Journal of Cases on Information Technology
Volume 24 • Issue 5

Research on Value-Added Effect of Venture Capital on Enterprises Based on Data Mining Technology

Nini Xu, Harbin University of Commerce, China*

ABSTRACT

Based on data mining technology, this paper introduces venture capital, which is an external strategic investor factor, and takes the maximization of enterprise value as the goal, and discusses the characteristics of the optimal ownership structure, the optimal shareholding ratio, and the ways to optimize the ownership structure under the participation of venture capital, so as to accurately increase the value of enterprises and grasp the role of venture capital in the development of start-up enterprises. Venture capital enterprises will have rich content, which is mainly reflected in financial returns. That is to say, if enterprises withdraw from investment after venture capital, they will have direct benefits. In the current environment of relatively scarce technical resources, enterprises should change the situation of passively accepting venture capital to provide financial capital and actively seek venture capital, which can satisfy the complementary resources and easily reach mutual trust, so as to achieve win-win cooperation.

KEYWORDS

Enterprise Value, Value-Added Effect, Venture Capital

1 INTRODUCTION

The active participation of venture capital is very important for the development of gem enterprises and the development of GEM market (Wang, 2017). In a sense, it plays the role of market selection mechanism. The launch of gem provides the most direct channel for venture capital. Venture capital invests capital at the beginning of an enterprise's establishment or development, and intervenes in the enterprise to varying degrees, providing non capital services for the enterprise with its own human capital and social resources in strategic guidance, governance supervision, acquisition of external resources, and becoming an entrepreneur's mentor (Bermiss, et al., 2017)(Hu and Bi, 2017). China's listed companies are mainly state-owned enterprises, and the main board market is the main capital market, among which the state-owned holding mode is prevalent (Dong, 2015). With the development of social economy, not only the existence of large enterprises is needed, but also the development of small and medium-sized enterprises has become a part that can not be ignored (Colombo, et al., 2016). At present, China's venture capital is mostly concentrated in some mature projects. Some venture capital companies choose enterprises not to examine their specific operating conditions and development prospects, but to see the possibility of their recent listing (Yixi, et al., 2019). With the increasingly fierce global market competition environment, the survival and development of enterprises

DOI: 10.4018/JCIT.295245 *Corresponding Author

are facing more severe challenges (Ma, et al., 2016). This not only requires enterprises to have a broad network of relationships, cutting-edge technology and R & D capabilities within a specific range, but also need to have abundant financial resources (Xie and Zuo, 2017).

In the 21st century, mankind has entered the era of knowledge economy. If an enterprise wants to maintain its comprehensive competitiveness, it must make continuous efforts in science and technology and maintain a certain leading edge (Ma and Ji, 2019). The value-added effect of venture capital for enterprises is subject to specific scenarios. For example, venture capital only has value-added effect on enterprises with specific development stage or high degree of uncertainty (Zheng, 2018). In the process of formulating development strategy, enterprises need to consider many factors such as technological innovation (Liu, et al., 2016). Only by taking enterprise innovation as the focus of R & D, can listed companies have greater value in participating in venture capital (Fan, et al., 2019). Compared with the enterprises in the capital market of mature countries, Chinese listed enterprises have little difference in the nature of equity, but have great differences in the equity structure (Shi, 2015). The supply-demand fit and relationship fit of venture capital and non capital services between enterprises are important factors for venture capital to intervene in enterprises and enterprises to choose venture capital (Liu, et al., 2018). From a certain point of view, performance can only reflect the level of enterprise development in the past, and has no substantive help for the future. However, the innovation ability of listed enterprises has become a potential for enterprise development, supporting the future development of enterprises, and transforming it into a potential for enterprise development, bringing economic benefits to enterprises (Yue, 2019)(Li, 2019).

Although venture capital will also invest in some traditional industries, its main investment object is undoubtedly high-tech enterprises. Nowadays, many countries in the world are beginning to pay attention to the field of science and technology, and the competition in science and technology is also developing in the direction of white hot (Lin, 2019). In order to gain an advantage in the fierce competition, they all take improving their technological innovation ability as the focus and core strength of enterprise development (Ma and Meng, 2017). For enterprises, corporate finance is a double-edged sword, which brings both economic benefits and financial risks. In order to achieve long-term and stable development, enterprises must establish awareness of risk prevention, find effective preventive measures, and deal with the risks that may exist at any time during the financial development of enterprises (Ma, et al., 2018). In order to realize the rapid development of China's economy, the enterprise financial industry has also developed rapidly. Now the enterprise financial industry is gradually developing towards high technology and high content (Duan and Xuan, 2018). The development of enterprise financial economy will affect the development of our national economy, but it will be influenced by various factors in the process of enterprise financial development. With the rapid development of China's economy, the development scale of various industries is gradually expanding, among which the financial industry is the fastest growing in recent years, which has two sides for the whole market economy. In the process of rapid economic development, in order to pursue greater economic benefits, there is also fierce competition among enterprises, which also leads to financial risks. Based on data mining technology, we can analyze and discuss the financial and economic benefits of Chinese enterprises, and put forward feasible preventive strategies for the risks that enterprises may encounter (Su, 2018). Based on data mining technology, this paper introduces venture capital, an external strategic investor factor, and takes the maximization of enterprise value as the goal to explore the characteristics of the optimal ownership structure, the optimal shareholding ratio and the ways to optimize the ownership structure under the participation of venture capital, so as to more clearly and accurately grasp the role of venture capital in the development of start-up enterprises. This paper first discusses the relationship between venture capital and enterprise value from the characteristics of venture capital and the connotation of enterprise value, then studies the value-added effect of venture capital on technological innovation of start-up enterprises combined with data mining technology, and analyzes the application effect of data mining technology.

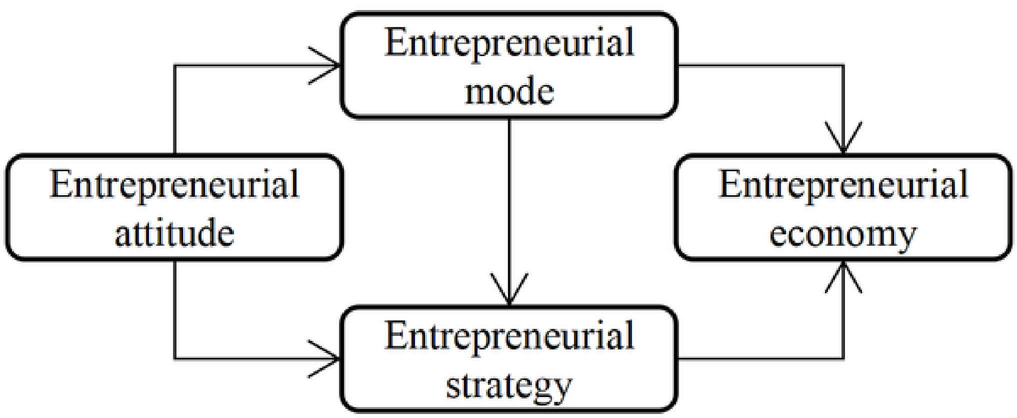
2 THE RELATIONSHIP BETWEEN INVESTMENT AND ENTERPRISE VALUE

2.1 Characteristics and Operation Process of Venture Capital

Venture capital is the link between enterprises and investors. After screening and investigation, venture capital invests the raised funds into enterprises, and uses its own advantages to participate in the governance and important decisions of the invested enterprises, so as to drive the rapid development of enterprises and obtain high returns. Venture capital has the ability and motivation to provide non capital services for enterprises. It usually has the entrepreneurial and operational experience of successful entrepreneurs, or has the experience of cross industry investment. Venture capital provides support in addition to capital, which helps enterprises in the initial stage of establishment or development to reduce the huge uncertainty and lack of resources, and provides help for the survival and development of enterprises, Finally, it brings return on investment for venture capital through enterprise growth and profitability (Chen, 2020). The objective difference between venture capital and enterprises is an undeniable objective fact. If there is no corresponding governance mechanism after venture capital investment, venture capital behavior may deviate from the objectives and needs of enterprises, and bring adverse consequences to the development of enterprises. According to resource-based theory, enterprises are regarded as the aggregation of resources and capabilities, and their competitive advantages and performance differences come from the heterogeneity of enterprise resources.

From the perspective of the background of venture capital, venture capital has profit motive and market-oriented motive. Profit motive is not only the motive of most venture capital institutions, but also the original motive. Its purpose is to seek high return on investment. The innovation ability of enterprises is more reflected in the allocation and utilization of resources. The mode of the effect of enterprise policy on enterprise behavior is shown in Figure 1.

Figure 1. The model of the effect of corporate policy on corporate behavior



Innovation can play a vital role in the future development of enterprises, which is reflected in benefits and innovative achievements. In terms of human resources, venture capital provides guidance and suggestions for enterprises at the strategic level, including providing industrial guidance and forming business models. In terms of organizational resources, venture capital helps enterprises establish control systems, supervise financial performance, form reporting systems to standardize enterprise operations, help establish and develop business network relationships, and obtain further external financing for enterprises through network resources. From the organizational performance, venture capital can improve the governance level of enterprises, bring faster growth, reduce the possibility of financial difficulties and improve the survival rate. Compared with other financial intermediaries, venture capital has stronger ability to reduce the risk of information asymmetry. Once venture capital is involved in an enterprise, it will form a principal-agent relationship. Entrepreneurs may use their information advantages to make decisions that are beneficial to their own interests, or engage in activities that are detrimental to the development of enterprises due to their own management capabilities. In order to avoid the above-mentioned behaviors of entrepreneurs, venture capitalists supervise and motivate entrepreneurs through contracts, and even hire experienced managers to replace entrepreneurial managers, so as to strengthen and upgrade the existing management team (Guo, et al., 2015). Venture capital institutions are the most direct operators of venture capital, and limited partnership is its main organizational form, which bears risks and shares benefits directly. Venture capital injects capital into the growth of new enterprises, but in order to obtain high returns, they generally seek channels to realize capital withdrawal.

2.2 The Connotation of Enterprise Value and Its Influencing Factors

The management and supervision of venture capital on enterprises usually shows formal intervention in corporate governance, which monitors financial performance and business development through information or other control systems, such as performance evaluation and salary system, staged investment based on performance, and the latter such as voting rights and board seats. The core strength of enterprise development can be embodied by venture capital, which can provide more decisive factors for enterprise innovation in practice. Therefore, it is necessary to pay attention to the impact of enterprises' participation in venture capital, and conduct in-depth research on management and operation mode, so as to play a more substantial role in all aspects of enterprise innovation. Before deciding to invest in an enterprise, venture capital will make full use of its professional ability to collect information, analyze and evaluate investment opportunities (Zeng, et al., 2020). Venture capital will choose enterprises with strong profitability and high labor productivity, sales growth rate and R&D investment as investment objects. In order to cope with the uncertainty faced by enterprises, venture capitalists and entrepreneurial teams need mutual responsibilities, commitments and expectations based on mutual trust, cooperation, open information exchange and sharing, and mutual dependence.

The consensus reached between venture capitalists and entrepreneurial management team based on mutual trust and dependence is more suitable for enterprises to make quick and flexible decisions. In order to cope with the ever-changing competitive pressure, some companies and venture capital institutions have formed partners in order to obtain additional assets. In this cooperation, the advantages of capital, information and marketing resources of venture capital are combined with the advanced technology, innovation efficiency and flexibility of small and medium-sized enterprises, so as to generate synergy, enhance their respective comparative advantages and provide sufficient power and technical support for the development of enterprises. The purpose of venture capital is to grow the enterprise and obtain the investment return finally, especially the independent partnership investment fund, whose investment period is subject to the contract with the partner. In order to fulfill the contract with the partner, venture capital needs to redeem the capital within a certain period of time to distribute it to the partner. No matter which of the above investment methods is adopted, venture capitalists provide value-added services. From the perspective of entry methods, they can invest in start-up enterprises by stages or at one time. At the same time, compared with the profit-seeking venture capital institutions, the market-oriented venture capital institutions pay less attention to the short-term monetary gains, so they are more sought after by enterprises.

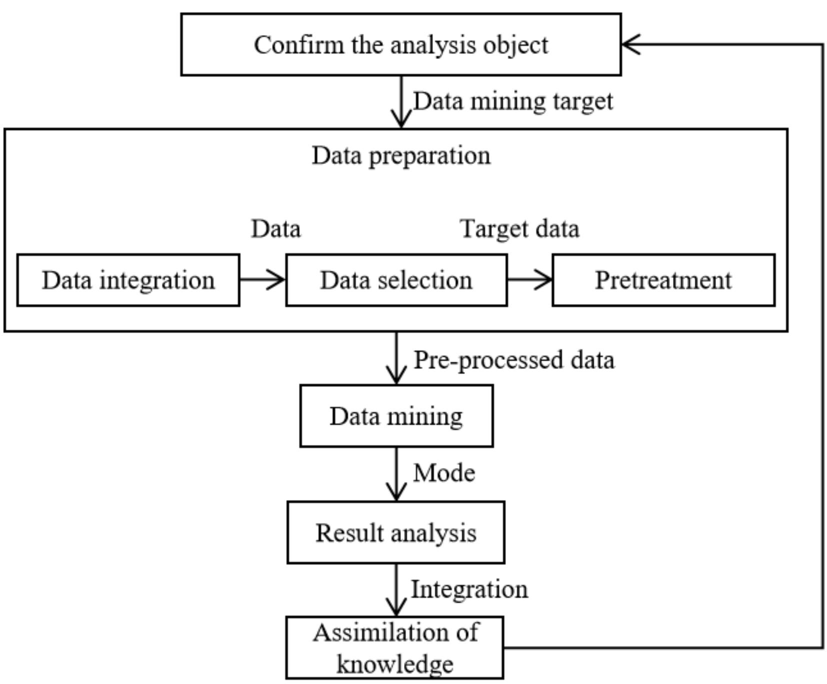
3 VALUE ADDED EFFECT OF VENTURE CAPITAL ON TECHNOLOGICAL INNOVATION OF START-UP ENTERPRISES

3.1 Enterprise Value Measurement Based on Principal Component Analysis

Independent venture capital is usually a partnership investment with a certain period. Partners with investment experience get investment returns and return the principal and income to meet the contractual requirements of venture capital. The affiliated venture capital is funded by the affiliated institution, looking for the investment object that conforms to the overall strategy of the institution, and its investment purpose is usually not pure financial return but strategic coordination of the organization. Entrepreneurial enterprises are usually small in scale, high in business risk, uncertain in innovation income, lacking in business records, unable to meet the requirements of listing financing and difficult to obtain loan conditions from banking institutions, so they are faced with serious financing constraints of innovation. In addition to providing direct financial support for start-ups, venture capital can also provide indirect financial support for start-ups through its own network resources and certification effect, which is an important value-added service provided by venture capital for start-ups (Zhuang, et al., 2017). Ownership structure affects the governance structure of enterprises, and unreasonable ownership structure will cause obstacles to the development of enterprises. In the GEM market, unreasonable ownership structure leads to serious stock speculation, with a large reduction of investors' shares, high concentration of ownership, "one share is dominant" of controlling shareholders and weak checks and balances of equity. In view of the impact of venture capital in different organizational forms, the value-added effect brought by angel investors is greater than that of venture capital with formal organization, and the role of angel investors is not as good as that of venture capital in other organizational forms in the commercialization process of invested enterprises.

From the perspective of its influence on the long-term performance of enterprises, venture capital is eager to promote the early listing of invested enterprises in order to realize short-term interests.

Figure 2. Risk investment data mining



On the one hand, it achieves its purpose through earnings management, which leads to the long-term performance of enterprises supported by venture capital after IPO being significantly lower than that of companies supported by non-venture capital. See Figure 2 for the data mining process in the analysis of investment financial data.

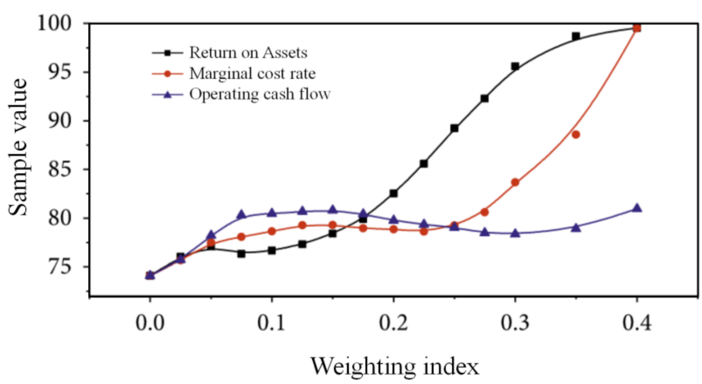
Based on data mining technology, this paper introduces venture capital, which is an external strategic investor factor, and takes the maximization of enterprise value as the goal, and discusses the characteristics of the optimal ownership structure, the optimal shareholding ratio and the ways to optimize the ownership structure under the participation of venture capital, so as to accurately increase the value of enterprises and grasp the role of venture capital in the development of start-up enterprises. A rational investor always seeks a portfolio x that minimizes the risk under the conditions of a given expected return level of R_0. That is to solve the formula (1) or maximize the expected return under the condition of a given risk level V_0.

Table 1. Results of financial status risk comparison data

	Return on assets	Marginal cost rate	Operating cash flow
Return on assets	1	0.85	0.86
Marginal cost rate	0.87	1	0.80
Operating cash flow	0.73	0.74	1

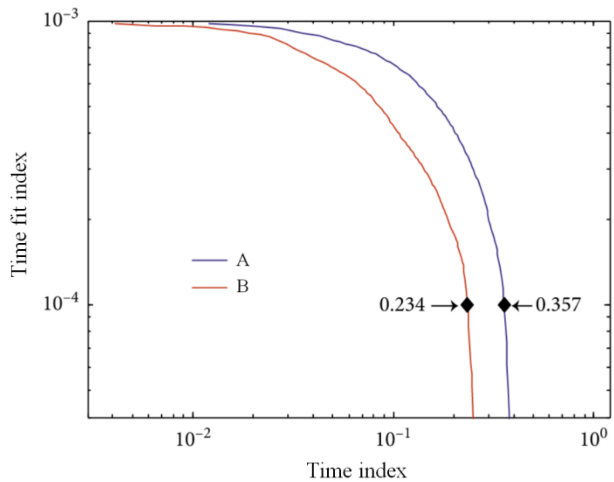
The comparison results of financial situation risks are shown in Table 1. Figure 3 shows the relationship between financial risks and assessed values.

Figure 3. Relationship between risk weight of financial situation and evaluation value



Venture capital provides financing value-added services for startup enterprises, helps startup enterprises to carry out follow-up external financing, can alleviate the constraint of innovation financing of startup enterprises, and is an important link that affects the technological innovation of startup enterprises. Speculation leads to the flow of social capital to enterprises whose main business is not prominent, but they are keen on false reorganization. These enterprises are keen on making false accounts and engaging in "public relations", and it is a serious waste of resources to flow social resources to them. However, because of the large circulation of enterprises with real strength, the stock price is not easy to speculate and it is difficult to raise funds at high prices. The time inconsistency curve is shown in Figure 4.

Figure 4. Time inconsistency curve



From the perspective of different property rights, private venture capital follows the market operation mode and implements strict screening mechanism, with the aim of pursuing financial returns and playing a better signal transmission role in the quality of invested enterprises. The full transfer and circulation of stocks can promote the flow of property rights and the competition of control rights among enterprises. However, it is difficult for family-style entrepreneurial enterprises to make everything happen, and the acquisition and merger between listed companies cannot be fully carried out. Enterprises cannot acquire another enterprise through the secondary stock market, and enterprises without vitality cannot get any improvement. The intrinsic value of an enterprise is the present value of its future cash flow. The ability of enterprises to create cash flow in the future is determined by many factors, including macro-economic conditions, industry conditions, enterprises' own conditions and so on. From the impact of listed companies' participation in venture capital on the innovation ability of enterprises, we can see that all investment enterprises can benefit from venture capital activities, which is not only financial but also strategic, and there are more complex connotations.

3.2 Value-added Effect of Venture Capital on Technological Innovation of Start-Ups

On the whole, venture capital may not provide financing value-added services for startups. From the perspective of debt financing, start-ups usually have higher risks and less tangible assets. It is difficult to increase the tangible assets of enterprises in the short term with a small increase in venture capitalFrom the perspective of the perception of invested companies, the value-added effect of state-owned venture capital is obviously inferior to that of private investment. Existing research evidence shows that the impact of state-owned venture capital on enterprises is mostly negative. Compared with private venture capital, companies that accept government venture capital have slower sales and employee growth, lower IPO pricing, and poorer innovation performance (Xia, et al., 2019). High reputation risk investment can promote the equity financing of start-up companies, and then promote the technological innovation of start-up companies, that is, high reputation risk investment has a financing value-added effect on the technological innovation of start-up companies.

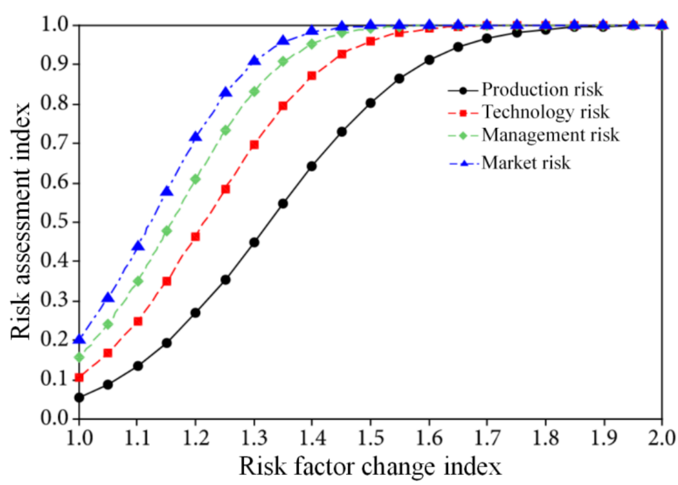
Venture capital enterprises will have rich contents, which are mainly reflected in financial returns. That is to say, if enterprises withdraw from investment after venture capital investment, they will produce direct benefits, and the generation of benefits in this respect can be better understood. On the surface, the short-term solvency of enterprises without venture capital can not be ruled out, but the participation of venture capital can make enterprises more standardized and stable and face less short-term debt pressure.

See table 2 for the sensitivity of risk assessment. See Figure 5 for the relationship between risk assessment and risk factors.

Table 2. Risk assessment

	Evaluation value	Score after change
Production risk	0.627	0.750
Manage risk	0.744	0.863
Technical risk	0.539	0.652
Market risk	0.540	0.765

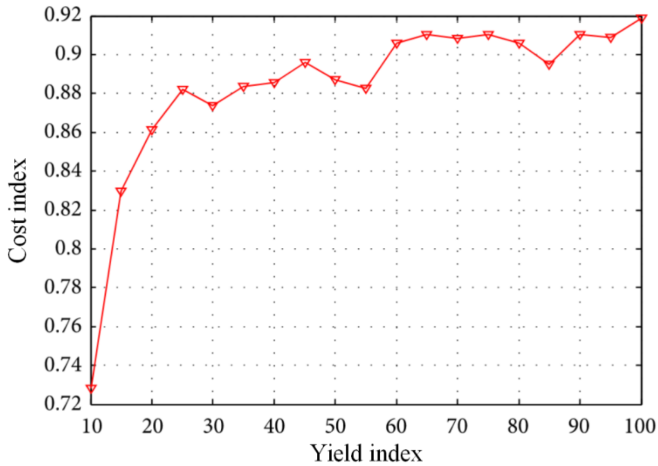
Figure 5. Relationship between risk assessment and risk factors



For enterprises in the same industry, the difference in value is mainly determined by their own situation. From a financial point of view, an enterprise's own situation can be described by its profitability, operating ability, financial leverage and debt ability. When there is significant economies of scale, the relationship between enterprise scale and cost is shown in Figure 6.

Based on data mining technology, introducing venture capital, which is an external strategic investor factor, can take the maximization of enterprise value as the goal, and discuss the characteristics of the optimal ownership structure, the optimal shareholding ratio and the ways to optimize the

Figure 6. The relationship between enterprise scale and cost



ownership structure under the participation of venture capital, so as to accurately increase enterprise value and grasp the role of venture capital in the development of start-up enterprises. The management relevance of listed companies in participating in venture capital is reflected in the fact that listed companies can show certain commonness in enterprise management when participating in venture capital, which will have a certain impact on the management ability of enterprises. The main performance is that enterprises will hold higher positions in management. The essence of speculation is that controlling shareholders take advantage of their own control rights, venture capital shareholders control tradable shares, plunder shareholders by various means such as information release and stock price control, and plunder small and medium shareholders for a long time, which will lose credibility and eventually lead to financial crisis (Lin, 2020). If we want to study the influence of listed companies' participation in venture capital on the innovation ability of enterprises, the most correct way is to divide the income and clearly identify its income type, so that we can analyze the quantitative indicators from the meaning.

4 CONCLUSIONS

Venture capital can bring many benefits to enterprises, and founders should pay attention to possible risks when they devote themselves to the development of enterprises. Based on data mining technology, this paper introduces venture capital, which is an external strategic investor factor, and takes the maximization of enterprise value as the goal, and discusses the characteristics of the optimal ownership structure, the optimal shareholding ratio and the ways to optimize the ownership structure under the participation of venture capital, so as to accurately increase enterprise value and grasp the role of venture capital in the development of start-up enterprises. On the whole, the introduction of venture capital has not brought obvious positive effects to enterprises. The capabilities of venture capital in enterprise strategy, company management, cost control and channel expansion are uneven, which affect the future value growth of enterprises.

Investors have different characteristics, and they also have different requirements when choosing investment objects. Therefore, entrepreneurs should choose the most suitable investment institutions according to their own situation. It is the combination of technology and capital for enterprises to obtain venture capital. In the current environment of relatively scarce technical resources, enterprises should change the situation of passively accepting venture capital to provide financial capital, and actively seek venture capital which can satisfy the complementary resources and easily reach mutual trust, so as to achieve win-win cooperation.

ACKNOWLEDGMENT

2020 Heilongjiang philosophy and social sciences research and planning project "Research on the sustainable deepening path of mixed ownership reform of Heilongjiang Province under the perspective of sharing economy" (20JLE361)

REFERENCES

Ma & Meng. (2017). Research on the synergy of venture capital and intellectual capital from the perspective of joint venture capital. *Forecast, 36*(2), 30-36.

Bermiss, Y. S., Hallen, B. L., Mcdonald, R., & Pahnke, E. C. (2017). Entrepreneurial beacons: The Yale endowment, run-ups, and the growth of venture capital. *Strategic Management Journal*, *38*(3), 545–565. doi:10.1002/smj.2508

Hu & Bi. (2017) Analysis on the Enterprise Value in Venture Capital. *Public Investment Guide, 1*(285), 100-102.

Chen, R. (2020) The timing of venture capital exit and the evaluation and analysis of corporate equity value. *Fortune Times, 178*(3), 130-132.

Colombo, M. G., Cumming, D. J., & Vismara, S. (2016). Governmental venture capital for innovative young firms. *The Journal of Technology Transfer*, *41*(1), 10–24. doi:10.1007/s10961-014-9380-9

Duan & Xiao. (2018). Research on the Value Evaluation System of Internet Enterprises Based on the Perspective of Value Creation. *Finance and Trade Research, 29*(9), 89-101.

Fan Chi, & Huang. (2019) Research on the Timing and Ways of Venture Capital Entry into Innovative Enterprises Based on Threshold Model. *Chinese Journal of Management, 154*(7), 92-100.

Dong, J. (2015) The impact of venture capital on the value of entrepreneurial enterprise. *Market Modernization, 797*(22), 224-225.

Ma & Ji. (2019). Venture capital reputation, intellectual capital and corporate value. *Scientific Research Management, 287*(9), 99-110.

Li. (2019). Venture capital, cash holding level and holding value. *Value Engineering, 542*(30), 84-86.

Lin. (2019). Research on the Evaluation Index System of Venture Capital of Start-up Technology Enterprises. *Research on the Development Strategy of Science and Technology Innovation, 14*(6), 23-29.

Lin. (2020). Research on Venture Capital Evaluation System of Start-up Blockchain Enterprises. *China Collective Economy, 649*(29), 84-85.

Liu, Zhao, & Wen. (2016). An Empirical Study on the Impact of Venture Capital on the Performance of Listed Companies. *Soft Science, 194*(2), 73-77.

Ma, Meng, & Ji. (2018). Research on the Enterprise Value Creation of State-owned Venture Capital and Intellectual Capital. *Research and Development Management, 30*(1), 60-71.

Liu, Qu, & Scherpereel. (2018). An Empirical Study on the Impact of Joint Venture Capital Strategy on the Value Creation of Startups. *Forecast, 37*(2), 56-62.

Shi. (2015). Venture capital in the development of high-tech SMEs. *Journal of Zhengzhou Institute of Aeronautical Industry Management, 33*(3), 100-103.

Su. (2018). Analysis of the impact of venture capital in listed companies on the GEM on their issuance price-earnings ratio. *Industrial Technology Economics, 298*(8), 156-162.

Tang & Tang. (2016) Research on valuation methods of start-up technology companies: Based on the perspective of venture capital law. *Finance and Accounting Communications, 32*(427), 9-12, 131.

Guo, Wang, & Guo. (2015). The effect of project liquidation value on venture capital decision-making. *Journal of Systems Engineering, 30*(2), 174-180.

Wang. (2017). Research and practice of enterprise data asset management platform based on big data mining and operation. *Information and Computer (Theoretical Edition), 380*(10), 187-189.

Xia, Wei, & Nian. (2019). Research on the Target Preference of Agricultural Enterprise Working Capital Investment Decisions. *Statistics and Decision, 533*(17), 187-190.

Xie & Zuo. (2017). Optimizing the equity structure of entrepreneurial enterprises with the participation of venture capital. *Finance and Accounting Monthly, 35*(819), 37-43.

Zeng, Yang, & Shen. (2020). CVC participation degree, innovation capital and entrepreneurial enterprise value appreciation. *Soft Science, 241*(1), 29-34.

Yixi, N., Gubo, X., & Ziwu, L. (2019). What drives the venture capital investments in China? *Chinese Management Studies*, *13*(3), 574–602. doi:10.1108/CMS-07-2017-0193

Yue. (2019). An Empirical Study on the Involvement of Venture Capital Institutions, Internationalization Strategy and Corporate Value. *Modern Marketing: Business Edition, 315*(3), 178-178.

Zheng. (2018). Value evaluation of GEM listed companies based on venture capital background. *Times Finance, 712*(30), 128-143.

Zhuang, Ou, & Zhou. (2017). Venture capital and listed companies' innovation investment: the adjustment of property rights and institutional environment. *Scientific Research Management, 38*(11), 48-56.