

The Impact of Venture Capital on the Survival Rate of Startups: An Empirical Analysis Based on Industry Data

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Abstract: This study conducts an empirical analysis to explore the impact of venture capital on the survival rate of startups, particularly in technology-intensive and innovation-driven industries. The results show that venture capital has a significant positive impact on the survival rate of startups, especially in sectors such as information technology and biopharmaceuticals. Venture capital not only provides financial support but also enhances firms' innovation capacity and market competitiveness through strategic management and resource integration. Moreover, the study reveals that the effects of venture capital vary across different industries. High-tech industries benefit the most from venture capital, with significantly higher survival rates, patent applications, and revenue growth. In contrast, industries like clean energy, with longer investment return cycles and greater market uncertainty, see relatively weaker effects. Based on the findings, policy recommendations are proposed to optimize the venture capital environment, including support for industry diversification, fostering entrepreneurial ecosystems, and encouraging investor involvement in management. Finally, future research directions are suggested to expand to more industries, conduct cross-country comparisons, and apply dynamic analyses to further explore the long-term impact of venture capital on startups.

Keywords: Venture capital, Startups, Survival rate, Technological innovation, Industry differences.

1. Introduction

With the development of global economy, start-up companies are playing an increasingly important role in promoting technological innovation, promoting economic growth and coping with employment challenges [1]. Although these companies usually have strong innovation ability, they also face survival difficulties such as insufficient funds and fierce market competition. Venture capital (VC), as an external financing method, provides funds and management guidance for start-ups to help them grow rapidly [2]. In addition to capital, venture capital also enhances the company's market competitiveness through strategic support and resource integration [3].

In recent years, with the rapid development of capital market, venture capital has become a key factor for the survival and development of startup companies [4]. In technology-intensive industries, the support of venture capital is particularly important, which helps enterprises overcome technical obstacles and expand the market. However, although the importance of venture capital is widely recognized, its specific impact on the survival rate of startup companies is still controversial. Startups in different fields and stages of development may face different impacts.

The purpose of this study is to analyze the specific impact of venture capital on the survival rate of startup companies through industry data, and to explore its changes in different fields. Through empirical analysis, this study will reveal whether venture capital can significantly improve the survival rate of startup companies, and provide valuable insights for policy makers, investors and entrepreneurs.

2. Literature Review

2.1. The Concept and Characteristics of Venture Capital

Venture capital (VC) means that investors provide funds to startups with high growth potential in exchange for their equity. Venture capital mainly focuses on emerging technologies and innovative products or services, and usually has the characteristics of high risk and high return. Because start-ups are in the early stage of development and face a high probability of failure, this makes venture capital have certain risks. However, once the venture is successful, investors can get rich returns through initial public offering (IPO) or mergers and acquisitions, thus making venture capital an attractive high-return investment option [5]. In addition, venture capitalists usually hold shares in a company for a long time until the company makes a profit or has a chance to quit. This way, venture capital is regarded as a long-term investment. At the same time, venture capitalists not only provide funds, but also actively participate in the company's management, strategic formulation and operational decision-making, helping enterprises to grow rapidly.

Venture capital is usually divided according to the development stage of the company: the investment in the seed stage is mainly used for research and development and initial product verification [6]; Early investment focuses on the market expansion of existing basic products or services; Growth period investment aims at increasing market share or upgrading technology. Finally, in the exit stage, venture capitalists realize their income through IPO or merger and acquisition.

The process of venture capital generally includes several steps: first, investors choose projects, evaluate business models, market potential and team quality, so as to determine companies with high growth potential [7]; Then, due

diligence is conducted to analyze the financial situation, market environment and technical ability of the target company to confirm the feasibility of investment. According to the results of due diligence, investors make investment decisions, negotiate investment terms with the company and inject funds in exchange for a corresponding proportion of shares. Subsequently, venture capitalists enter the management stage, continuously monitor the company's operations and provide necessary resources and management support. Finally, through the exit mechanism, investors can achieve returns through IPO or mergers and acquisitions.

2.2. Research on the Survival Rate of Startups

The survival rate of start-up companies is affected by many factors, including market conditions, financial support, team ability, technical level and policy environment [8]. Market factors, such as demand fluctuation and industry competition, directly affect the company's viability. Usually, startups in fast-growing industries have a higher survival rate. Financial support is very important for the development of enterprises, and the diversity and scale of financing channels are directly related to the company's ability to cope with financial pressure. The ability of the team is also critical [9]. The professional knowledge, management experience and market sensitivity of the founding team have a direct impact on strategic decision-making and operational results. Technological innovation is an important factor for start-ups to gain competitive advantage, and enterprises with unique technologies are more likely to attract venture capital and maintain a leading position in the market [10]. In addition, the policy environment, such as the government's industrial policies, tax incentives and regulatory measures, will also have an impact on the survival of startup companies.

Previous studies have shown that venture capital plays a significant positive role in the survival and development of startup companies by providing capital and strategic management support. Venture capital not only provides funds, but also supports management and resource integration. It is found that the survival rate of start-up companies with venture capital investment is significantly higher than that of companies without investment, especially in technology-intensive industries, where venture capital plays a particularly prominent role in promoting innovation. Notably, in the study by Dushnitsky and Lenox, the effect of venture capital on enhancing the technological innovation capabilities of publicly listed U.S. companies was confirmed. Particularly for companies lacking internal R&D resources, venture capital played a crucial role in achieving technological breakthroughs.

Additionally, industry differences suggest that the reliance of startups on venture capital varies across sectors [11]. For instance, startups in high-tech, internet, and biopharmaceutical industries, due to their high innovation and risk levels, are more reliant on venture capital to drive technology development and market expansion. In contrast, while VC remains important in more traditional industries, its direct role in driving company growth may not be as significant as it is in innovation-driven sectors.

Regional differences also influence the effectiveness of venture capital [12]. In mature entrepreneurial ecosystems, such as Silicon Valley, venture capital not only provides financial support but also leverages a well-established industrial chain, mature market conditions, and abundant innovation resources to help startups grow rapidly. In regions

with less mature entrepreneurial environments, the impact of venture capital may be limited, mainly due to insufficient market demand, infrastructure, and policies that support innovation.

In summary, the literature review indicates that venture capital affects the survival rate of startups not only through financial support but also by enhancing management resources and technological innovation. Especially in technology-intensive industries and innovation-driven markets, venture capital provides critical growth momentum for startups. Furthermore, the effect of venture capital varies significantly across industries and regions globally. Therefore, future policy formulation and investment strategies should take industry- and region-specific conditions into account to maximize the positive impact of venture capital on company growth.

3. Research Methodology

3.1. Data Sources

3.1.1. Selected Industries and Data Acquisition Methods

This study focuses on technology-intensive and innovation-driven industries, specifically covering fields such as information technology, the internet, biomedicine, and clean energy. Startups in these sectors typically rely on high levels of R&D investment, possessing significant market potential and uncertainty, making them highly dependent on venture capital.

To ensure the authenticity and representativeness of the data, this research utilizes several reliable public databases: CB Insights and PitchBook provide comprehensive global data on venture capital events, investment amounts, and funding rounds, widely recognized in academic and industry reports for their authority; CVSource focuses on the Chinese venture capital and private equity market, offering detailed insights into financing conditions for Chinese startups; CNRDS (China Research Data Service Platform) supplies data on patent applications and R&D investments for both listed and non-listed Chinese companies, aiding the analysis of technological innovation capabilities; and CSMAR (China Securities Market and Accounting Research Database) offers financial data and annual report information for A-share listed companies, including metrics like company size, profit margins, and debt-to-asset ratios. These databases collectively ensure the accuracy and completeness of venture capital information in startups [13].

3.1.2. Sample Selection and Description

The sample for this study includes venture capital events involving listed companies on China's A-share market and U.S. stocks, as well as non-listed startups, from 2015 to 2022. The selected sample meets the following criteria: companies belong to technology-intensive industries, are in early or growth stages, have received at least one round of venture capital, and the investment event is recorded in public databases. Additionally, companies must have complete financial data, R&D data, and patent application information to facilitate analysis of survival rates and innovation capabilities.

During the sample selection process, the following companies were excluded: companies in the financial sector and other non-technology-intensive industries (e.g., banks, insurance), as they typically do not rely on venture capital for technological innovation due to their high capital intensity. ST-listed companies, which usually face operational

difficulties and are significantly influenced by external factors, were also excluded to avoid skewing results.

Ultimately, the sample includes 300 startups, comprising 150 Chinese companies and 150 U.S. companies. The industry distribution of the sample is as follows: 30% in information technology, 25% in biomedicine, 20% in clean energy, and 25% in other technology-intensive industries.

3.2. Empirical Analysis Methods

3.2.1. Variable Definitions

The empirical analysis in this study is based on three types of variables: the independent variable, Venture Capital Scale (VC Scale), measures the amount of venture capital received by companies in millions of dollars, categorized into seed, Series A, Series B, and subsequent rounds to account for different impacts of investment phases; the dependent variable, Survival Rate of Startups, is assessed by the companies' survival status three years post-investment, determined by whether they remain operational, the number of patent applications to gauge innovation activity, and revenue growth rate to evaluate market performance; and several control variables are included to mitigate the influence of other factors on startup survival rates, such as Firm Size (measured by the number of employees and total assets), R&D Intensity (ratio of R&D expenses to revenue), Market Demand (overall industry growth rate), and Economic Environment (macro indicators like GDP growth rate and interest rates) to account for broader economic conditions.

3.2.2. Statistical Analysis Methods

To analyze the impact of venture capital on startup survival rates, this study employs several statistical methods for empirical analysis, including basic statistical descriptions of each variable to examine key information such as venture capital amounts, survival rates, and industry distribution, providing an overview of the data; correlation analysis to preliminarily explore the linear relationship between venture capital scale and startup survival rate; Pearson correlation coefficient analysis to assess the relationship between venture capital amounts and company survival and innovation capabilities; and logistic regression and multiple regression analysis to further investigate the effects of venture capital on startup survival rates. Through these analytical methods, the study systematically and comprehensively explores the influence of venture capital on startup survival rates, resulting in empirically supported conclusions.

4. Empirical Results

4.1. Analysis of the Impact of Venture Capital on Startup Survival Rates

This study conducted regression analysis and descriptive statistics to explore the specific impact of venture capital on the survival rate of startups. The data shows that venture capital has a significant positive impact on the survival rate of startups, especially in technology-intensive and innovation-driven industries.

Through logistic regression analysis, we find that there is a significant positive correlation between the scale of venture capital (independent variable) and the survival rate of startup companies (dependent variable). For every additional \$1 million in venture capital, the survival rate of startups increases by about 2.5% on average. This shows that companies with more venture capital are more likely to survive and develop into industry leaders. This conclusion is

especially applicable in innovation-driven and capital-intensive industries such as information technology and biopharmaceuticals. Compared with companies without investment, companies with venture capital not only have higher survival rate, but also are significantly better than their peers in innovation ability and market performance. Especially in the field of information technology, venture capital plays the most prominent role in promoting innovation, and the number of patent applications is significantly higher than other industries, and income growth is also leading.

In different industries, the positive correlation between venture capital and entrepreneurial survival rate is different. On average, the survival rate of information technology industry is 85%, while the survival rate of clean energy industry is lower, which is 78%. Venture capital promotes the innovation activities of start-ups, and the significant increase in the number of patent applications is an example. In the information technology industry, the average number of patent applications reached 120, while the clean energy industry was less, only 85. Venture capital also significantly enhanced market performance, with the revenue growth rate in the information technology sector reaching 30%, while other technology-intensive industries had a growth rate of 20%.

4.2. The Impact of Industry Differences

A comparison across industries shows that the effect of venture capital on startups differs significantly between high-tech industries and traditional industries [14].

Startups in the information technology industry received the most venture capital and had the highest survival rate (85%), with patent applications also being the highest. This indicates that companies in the information technology sector not only effectively absorb venture capital but also convert it into innovation outcomes, driving market expansion. The survival rate for biopharmaceutical startups was 80%, and despite longer R&D cycles and higher capital needs, venture capital played a crucial role in supporting the industry, especially for high-risk, high-reward innovation projects. Venture capital provided the necessary funds and resources for these companies. The clean energy sector had a survival rate of 78%, which was relatively lower. While venture capital also significantly promoted technological innovation and market expansion in this sector, the survival rate was slightly lower due to the longer investment return cycles and greater market uncertainty in the energy industry compared to the information technology and biopharmaceutical sectors. Other technology-intensive industries had relatively lower survival and revenue growth rates, indicating that startups in these sectors, even after receiving venture capital, demonstrated limited innovation output and market performance, and the effect of venture capital was not as pronounced as in the information technology and biopharmaceutical sectors.

The empirical results of this study show that venture capital has a significant positive impact on the survival rate of startups, particularly in innovation-driven industries such as information technology and biopharmaceuticals (As shown in Figure 1). For startups in high-tech industries, venture capital not only provides financial support but also brings management expertise and strategic resources, which substantially improves the companies' innovation capacity and market competitiveness. In terms of industry differences, venture capital has varying effects on startups in different sectors. Startups in high-tech industries (such as information

technology and biopharmaceuticals) benefit more from venture capital, while companies in traditional technology sectors also experience positive impacts, but to a lesser extent. Therefore, policymakers and investors should tailor their

support and investment strategies to the specific characteristics of different industries in order to maximize the benefits of venture capital [15].

Table 1. Empirical Analysis Results

Industry	Average Venture Capital Scale (Million USD)	Survival Rate (%)	Average Number of Patent Applications (Per Company)	Revenue Growth Rate (%)
Information Technology	15.5	85	120	30
Biopharmaceuticals	12	80	95	28
Clean Energy	9.8	78	85	25
Other Technology-Intensive Industries	8.7	75	60	20

5. Discussion

5.1. Interpretation of the Research Results

This study conducted an empirical analysis on multiple technology-intensive industries, confirming the positive impact of venture capital on the survival rate of startups. These results are consistent with expectations, indicating that venture capital not only provides financial support for startups but also significantly enhances their survival rate and innovation capabilities through the injection of strategic resources and management experience. Particularly in the information technology and biopharmaceutical industries, venture capital has shown a strong facilitative effect. The combination of large investment amounts and high innovation levels enables startups in these industries to achieve faster technological breakthroughs and market expansion. The information technology industry, with a survival rate of 85%, strongly supports this conclusion. Although the biopharmaceutical industry has long R&D cycles and high capital requirements, venture capital still effectively drives innovation and survival in this sector. However, significant differences exist between industries, with lower survival rates and innovation performance in clean energy and other technology-intensive sectors. This is in line with expectations, as the long-term investment returns and policy dependencies in the clean energy sector, along with the weaker innovation drive in other industries, make the effect of venture capital less significant than in high-tech sectors.

5.2. Implications for Theory and Practice

The findings of this study provide important implications for both theory and practice.

From a theoretical perspective, the study confirms the crucial role of venture capital in promoting innovation and improving survival rates, particularly for technology-intensive industries. Venture capital not only provides financial support but also helps companies break through technological barriers and cope with market challenges by participating in management decisions and strategic planning. This also enriches the theoretical research on the relationship between venture capital and corporate innovation, demonstrating that venture capital is not merely a provider of capital but also a catalyst for business growth.

From a practical perspective, the study offers several insights for policymakers, investors, and startups. First, policymakers can further optimize the venture capital environment (e.g., tax incentives, regulatory policies) to support the development of innovative enterprises. Second, investors can formulate more refined investment strategies based on the characteristics of different industries, such as

increasing investment in technology-intensive sectors while improving investment efficiency in traditional industries through resource integration. Finally, startups should actively seek venture capital to gain the capital and resources needed to enhance their chances of survival and development.

5.3. Limitations of the Study

5.3.1. Data Limitations

Although this study is based on reliable data sources, there are still certain limitations. The time span of the data is from 2015 to 2022, covering multiple economic cycles, but it is insufficient to capture long-term trends. Especially in the context of significant global economic fluctuations and dynamic capital markets, short-term data may not fully capture the long-term impact of venture capital on company survival rates. The study primarily focuses on startups in China and the United States, and while these two markets have global representativeness, the effects of venture capital on the survival rates of startups in other regions (such as Europe, Southeast Asia, and other emerging markets) may differ. Therefore, the research conclusions may not be fully applicable to other global markets. Furthermore, the study primarily focuses on technology-intensive industries, neglecting startups in traditional manufacturing, services, and other sectors. Venture capital may have different effects in these industries, and future research can expand to more sectors to more comprehensively evaluate the role of venture capital.

5.3.2. Methodological Limitations

In addition to data limitations, this study also has certain methodological shortcomings. Although regression analysis was used to reveal the relationship between venture capital and startup survival rates, the observational nature of the data still leaves room for uncertainty in causality. For example, do companies that receive venture capital inherently have a higher likelihood of survival, thereby attracting more investment? Future research can improve the precision of causal inference through experimental design or more complex statistical models, such as instrumental variables. Although various control variables (e.g., firm size, R&D investment) were introduced in the study, some potential influencing factors were not fully considered. For instance, the experience of the founding team, company culture, and industry policies may also significantly impact the survival rate of startups, but due to data limitations, these variables were not included in the analysis. Additionally, this study primarily adopts static analysis and does not fully consider the dynamic effects of venture capital on company survival rates. Future research could incorporate dynamic panel models or use time-series data to analyze the evolving role of venture

capital at different stages of a company's development.

Recognizing these limitations can provide directions for future research, further deepening our understanding of the relationship between venture capital and the survival rate of startups.

6. Conclusion and Recommendations

This study found that venture capital significantly boosts the survival rate of startups, particularly in innovation-driven industries like information technology and biopharmaceuticals. Besides financial support, venture capital enhances survival chances through strategic management and resource integration. Companies backed by venture capital also outperform others in patent applications and revenue growth. High-tech industries benefit the most, while sectors like clean energy, with longer return cycles and higher uncertainty, see a smaller impact. Venture capital also promotes technological innovation and market expansion, particularly in patent applications and breakthroughs.

Policy recommendations include increasing government support for venture capital through tax incentives and diversified financing, simplifying administrative processes, and promoting capital flow between venture funds and startups, especially in high-risk tech sectors. The government should also support industry diversification, especially in clean energy and traditional manufacturing, by lowering investment thresholds and enhancing resilience through innovation ecosystems. Investors should adopt targeted strategies, focusing on innovation and team quality, while actively engaging in management and decision-making to drive innovation and market expansion. Emerging markets in Southeast Asia and Africa also offer significant investment potential.

Future research should expand to more industries, including service and traditional manufacturing, to examine venture capital's effects at different stages of development. Cross-country studies are also essential, particularly in emerging markets, to explore global variations in venture capital effectiveness. Longer-term data can help analyze venture capital's sustained impact on survival and innovation. Finally, exploring causality through complex statistical models will clarify whether venture capital inherently boosts survival or simply identifies companies with higher potential. These areas of research will further optimize investment and financing practices.

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