# Approaches to Assess Venture Capitals' Risk, Feasibility, and Its Impacts on the Performance of Firms in China

Zhenyu Qian*

Shanghai United International School GubeiCampus, Shanghai, 201103, China

*Corresponding author: 1631180874@xzyz.edu.cn

**Abstract.** Venture capitals (VCs) are the type of investment that are featured for its high risk and high returns. Nowadays VCs have been more and more commonly employed in firms' strategies, in that venture capitalists gradually realize the benefits of doing so and are underpinned by the advanced technology as well as economic growth. This article examines the VCs' risk, feasibility, and impacts on firms based upon three models. The article reviews 5 papers and discusses the research methods used for the assessment of VCs. The review of the three models, the Propensity Score Matching method (PSM), the Cox Proportional Hazard model (CPH), and the Fuzzy Synthetic Evaluation model (FSE), summarizes the various impacts of VCs on firms in China. In this paper, it is noticed that not only the risk and returns of VCs have to be paid attention to, but also the reputation of firms and the time in which firms invest VCs should also be considered.

**Keywords:** Venture Capitals, Risk, firms, the Propensity Score Matching (PSM) method, the Cox Proportional Hazard (CPH) model, the Fuzzy Synthetic Evaluation (FSE) model.

## 1. Introduction

Venture capitals (hereinafter VCs) are a type of investment that play an essential role in terms of economic performance. Differ from traditional investments, VCs are idiosyncratic for their high risk as well as high returns, which should be considered carefully when opting projects [1]. People have been focusing on VCs insomuch as the considerable growth of VCs over the past three decades [2]. They have been beware of VCs' high potentiality of remuneration and thus are more proactive in promoting the investments. Chu [3] reported that, by dint of cutting-edge growth and level effect, Chinese economy has witnessed a significant growth in its High-Tec industry, in which the number of venture capital transactions in China grew from 47.3 billion in 2012 to 81.3 billion in 2018, and the transaction amounted from 5.65 billion yuan in 2012 to 484.72 billion yuan in 2018 [3]. Nevertheless, at present, the success rate of venture capital is only 5%- 20% [3]. Most VCs ended precipitately, be them being curbed or failed completely. China, as aforementioned, has been growing at a fast rate. Fundamentally China has built and developed a robust infrastructure that underpins further VCs, but an unexpected globally pandemic stroke over the world. It was estimated that in the first half of 2020, the pandemic undermined the usefulness of the China Global Investment Tracker. The pandemic either delayed most Chinese outbound investment and construction, discouraged firms from disclosing transactions as they did from 2005 to 2019, or both. The central government says outbound investment and construction went on their merry way [4]. The world, furthermore, shrunk heavily. Generally, investors as well as venture capitalists became more unwilling to take risks under such precarious situation, and this threat reached China too. It was frantic private spending that pushed Beijing to impose capital controls. Since then, the private share has been range-bound even while aggregate investment fall [4]. What's perhaps worse was that increased public spending had helped to stabilize the slowing GDP growth in recent years, but returns on investments are shrinking as China becomes more developed [5]. This was likely to further shrink the willingness of outside VCs. Also, few of those companies that survived the pandemic are back to full capacity. Restarting supply chains takes time and requirements for infection control have reduced productivity and increased costs [5]. This denoted that firms were intrinsically unable to afford the high-induced costs, and they might face the break-even point or shut-down point. Such uncertainty, again, pulled away the wants for investing therein. Therefore, it necessitated firms to consider a way in which they can

survive under such predicament: the VCs. Of course, several factors must be considered if they choose to invest VCs, and they will be listed hereinafter.

## 2. Literature Review

This article summarizes three models, including the Propensity Score Matching method (PSM), the Cox Proportional Hazard model (CPH), and the Fuzzy Synthetic Evaluation model (FSE). The purpose of this article is to tender a multifaceted overview and review of the impact of VCs on firms' performances by citing examples of the existing articles. After scrutinizing the reading and analysis of the literature on the impact of VCs, we decided to categorize this article according to research methodology. Herein, several articles have been reviewed, including two articles on the PSM model, two on the CPH model, and one on the FSE model. All of these articles study certain perspectives wherefrom the impact of VCs on firms have been examined and evaluated.

### 2.1 The PSM Model

In the Propensity Score Matching Model, the innovation of venture capital intervention in enterprises from risk probability intervention, probability evaluation, matching equilibrium validity test, matching results analysis, different venture capital, and different background risks are tested and expounded [6]. In Chu's paper, for instance, four variables are selected as the explanatory variables: whether there is venture capital (VCH), venture capital political background (VCB), venture capital shareholding ratio (VCP) and venture capital corporate reputation (VCR) [7]. After an intricate and meticulous calculations, it was calculated that whether there is venture capital before listing has a significant negative impact on enterprise performance [3]; specifically, the result indicated that VCs that enter into enterprise in the first year promote the innovation performance insignificantly, both in the short-run-wise and in the long-run [8]; in contrast, VCs that enter into enterprises in the second year promote remarkably [9]. This result is similar to that of the one conducted by Zou and Chen. In their analysis, they also reported that the staggering impact on the second year may well be accounted for the fact that VCs may potentially bring considerable breakthrough innovations, which, however, have a longer innovation cycle, greater risk, and greater difficulty in commercialization [10]. The difference also lies in between: concerning the study of Chu, she discovered that the shareholding ratio of venture capital has a certain degree of negative impact on enterprise performance, and the reputation of venture capital has a certain degree of negative impact on enterprise performance [3]. In contrast, Zou and Chen found out that compared with single venture capital and low qualification venture capital, joint venture capital and high qualification venture capital play a greater role in promoting enterprises [9]. Although both studies utilized the method of PSM, different conclusions were drawn due to engrossing on various perspectives. Still, the similarities reveal that the impact of VCs on firms in the first year seems to be weak in comparison with those in the following years.

### 2.2 The CPH model

The second model selected is the CPH model (the Cox Proportional Hazard model). This is a model that, essentially, illustrates a regression model commonly employed statistical research for investigating the association between one subjective and various predictor variables [11]. The selection of the two groups views the performance of the firms via VCs through two lenses: time and surroundings' effect.

In the Cox model, the dependent variable is the risk rate. If the coefficient of an independent variable were positive, it would indicate that the variable has a positive impact on the risk rate; vice versa. The larger the value of the variable, the greater the risk rate and the shorter the expected period [12]. The study conducted by Zhang ChunXiang and Zhang BaiGe illustrates that, after detail and sophisticated variables calculations, in the selection of 200 firms in China, 42.55% of the reported enterprises (60 of 141 enterprises) got venture capital, while among the enterprises without media coverage, only 15.25% of the enterprises (9 of 59 enterprises) finally got venture capital during the

study period [13]. This suggests that the VCs are strongly correlated with the attitude of the surroundings, in this case the media. Overall, the conclusion is that the higher the reputation of the enterprise, the shorter the overall risk; furthermore, compared with familiarity, reputation plays a greater role in shortening time; and, finally, the higher the degree of professional background differentiation of the management team, the more conducive it is for the enterprise to reduce the time to obtain investment [13]. This is because fair reputation denotes greater possibility to acquire outside resources [14]. In other words, firms with great reputation will continue to be great, whilst those with poor reputation will continue to be poorer [15].

Another study is performed by Yang et al. [12], in which they tested the relationship between the time-gap between which a firm performs the first VCs and the second one. As pointed out, if costs were negligible, firms would employ a continual investment approach in VCs [16]. However, this is not applicable in real life. After calculating, the studiers found that when the venture capital firms are syndicated to invest in the entrepreneurial enterprise, the duration between this round and the next round will be longer, and that when the number of the syndicated venture capital firms increases, the duration between this round and the next round will be further prolonged, and that the above effects will become more pronounced if the investees are of the early-stage or of the high-tech industry [12].

Overall, two groups employ the CPH model in testing two perspectives for VCs in helping firms. The result is slightly incomparable, but they tender the idea that VCs need to be carefully opt and employ, but it is still arguable that according to the second study, joint cooperation may be driven from an avid for reputation, which corresponds to the first study's conclusion that the higher the reputation, the more promising the returns will be, and vice versa. Moreover, since if more firms are joined within the cooperation, the uncertainty may increase due to the increase in hardness of VC success, so it then becomes reasonable that 'the duration between this round and the next round will be longer.'

### 2.3 The FSE model

The last case will be evaluating the risk of VCs on firms, and this one is extrapolated via the FSE model, the Fuzzy Synthetic Evaluation model, conducted by Wei Xing, Xia EnJun, and Li QuanXing. This model is employed when evaluation transaction is determined by many factors, and it is therefore necessary to evaluate each factor. On the basis of making a separate comment on each factor, how to make a comprehensive comment considering all factors is a comprehensive evaluation problem. FSE model can be lucid and advantageous in that. When used to assess risk, it can handle this uncertainty much better, as there is no need to distribute indicators among different domains. In FSE, a specific indicator can either increase (positive sign) or decrease (negative sign) a risk, following a simple binary logic. This does not require any expert opinion and thus is free from subjective perception [17].

In the study, they emphasize that in order to correctly and objectively evaluate the risk assessment of VCs, five points based upon systematic, scientific, international, operation-able, and perspicacious perspectives need to be considered [12]. Furthermore, they also evaluate the method, considering its uncertainties, risk, first-order evaluations, and second-order evaluations, drawing the conclusion that the level of risk can be evaluated based upon current criteria; however, they too accentuate the fact that the acquisition of many data has certain subjectivity, which will produce certain errors to the results of comprehensive evaluation. In fact, when comprehensively evaluating the risks in venture capital, people should try to find knowledgeable and far-sighted experts to score [11].

Overall, the study tenders the perspective that risk, as the name suggested, involves much uncertainty, and is therefore hard to be predicted and evaluated in perfection. Reality is a mixture of uncertainty and options, and this fact perhaps accounts for the fluctuations of VCs when firms opt projects.

## 3. Summary

The articles mentioned above examine the impact VCs on firms from the perspective of different fields. This article focuses on three approaches: the PSM model, the CPH model, and FSE model. Although there are some methodological differences, some similarities between these articles are considered. Overall, regardless of different approaches, the above articles draw conclusions that have similarities as well as differences.

Firstly, the article examines several articles that use the PSM model. The model is a comprehensively extensive study. Amongst them, Chu's work employs the model and examines the performance of firms before listing, the first year, and the second year when investing the VCs. Similar procedure has been utilized in Zou and Chen and has come to a similar end. Overall, these two articles show that the time in which VCs are invested has to be carefully discussed and opted.

Secondly, the article proceeds with an extrapolation of several articles that utilize the CPH model. Although two studies mainly engross on two perspectives: the former from the reputation perspective and the latter from the joint-cooperation perspective, similarities still exist. Overall, the articles point out that the idea of firms' figures is important in both determining its possibility and potentiality in cooperating with other firms, as well as demonstrating a good reputation in front of medias and consumers.

Finally, articles on the impacts of VCs on firms applying the FSE model are further reviewed. The discussion is based upon the uncertainty of VCs. Due to the high uncertainty, Wei, Xia, and Li concluded that solely rely on the data and conclusion is not abundant and credulous enough; in fact, peer-viewing as well as scientific and professional corroboration should also be taken into consideration.

## 4. Conclusion

Overall, I acknowledge that China has been growing into a state of promising economic futurity with abundant VCs being invested, and by the help of which, China's economy continues to foster. In order for the economy to continue fostering, VCs have to be utilized by firms. Nevertheless, as it is already said, due to the high risk, along with the high uncertainty, of VCs, firms do need to carefully consider that, and it is not until they should gather enough reputation and market share can they then adopt VCs. After that, due to the aforesaid level effect and multiplier effect, China's economy is promising in further cutting-edge growth and is promising in constructing a robust infrastructure that furthers the development of tertiary sector overall.

## References

[1] X. Wei, E.J. Xia, Q.X. Li, Comprehensive Evaluation of Risks in Venture Investment Project Decision-making, Chinese Soft Science, 02 2004 153-157. DOI: 0.3969/j.issn.10029753.2004.02.028

[2] R. Florida, D. F. Smith, Jr, Venture Capital Formation, Investment, and Regional Industrialization, Annals of the Association of American Geographers, 83(3) 1993 434-451. DOI: 10.1111/j.1467-8306. 1993.tb01944.x

[3] H.Y. Hu, Analysis on the Impact of Venture Capital on the Performance of Enterprises based on PSM Model. Fiends of Accounting, 7 2019 114-119. DOI: 10.3969/j.issn.1004-5937.2019.07.019.

[4] D. Scissors, China's global investment vanishes under Covid-19. American Enterprise Institute, 6 2020 1-12. DOI: https://www.jstor.org/stable/resrep25366

[5] F.M Connections, The Security Impacts of the COVID-19 Pandemic, 19(2) 2020 115-124. DOI: 10.11610/connections.19.2.09

[6] H. Bei, The Impact of Foreign Venture Capital Intervention on Venture Capital Innovation of Startup Entrepreneurs Using Propensity Score Matching Model. Frontiers in Psychology, 12 2021. DOI: 10.3389/fpsyg.2021.750348

[7] J.X. Guo, The Effect of Venture Investment on the Performance of Small and Medium-Sized Enterprises-Based on the Propensity Score Matching. Shanxi University of Finance and Economics, 2016.

[8] D. Engel, M. Keilbac, Firm level implications of early stage capital investment: An empirical investigation[J]. Journal of Empirical Finance, 14(2) 2007 150-167. DOI: 10.1016/j.jempfin.2006.03.004

[9] L.W. Cheng, S. Zou, Venturecapital's entry time, technology preference and innovation performance: An evidence from manufacturing firms listed on the GEM by the PSM method. Management of Science Research, 40(7) 2019 215-223. DOI: 10.19571/j.cnki.10002995.2019.07.021.

[10] G.C. O'Conner, R. D. Martino, Organizing for radical innovation: An exploratory study of the structural aspects of RI management systems in large established firms. Journal of Production Innovation Management, 23(6) 2006 475-497. DOI: 10.1111/j.1540-5885.2006. 00219.x

[11] Statistical tools for high-throughput data analysis, http://sthda.com/english/wiki/cox-proportional-hazards-model.

[12] M.L. Yang, X. Wei, X.H. Dang, F. Wang, The substitution effect of syndication on staging in venture capital industry—empirical evidence based on the Cox proportional risk model. Journal of Xi'an University of Technology, 31(4) 2015 493-499. DOI: 10.19322/j.cnki.issn.1006-4710.2015.04.021.

[13] C.X. Zhang, B.G. Zhang, The Effect of High-tech Startups' Reputation on the Length of Time to Obtain Venture Capital Funding—Empirical Analysis of Proportional Risk Model based on Cox. Technical economy and management research, 9 2018 57-61. DOI: 10.3969/j.issn.1004-292X.2018.09.011

[14] Charles Fombrum, M. Shanley, what's in a name-reputation building and corporate strategy. Academy of Management Journal, 22(2) 1990 233. DOI:10.5465/256324

[15] B.K. Boyd, D.D. Bergh, D.J. Ketchen, Reconsidering the reputation performance relationship: A resource-based view. Journal of Management, 36(3) 2010 588-609. DOI: 10.1177/0149206308328507

[16] Gompers P A, Optimal investment, monitoring, and the staging of venture capital, Journal of Finance, 50(5) 1995 1461-1489. DOI: 10.1111/j.1540-6261. 1995.tb05185.x

[17] M. Akter, M. Jahan, R. Kabir, D. Sadia, K.Anisul, H. Munsur, R.M., Risk assessment based on fuzzy synthetic evaluation method, The Science of the Total Environment, 658(MAR.25) 2018 818-829. DOI: 10.1016/j.scitotenv.2018.12.204