table 1: Variable Summary

Variable Summary

Variable	Meaning of Indicator	Method of Calculation
	Dependent variables	
Log(Multiple)	Return multiple	Return multiple taken as the logarithm
Log(Return)	Annualized average return	Annualized average return taken as the logarithm
	Independent variable	
Log(Holding time)	Holding time	Holding time taken as the logarithm
	Control variables	
Board	IPO board	Values 1, 2, 3, and 4 are assigned to main board, SME board, ChiNext, and STAR Market, respectively
Exit method	Exit method	M&A – 0, IPO - 1
Log(PE)	PE indicator	30-day dynamic PE after IPO taken as the logarithm
Log(Value)	Market value indicator	Average market capitalization within 30 days of IPO, taken as the logarithm
Area	Area indicator	Values of 1, 2, and 3 assigned to each project based on the size and economic vitality of the city in which the project is located
Log(Inv issue number)	Industry intensity at time of investment	Number of A-share issuances in the year of investment, taken as the logarithm
Log(IPO issue number)	Industry intensity at time of IPO	Number of A-share issuances in the year of the IPO, taken as the logarithm

4.2.2 Core Hypotheses

The literature discussed previously has different conclusions regarding the relationship between investment returns and holding time. Based on the conclusions of most research, this study proposes hypotheses H1 and H2. In terms of other factors that influence returns, number of IPOs and market intensity are also discussed in the literature. Factoring in the characteristics of China's capital market as a developing market – the four A-share boards were rolled out at different times; the price differential between the primary and secondary markets is significant; and the A-share market's preferences for firms' characteristics rotate – the research proposes hypotheses for several control variables, including IPO board, exit method, project characteristics, and market intensity.

H1: The return multiple has a positive correlation with the holding time.

H2: The annualized average return has a negative correlation with the holding time.

H3: The exit board has a significant impact on exit returns.

H4: The exit method has a significant impact on exit returns (IPO or M&A).

H5: Project characteristics have a significant impact on exit returns.

H6: Issuance policies and market intensity have a significant impact on exit returns.

4.2.3 Model Design and Descriptive Statistics

The research selects two dependent variables, return multiple and annualized average return, to perform ordinary least squares (OLS) regressions, as shown in the following regression equation:

$$Y_i = \alpha_0 + \beta_1 * \mathrm{Log}(\mathrm{Holding\ time}) + \beta_2' X_i + \Sigma\,\mathrm{year} + \Sigma\,\mathrm{Industry} + \varepsilon_i$$

where Y_i is the dependent variable; α_0 is the intercept of the regression equation; β_i is the regression coefficient; Holding time is the independent variable; X_i denotes the vector consisting of all control variables; $\beta_2' X_i$ is the interaction of the control variables and their coefficient; year (exit year) and industry are the fixed effects; and ε_i is random disturbance.

Table 2: Descriptive Statistics of the Variables

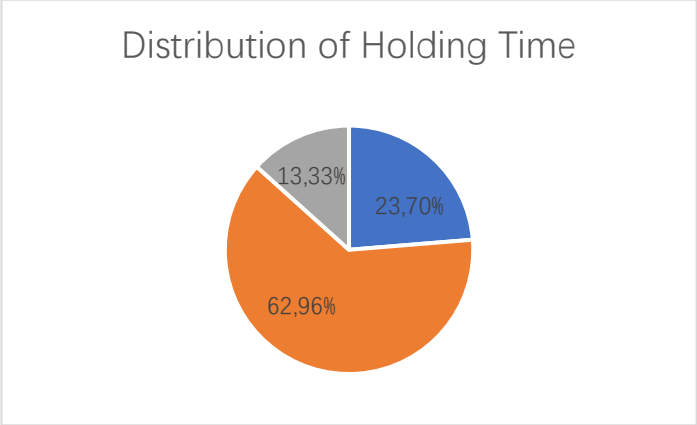
Descriptive Statistics of the Variables

Variables	N	mean	sd	min	max	Median
Multiple	135	9.827	10.062	1.07	73.96	7.09
Return	135	2.759	2.671	0.016	13.311	1.812
Holding time	135	3.743	2.338	0.36	12.56	3.19
Log(Multiple)	135	1.969	0.766	0.068	4.304	1.959
Log(Return)	135	0.570	1.054	-4.135	2.589	0.594
Log(Holding time)	135	1.128	0.644	-1.022	2.531	1.16
Log(PE)	135	4.242	0.670	3.031	7.248	4.186
Log(Value)	135	-0.420	0.964	-2.205	3.721	-0.654
Log(Inv issue number)	135	0.276	1.219	-3.912	1.477	0.432
Log(IPO issue number)	135	0.904	0.540	-0.446	1.564	1.019

The statistics in the above table indicate that S company has prominent overall performance over the past two decades. The highest return multiple is 73.96, and the lowest is 1.07; the mean multiple is 9.8, and the median is 7.09; the highest average annual return is 1,331%, the lowest is 1.6%, the mean is 267%, and the median is 181%; and the longest holding time is 12.56 years, the shortest is 0.36 year, the mean is 3.74 years, and the median is 3.19 years. The independent and dependent variables have relatively large standard deviations, indicating the sample data are dispersed.

In terms of holding time, of the 135 records in the sample, 32 projects have a holding time within 2 years, accounting for 23.7% of all projects; 85 projects have a holding time of 2-6 years, accounting for 62.96%; and 18 projects have a holding time of over 6 years, accounting for 13.33%. In general, if the time between investment and the IPO is within two years, the project is deemed a pre-IPO project; if the time is 2-6 years, the project is deemed a VC project; and if the time is over 6 years, the project is deemed a VC project that has had twists and turns in development or deemed an angel investment project. The projects in which S company invested cover all stages. VC investments account for the majority of projects, which are supplemented by pre-IPO investments; there is also a small number of angel investments.

Figure 3: Distribution of Holding Time



4.2.4 Results of Empirical Regressions

Control variables are added gradually to perform separate tests for the seven hypotheses proposed above and to continuously test the model's goodness of fit and robustness.

(1) Tests of Hypotheses H1 and H2

Regressions are performed for the two dependent variables, i.e., return multiple and annualized rate of return, with the holding time, while controlling for the fixed effects of IPO or M&A time and industry. The regression results are provided in the following table.

Table 3: Hypotheses H1 and H2

Variables	(1) Log(Multiple)	(2) Log(Return)
Log(Holding time)	4.592***	-4.408***
	(4.32)	(-3.00)
IPO time FE	Yes	Yes
Industry FE	Yes	Yes
Observations	135	135
F	18.69	8.98
Prob>F	0.00	0.00
R-square	0.209	0.324
Adj.R-square	0.142	0.198

Note: ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

The results indicate that when the return multiple is the dependent variable, holding time is positive and significant at the 1% level. When annualized average return is the dependent variable, holding time is negative and significant at the 1% level. The above results support hypotheses H1 and H2.

(2) Tests of Hypotheses H3 and H4

Two variables, IPO board and exit method, are added as control variables; regression analyses are performed for two dependent variables—return multiple and annualized average return—with holding time, and the results are provided in the following table.

Table 4: Hypothesis H3

	(1)	(2)
Variables	Log(Multiple)	Log(Return)
Log(Holding time)	5.010***	-4.020***
	(4.68)	(-2.70)
Board	1.918**	2.165*
	(2.30)	(1.87)
Exit method	0.585	2.860
	(0.22)	(0.78)
IPO time FE	Yes	Yes
Industry FE	Yes	Yes
Observations	135	135
F	8.25	4.53
Prob>F	0.00	0.01
R-square	0.364	0.215
Adj.R-square	0.233	0.109

Note: ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

The results indicate that after two categorical variables, i.e., IPO board and exit method, are added to the model and when return multiple is the dependent variable, holding time and IPO board are still significant, but exit method is not significant. Time is positive and significant at the 1% level; IPO board is positive and significant at the 5% level. When the annualized average return is the dependent variable, holding time and IPO board are still significant, and exit method is still not significant. Holding time is negative and significant at the 1% level; IPO board is positive and significant at the 10% level. The

above results indicate that both the return multiple and annualized average return increase with the shifts in IPO boards in the following order: main board-SME board-ChiNext-STAR Market. This finding supports hypothesis H3; meanwhile, exit method does not have a significant impact on either indicator, and H4 is rejected.

A multicollinearity test is performed for the model, as shown in the following table. Holding time, IPO board, and exit method all have a VIF that is less than 10; there is no multicollinearity.

Table 5: Hypothesis H4

	(1)	(2)
Variable	VIF	1/VIF
Log(Holding time)	1.15	0.869
Board	1.24	0.815
Exit method	1.03	0.969

(3) Test of Hypothesis H5

More factors that reflect a firm's characteristics, including 30-day dynamic PE after IPO, market capitalization within 30 days of IPO, and area of the project, are added as control variables. The regression results are provided in the following table.

Table 6: Hypothesis 5

Variables	(1) Log(Multiple)	(2) Log(Return)
Log(Holding time)	4.780***	-4.404***
	(4.30)	(-2.86)
Board	1.995**	2.335*
	(2.16)	(2.28)
Exit method	1.682	4.473
	(0.60)	(1.15)
Log(PE)	1.352	1.871
	(1.21)	(1.21)
Log(Value)	-0.266	-0.345
	(-0.31)	(-0.29)
Area	0.449	0.776
	(0.45)	(0.56)
IPO time FE	Yes	Yes
Industry FE	Yes	Yes
Observations	131	131
F	4.24	3.04
Prob>F	0.00	0.02
R-square	0.375	0.377
Adj.R-square	0.218	0.221

Note: ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

The results indicate that after the above control variables that represent the firm's characteristics are added to the model and when return multiple is the dependent variable, holding time and IPO board are still significant, but none of the variables representing the firm's characteristics is significant. When annualized average return is the dependent variable, the same conclusion is reached, so hypothesis H5 is rejected.

A multicollinearity test is performed for the model, as shown in the following table. The VIF of all independent variables is less than 10; there is no multicollinearity.

Table 7: Multicollinearity Test

Variables	(1) VIF	(2) 1/VIF
Log(Holding time)	1.27	0.784
Board	1.44	0.694
Exit method	1.35	0.740
Log(PE)	1.28	0.779
Log(Value)	1.43	0.697
Area	1.32	0.760

(4) Test of Hypothesis H6

In addition to the control variables above, two more control variables, i.e., number of A-share issuances in the year of investment and number of A-share issuances in the year of the IPO, are further added to the model; the regression results are provided in the following table.

Table 8: Hypothesis 6

Variables	(1) Log(Multiple)	(2) Log(Return)
Log(Holding time)	4.789***	-4.404***
	(4.29)	(-2.85)
Board	1.937**	2.335*
	(2.71)	(1.81)
Exit method	1.763	4.474
	(0.63)	(0.25)
Log(PE)	1.414	1.871
	(1.25)	(1.19)
Log(Value)	-0.377	-0.346
	(-0.43)	(-0.28)
Area	0.440	0.776
	(0.44)	(0.56)
Log(Inv issue number)	-0.341	-0.097
	(-0.68)	(-0.14)
Log(IPO issue number)	-0.275	0.080
	(-0.52)	(0.04)
IPO time FE	Yes	Yes
Industry FE	Yes	Yes
Observations	131	131
F	3.65	2.58
Prob>F	0.00	0.01
R-square	0.376	0.377
Adj.R-square	0.213	0.214

Note: ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

The results indicate that after the above control variables are added and when return multiple is the dependent variable, holding time and IPO board are still significant. However, the two variables that represent the pace of stock issuance and market intensity, i.e., number of A-share issuances in the year of investment and number of A-share issuances in the year of the IPO, are not significant. When annualized average return is the dependent variable, the same conclusion is reached, and hypothesis H6 is rejected.

A multicollinearity test is performed for the model, as shown in the following table. The VIF of all independent variables and control variables is less than 10; there is no multicollinearity.

Table 9: Multicollinearity Test

	(1)	(2)
Variables	VIF	1/VIF
Log(Holding time)	1.28	0.779
Board	1.46	0.681
Exit method	1.46	0.685
Log(PE)	1.34	0.747
Log(Value)	1.58	0.632
Area	1.32	0.756
Log(Inv issue number)	1.12	0.890
Log(IPO issue number)	1.45	0.688

The final equations are derived based on the regression results:

$$\text{Log}(Mutiple) = \alpha_0 + 4.789 * \text{Log}(Holding\ time) + 1.937 * Board + \beta_1{}' X_i + \Sigma\ year + \Sigma\ Industry + \varepsilon_i$$

$$\text{Log}(Return) = \alpha_0 - 4.404 * \text{Log}(Holding\ time) + 2.335 * Board + \beta_1{}' X_i + \Sigma\ year + \Sigma\ Industry + \varepsilon_i$$

4.3 Extended Investigation on the Overall Returns of the Case Company

In the above sections, the correlations between the exit returns of the IPO projects of S company and other variables are analyzed. For the VC industry, IPOs represent the most important exit avenues and sources of returns. In China, exits through M&As account for a smaller portion than that in the US; as such, an investment firm's performance is usually measured using the number of IPO projects and the return multiple of the IPO projects, and these are also the main indicators used for ranking firms in the industry. In addition to the performance of IPO projects, the exit ratio and the realizable value of the projects that have not been exited also have important impacts on an investment firm's overall performance. However, the two types of data above are firm secrets, and evaluations of current market

value lack uniform and fair criteria. Further, the two types of data are in a state of constant change. Before the settlement of a fund, it is difficult for the investment firm itself to calculate these indicators. S company is an incorporated entity; its funds can be cycled and reinvested, and there is no settlement period. As such, it is more difficult to calculate the exit rate and evaluate the residual value for S company. Fortunately, the data used in the case study cover a long time period, and the data for the middle period can be employed for a further analysis to improve the stability of the results. This section introduces indicators such as the multiple of the current value of projects that have not been exited, the overall return multiple, and the exit rate to further discuss the relationship between S company's overall return and the holding time. Due to the lack of uniform and fair criteria for assessing the data, quantified regression analyses and model development cannot be conducted; the analysis is just an expansion of the previous investigation.

In this section, the 2007-2017 period is used for the analysis. This period involves more than 800 investment projects. For S company, 2007 is an important year. At the year end of 2015, share-trading business reform was fully implemented, providing VC firms a normal avenue to exit. In 2016, investments in the entire VC industry experienced explosive growth, and for the first time, the total investment exceeded 100 billion Yuan. In 2017, S company also saw record growth in its investment, which exceeded 1 billion Yuan for the first time. During the 2007-2017 period, the total investment of S company was roughly maintained between 1 billion Yuan and 4.5 billion Yuan. The size of the firm during this period has a high degree of comparability. After 2017, the company's size of investment grew further and reached 10 billion Yuan in 2020. Considering the exit cycle, projects invested in after 2017 have not reached a stable state for exit. The 2007-2017 period offers certain stability and comparability and is used for the analysis. The current values for the projects that have not been exited are estimated using S company's internal evaluation criteria; the evaluation mainly considers the operational performance of the projects and the valuation for the next round of financing. These criteria are more robust and conservative than those adopted by VC funds in the open market. The analysis compares the value estimate with the original investment to derive the current value multiple for the projects that have not been exited. Then, the costs and values of the projects that have exited via IPOs and M&As are combined with those of the projects that have not been exited to arrive at the overall return multiple for the fund. Further, the proportion of investments in projects that have exited via IPOs and M&As in the total investment in the year the investments were made is calculated to derive the exit rate. The main data trends are as follows.

Figure 4: Current Value Multiple of Projects That Have Not Been Exited (2007-2017)

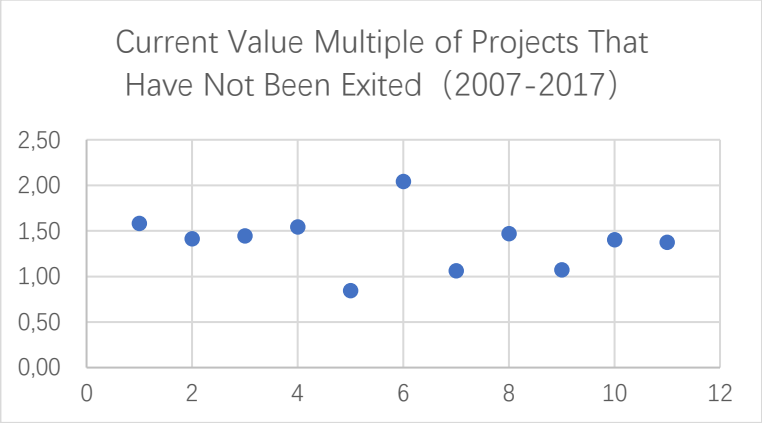


Figure 5: Overall Return Multiple (2007-2017)

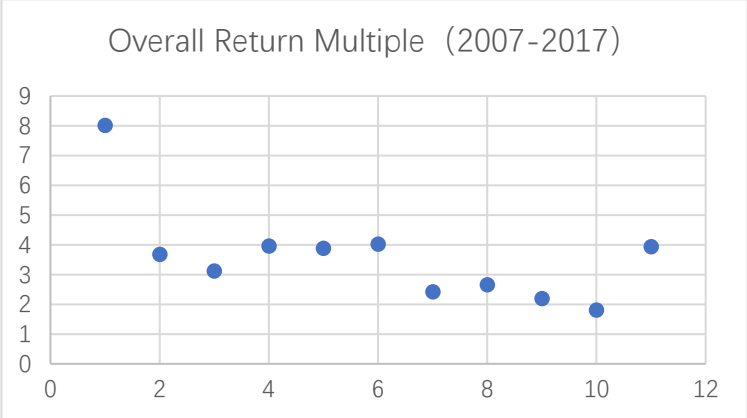
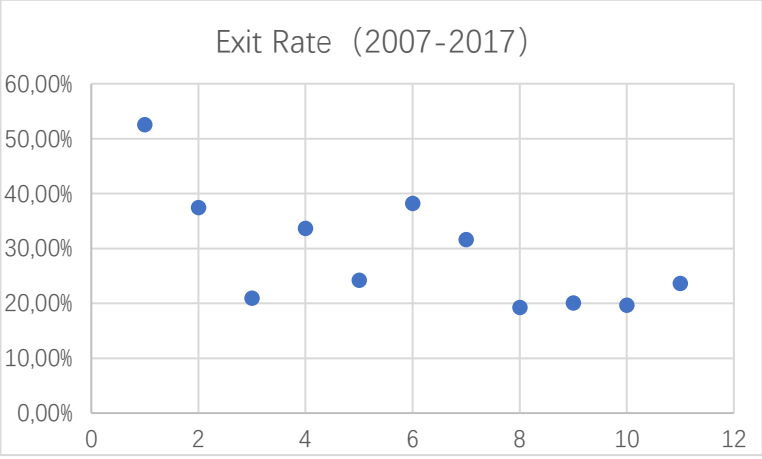


Figure 6: Exit Rate (2007-2017)



The above data indicate that the current value multiple of projects that have not been exited is essentially stable and does not significantly fluctuate with time. Most multiples are between 1 and 1.5, with an average of 1.38. The overall multiple shows a certain degree of correlation with time; the majority of multiples are between 2-4, and the average is 3.6.

As the current value of projects that have not been exited has neither a significant positive nor a significant negative correlation with holding time, the correlations of the overall return multiple and overall annualized average return with holding time should not deviate significantly from those derived via the regression analyses using the data of IPO projects. The exit rate calculated based on the projects investments is approximately 20-50% and increases with time, a finding that is consistent with the natural pattern; the average exit rate for all the years is 26.68%.

Based on the above parameters, it is estimated that the proceeds from IPO projects account for 70% of the total valuation of the fund. Given this ratio, the data estimates and model analysis performed for IPO projects can, to a certain extent, represent the overall performance of the fund.

4.4 Supplemental Information from Peer Firms

The following table presents the IPO information for renowned VC and PE firms in China for the year 2020. The data were collected by Zero2IPO, an industry research institution. The return multiple is not precise but is deemed to have high accuracy. As the statistics are only for one year, chances may have played a role in shaping the firms' returns, especially firms with a small number of IPOs. Overall, however, the statistics should reflect the industry's general situation and reveal certain trends within the industry.

Table 10: IPO Information

Institution	Number of IPOs in 2020	Number of IPOs on the STAR Market	Duration of Investment (year)	20-Day Return Multiple
Shenzhen Capital Group	21	8	3.93	7x
Hillhouse Capital Group	18	1	2.36	5x
Sequoia Capital	16	2	3.44	12x
Fortune Capital	15	7	4.92	14x
CDH Investments	12	6	2.68	3x
China Capital Investment Group	12	4	2.34	4x
IDG Capital	10	3	4.72	16x
Gold Stone Investment	10	7	4.24	7x
Passion Capital	9	3	2.23	2x
Qiming Venture Partners	9	3	4.08	15x
Cowin Capital	9	5	3.57	18x
Yida Capital	9	6	3.25	9x
Yingke PE	9	4	3.42	9x
Loyal Valley Capital	9	3	1.05	3x
Reform Fund	9	7	1.67	4x
Legend Capital	8	4	4.91	10x
Qianhai Ark	8	1	2.80	4x

A trend chart analysis is performed for the above data. The return multiple shows a clear positive correlation trend with holding time; a correlation between annualized average return and holding time is not evident, but a minor positive correlation is observed. In terms of the specific numbers, the average holding time for IPO projects is 3.27 years; the average multiple is 8.35; and the average annualized return is 210%. China's leading VC institutions have realized ideal returns from IPO projects. When the above findings are compared with those for S company, the conclusions regarding the correlation between return multiple and holding time are consistent, but the conclusions regarding the correlation between annualized average return and holding time differ. This may be because the data in the above table are only statistics for one year, and the holding time is approximately 2-5 years. This holding time duration usually yields maximal absolute and relative returns, while the holding time for the case study is up to 12 years, which may have, to a certain extent, undermined the relative return of the sample.

Figure 7: Holding Time and Return Multiple

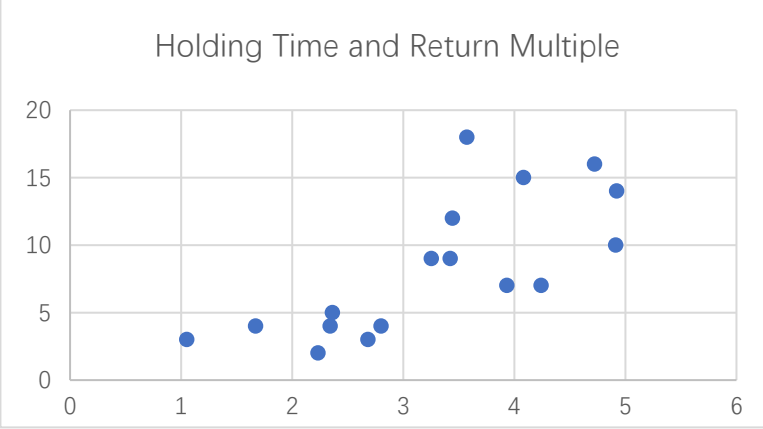
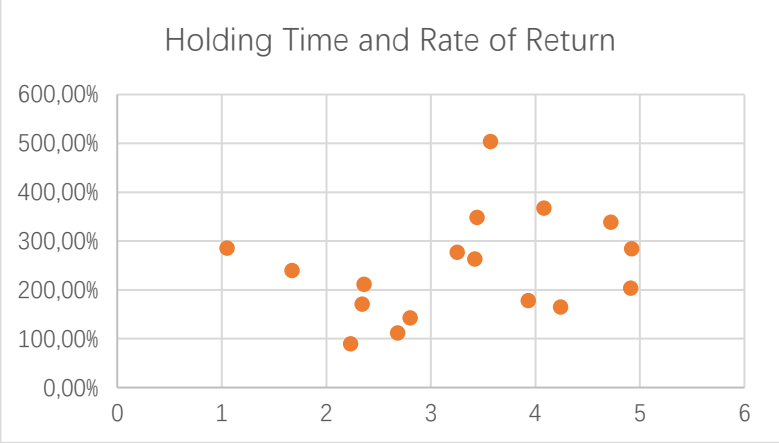


Figure 8: Holding Time and Rate of Return



4.5 Summary of Findings

In this chapter, multiple regression analyses are performed using the IPO project data of the case company, and the following conclusions are reached.

(1) Return multiple and holding time are positively correlated. Firms' growth, which is at the cost of time, increases returns. Annualized average return is negatively correlated with holding time. Among S company's projects, 63% have an exit cycle of 2-6 years. Overly long exit cycles undermine returns. However, after a concentrated exit period, projects that have not been exited will face increased difficulty in exiting and greater risk of loss with investing dragging on.

(2) IPO board has a significant impact on returns. Returns gradually increase with IPO board shifts in the following order: main board, SME board, ChiNext, and STAR Market.

(3) Exit method does not have a significant impact on returns. Meanwhile, when an investment project is acquired by a listed company, it may also achieve good returns.

(4) Project characteristics do not have a significant impact on returns. The area of the project, the market capitalization of a firm, and the PE of IPO projects do not have a significant correlation with exit returns. These findings indicate that investment preferences and pricing rules in the primary market are similar to those in the secondary market, and there are no significant differences between the preferences in the two markets.

(5) Issuance policy and market intensity do not have a significant impact on returns. The number of new stock issuances, which represents the pace of stock issuance and the mentality of the primary market, either in the year of investment or the year of the IPO, is not significantly correlated with exit returns. As a long-term business, VC investing is relatively tolerant of short-term policy fluctuations.

In addition to the above conclusions, this study also analyzes S company's projects that have not been exited. Using the exit rate and other indicators, the research examines the relationship between holding time and returns by focusing on a firm's overall return. The findings support the major conclusions arrived at via the regression analyses using the IPO project data.

To redress the possible bias as a result of using a single case, further supplemental analysis is provided using data of the VC industry at large, and the findings essentially support the conclusions drawn from the case study.

5. Conclusion and Outlook

5.1 Research Conclusion and Findings

After two decades of meaningful development, China's VC industry has realized rapid growth and achieved a prominent scale and vitality. Amidst the rapid transformation of Chinese society, capital market policies, hot-spot industries, sources of fundraising, and qualifications of practitioners of the VC industry have experienced constant change during the past 20+ years. This is a period marked by twists and turns. In the rapid development, scholars and industry practitioners have not systematically analyzed the industry's development patterns; data-based, impartial analyses of the industry's patterns are lacking because, first, the industry has a short history and has not accumulated sufficient data and, second, fundraising at a time when the industry is still in a state of immaturity did not entirely rely on a firm's historical performance, and therefore, firms tend to remain silent about their performance or to exaggerate the data. With the VC industry growing increasingly mature and normalized, investors, industry research institutions, and social evaluation systems are gaining a better understanding of the industry, and their evaluations of VC firms' performance and judgments about the industry's development patterns are also continuously improving; as such, data-based industry studies and policy evaluations become ever more important.

This study examines the underlying logic of the VC industry's sources of returns and collects data on the industry's actual returns as well as data on the factors that influence these returns. Regarding data collection, the research provides an overview of the development of China's VC industry and the selection of investment stages. By way of a case study, this study analyzes and compares the relationship between investment returns and holding time through multiple dimensions. Further, we offer recommendations on selecting investment stages and determining the holding time from the perspective of maximizing the economic interests of VC institutions and investors. The main findings and conclusions of this study are as follows.

(1) Reasonably shifting investments to earlier stages is an option for optimizing economic benefits. The analyses based on S company's data indicate that the return multiple of investments is positively correlated with the holding time - time plays its part - and pre-IPO projects are not necessarily the optimal option for most VC institutions. For VC firms with a certain degree of experience, investing in earlier-stage projects to increase returns is a rational and economical option. Regarding the relative return, the annualized

average return is negatively correlated with holding time, indicating that an excessively long holding time will reduce the time value of capital. In practice, the holding time of leading institutions' IPO projects is mainly concentrated within 2-5 years; the period for S company is 2-6 years. Considering the IPO lock-up period and limit on sales, the actual exit time is 3-8 years. To cover all the steps in a fund's cycle, including investment preparation, sale of IPO projects, and dealing with projects that do not go through IPOs, the appropriate duration for a fund is 8-10 years. This arrangement can essentially cover a project's needs from the early stage to the growth stage and enables VC firms to reap all economic interests that may accrue through the entire exit cycle; therefore, these firm will not miss opportunities to invest in high-return projects due to limitations of investment staging. Data from the case company and the industry's leading firms indicate that the annualized average return of IPO projects exceeds 200%; factoring in the high proportion of IPO projects among the overall investments, the overall returns of funds should also reach a relatively high level. For VC investors and experienced fund managers, given that risk-free returns continue to decrease and the opportunity costs of society as a whole has declined, appropriate investments in high-risk assets is recommended. Considering the surplus of human resources as a result of fundraising and fund settlement and the idling of capital while seeking investment opportunities, frequently entering and exiting later-stage projects to gain higher annualized returns has operational difficulties and may not achieve the expected results.

Regardless of which measure is used - absolute exit return or relative exit return on IPO projects – the performance of China's VC firms is prominent and unachievable in mature capital markets because China's capital market is still in a period of rapid development, which offers a dividend period to leading VC firms that were established earlier and have abundant experience. However, as the VC industry gradually matures and competition among investment institutions intensifies, exit returns will decline. The phenomenon in which a large amount of funds is concentrated during one stage will further reduce the returns from that stage; accordingly, firms making differentiated choices based on their comparative advantages and balancing their investments in different stages will become trends in the VC industry.

(2) The performance of the exit returns in China's capital market is closely related to trending issues in society. Regarding the regression results for the control variables, IPO board has significant impacts on returns. More recently established boards tend to attract a greater amount of capital, in the following order: main board, SME board, ChiNext, and STAR Market. New boards and new concepts are pursued with more enthusiasm under the

theme of innovation. From traditional to emerging industries, requirements for financial indicators under stock issuance policies are incrementally relaxed. Innovation premiums are evident. Furthermore, the A-shares market does not have a fixed preference regarding the scale of enterprise; in comparison with mature capital markets, China's capital market is more friendly toward small and medium-sized enterprises. The above characteristics are somewhat related to the general atmosphere of Chinese society, which places high value on innovation and entrepreneurship, industry upgrade, and technological progress; these characteristics are also related to government policies that endeavor to drive industry transformation and the development of small and medium-sized enterprises.

(3) A characteristic of the long-term performance of VC firms is that it transcends micro policies and economic cycles. Due to the long cycles of VC investments, if capital market policies support overall development trends, short-term policy fluctuations and adjustments do not have a significant impact on VC firms' performance. However, these fluctuations have a significant impact on fundraising by VC funds, in turn affecting the strength of investments. Due to expectations, investors are very responsive to the policy environment and the intensity of the capital market. Inconsistencies in fundraising and investing will destabilize the strength of support for industry development and entrepreneurship. The stability of capital market policies and publication and communication of more impartial data for the VC industry will help foster a positive environment for fundraising and investing and generate investors who value long-term investments.

5.2 Recommendations for the Industry and for Policy Development

(1) Focus on Industry Segmentation and Effectively Allocating Funds

Practitioners should impartially analyze the industry's data and development patterns, select reasonable investment stages based on their own strengths, and formulate their own unique investment style. Clustering in one stage will not help meet firms' continuous need to raise funds and develop at various stages, nor will it facilitate efficient resource allocation. Blindly clustering in later stages will intensify competition and undermine returns at the stage.

(2) Enhance the Consistency and Stability of Capital Market Policies

As discussed above, although the VC industry may transcend short-term policies and economic cycles, the instability of capital market policies with regard to issuance and

supervision can significantly influence society's mentality and affect the action plans and rhythm of investors and fund managers. A stable policy environment will promote the industry to develop a continuous economic feedback mechanism, eliminate the impact of human-made economic cycles on development, and facilitate efficient resource allocation in the VC industry. Furthermore, consistency and stability of the IPO process will effectively reduce the price differential between the primary and secondary markets and lower the industry's enthusiasm for pre-IPO projects, so that firms will focus more on value contributions from firms' endogenous growth.

(3) More Effectively Utilizing Governments' Leading Role as Investors

As China's VC industry has a short history and it has yet to be fully understood by society, the funding sources of China's VC industry are significantly different from those in the US. During recent years, governments and state-owned enterprises have accounted for a growing proportion of funds raised by the VC industry and have become the most important funding sources of RMB funds. State-owned investors tend to set explicit constraining conditions on the industries and investment stages for fund managers. Further, state-owned investors also have stringent conditions regarding management fees and CARRIE allocation. The pursuit of profits has undermined state-owned investors' strength in providing policy directions. Further, state-owned investors tend to focus more on short-term indicators of government performance (e.g., driving up the number of IPO projects and increasing tax revenues) but provide insufficient momentum and motivation that drive the long-term development of industries and society as a whole. This phenomenon, to a certain extent, weakens the effect of policy implementation.

The data presented herein indicate that leading institutions have an evident dominance in China's VC market. In 2020, the top 30 early-investment institutions accounted for 81% of total investments; the top 50 VC institutions accounted for 56% of total investments; and the top 50 private equity institutions accounted for 39% of investments. By focusing on guiding and motivating leading institutions, the government can improve the effect of policy instruments. It is recommended that the government involve representatives from leading institutions in developing industry policies and providing guidance to the industry to improve the operability of policies.

(4) Developing Taxation Policies that Enhance the Development of the VC Industry

Leading VC institutions exhibit prominent performance regarding their returns; however, it is difficult for privately owned firms to raise funds. Taxation policies for the VC industry have changed substantially across the years; standards for turnover taxes and income taxes imposed on the VC industry are the same as those imposed on the most

traditional firms. Tax policies for the VC industry are inferior to those for private equity funds in the secondary market. After layers of taxation, investors' actual tax burden is more than 40%, which significantly reduces society's enthusiasm in investing surplus capital in the VC industry. Across the years, the government has been affirmative about the VC industry's contributions to technological innovation and industry development and has been vocal in supporting the VC industry; however, no substantial taxation policy that supports the industry's development has been rolled out.

5.3 Research Gaps and Outlook for Future Research

5.3.1 Research Gaps

Through a case study, the correlation between VC's IPO exit returns and holding time was tested, and clear conclusions were reached. However, the research still has certain limitations and gaps.

(1) The research sample is small.

In this study, 135 projects of the case company that have been exited via IPOs or M&As are used for the case study; given the small sample size, the explanatory power of the regression model is somewhat limited.

(2) There are limitations regarding the case company. S company is an incorporated firm and does not have definite fund duration periods and settlement periods. Its own funds are cycled for reinvesting; therefore, there is not a cutoff time for the calculation of funds' overall return, and indicators such as overall return multiple and rate of return keep changing across time. Furthermore, the case company mainly invests in VC and PE stages and have few investment projects at the angel stage. As a case study for the entire industry, the analysis falls short in terms of coverage.

(3) The research lacks analyses for different time periods. Over the past two decades, China's VC industry has seen many changes, and the situations during different time periods and development stages may differ. Regression analyses are performed using data for the entire period from 2000 to March 2021. Limited by the amount of data and considering the main theme of this study, the research does not pursue more detailed studies on different time periods and different trending events of the industry.

(4) The holding time does not take into account factors related to the IPO approval time or IPO standards. In this study, holding time is used to represent the investment stage. In reality, the IPO approval time has an evident impact on holding time. If the IPO process is

accelerated, given a specific fund cycle, VC firms would have more time in the cycle to invest in earlier projects. Further, IPO standards also have an evident impact. After the STAR Market was rolled out, the financial criteria for IPO approval were relaxed. As a result, certain firms in the semiconductor and biomedicine industries were able to go public via IPOs even before generating meaningful revenues and making profits; in comparison with the previous process, the holding time was significantly shortened when investing in the same stage. There are certain difficulties in quantifying the above factors, and those challenges are not the focus of this study either; as such, the research does not address these issues. It should be noted, however, that research on these factors would be valuable to the industry's development and practices.

5.3.2 Outlook for Future Research

Given the research gaps discussed above, future research should further investigate the following areas:

(1) Continue to trace IPOs in the case company to provide data after March 2021 – With the increase in the sample size, the model can be further tested for its explanatory power. Additionally, the research object can be expanded to include other firms in the industry. Through collaboration with peers in the industry, the researcher can broaden the research scope to cover angel investments, VC investments, and private equity investments and help make the industry data more open and objective.

(2) To further refine the research directions and develop separate topics for the studies – Such topics as the different patterns at different development stages of China's VC industry, the impact of trending issues in the IPO market on investment returns, and the impact of the IPO approval process on investment returns and investment stages all have practical value and can be further pursued in future research.

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