Research on Social Credit System and Venture Capital Investment Efficiency

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Abstract: The research of the social credit system can not only analyze the problem of information asymmetry theoretically, but also provide more entrepreneurial characteristics information for entrepreneurial investors in practice. This article selects Changsha as a sample city and uses data from 2010 to 2019 to regress and analyze the relationship between the social credit system and the scale of venture capital. The empirical analysis results show that if a city's credit score increases, the proportion of venture investment that a city receives in the country's venture capital will increase; the proportion of a city's credit ranking decline in the amount of venture investment in the country's venture capital will also decrease accordingly. Moreover, the increase in the absolute level of the social credit system has a greater impact on the scale of venture capital than the increase in the relative level.

1 INTRODUCTION

Mass entrepreneurship and innovation have become an inevitable requirement for economic development transformation and improving the quality of economic development. The "Opinions of the State Council on Promoting the High-quality Development of Innovation and Entrepreneurship and Creating an Upgraded Version of 'Double Entrepreneurship'" clearly stated that the role of venture capital in supporting innovation and entrepreneurship should be fully utilized. The information asymmetry faced by venture capital institutions often faces obstacles to expanding the scale of venture capital when investing. Therefore, in-depth study of the relationship between the improvement of the social credit system and the expansion of the scale of venture capital has a positive guiding significance for giving full play to the role of credit as a new production factor, optimizing the allocation of resources, and improving the efficiency of investment and financing.

In 2014, the State Council issued the "Plan for the Construction of a Social Credit System (2014-2020)" to vigorously promote the construction of social credit system. Changsha is located in the central region of China. In 2020, the amount of venture capital investment in Changsha is 21.286 billion yuan, ranking 10 in China, which is far from the previous ones (Table 1). In terms of proportions, Changsha only accounts for 2.2% of the total investment amount in the country, indicating that the scale of venture capital in Changsha is relatively small. Judging from the number of investment cases, there were 4,567 investment events in China in 2020, of which only 35 were in Changsha, accounting for 0.8% of the country. At the same time, we found that the number of investment events in Changsha reached the highest in 2015 and 2016, and continued to

Table 1: Top 10 City Venture Capital Private Equity Amount in 2020.

Rank	City	Amount (100 million yuan)
1	Beijing	2075.51
2	Shanghai	1049.37
3	Jinan	1019.56
4	Shenzhen	501.05
5	Hefei	492.32
6	Guangzhou	391.82
7	Suzhou	345.62
8	Hangzhou	337.81
9	Nanjing	234.28
10	Changsha	212.86

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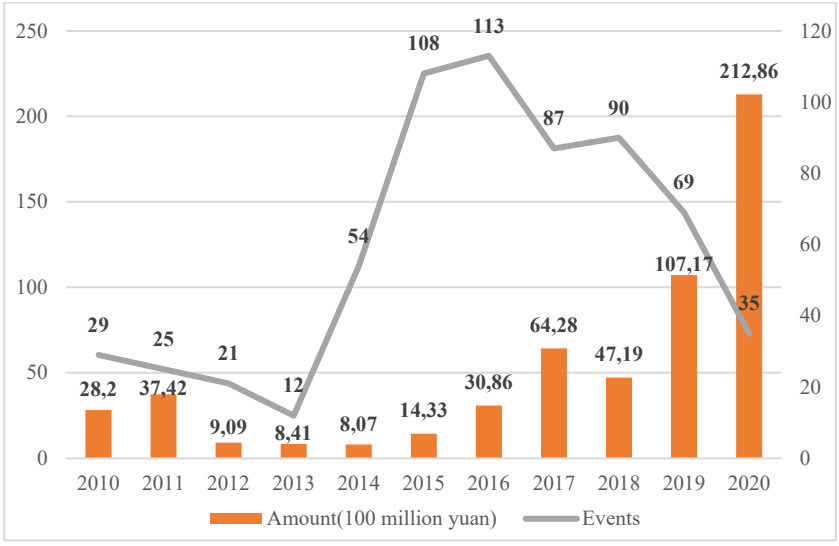

Figure 1: Venture Capital Private Equity Amount and Investment Events of Changsha in 2010-2020

decline in the next few years, reflecting the low level of overall investment development in Changsha (Fig. 1). This article uses empirical analysis and selects relevant data from Changsha from 2010 to 2019 to study the relationship between the construction of the social credit system and the efficiency of Changsha's venture capital, aiming to promote the further improvement of China's social credit system.

2 LITERATURE REVIEW

2.1 Social Credit System and Function

The core of the credit system is credit reporting, the essence of which is the sharing of credit information. The credit information sharing mechanism alleviates the problem of information asymmetry in the transaction process between the borrower and the lender by sharing the borrower's information between lenders.

In China, the traditional credit evaluation system based on quantitative financial data and hard information is not suitable for small and medium-sized enterprises, causing them to face a large financing gap. In order to solve this problem, the Social Credit System (SCS) was formally proposed in 2014 (Síthigh, Siems, 2019). The system combines the economic aspects of credit (involving financial creditworthiness and trust in the market) with measures to promote social harmony and effective government. Its core function is to establish a system to supervise the credit behavior of individuals and enterprises, and the untrustworthy behavior will be punished quickly and effectively (Chen, Grossklags, 2020). The current research shows that the use of big data, blockchain and other technologies to comprehensively evaluate the credit status of SMEs can effectively reduce the information costs and transaction costs between SMEs and lenders (Sun, 2021).

2.2 Factors That Affect the Decision-Making of Venture Capital

The current literature on such issues mainly uses two methods. The first method is the multiple regression method. By using multiple regression model, scholar empirically finds that financial literacy has a positive relationship with investment decision-making to a certain extent because of its ability to accurately control information quality and rationally select investment sectors (Alaaraj, Bakri, 2020).

The second method is to use statistical analysis. With a survey of 749 venture capitalists, research used experimental conjoint analysis to find that corporate revenue growth is the most important investment criterion, followed by the added value of products/services, the performance and profitability of the management team (Block, et al, 2019). 885 institutional venture capitalists were surveyed and the results show that when choosing investments, venture capitalists believe that the management team is more important than business-related features such as products or technology, and the ultimate success or failure of investments depends on the team rather than the business. Moreover, although deal sourcing, deal selection, and post-investment value-added all

contribute to value creation, VCs believe that deal selection is the most important of the three (Grompers, et al, 2020).

2.3 Social Credit System and Investment and Financing Efficiency

Scholars mostly use a combination of qualitative analysis and quantitative analysis to study such problems. An empirical research based on XBRL (Internet-based computer language dedicated to the preparation, disclosure and use of financial reports, which can be entered once and used multiple times) shows that the higher the efficiency of credit information processing, the more efficient the company's investment efficiency (Cheng, et al, 2021). By taking top 500 listed companies in China as the research object, the research constructs a DID model to study the relationship between information sharing and corporate investment efficiency. Research shows that credit information sharing can effectively improve the investment efficiency of enterprises (Ye, et al, 2020).

3 MODEL SETTING

3.1 Research Hypothesis

If a social credit system, including the credit investigation system, has established a shared credit information collection, and with the continuous improvement of this system, the availability of corporate credit information and even more characteristic information continues to increase, then adverse selection The problem will be alleviated. With a relatively complete social credit system, it is easier for venture investors to screen start-ups and make investment decisions. This means that the improvement of the social credit system also means that the default cost of start-ups will increase, and the problem of moral hazard will also be alleviated. Therefore, this article makes the following assumptions:

H1: The higher the degree of Changsha's social credit system, the larger the scale of venture capital.

3.2 Sample Selection and Data Sources

Considering the representativeness of the sample cities' regional geographic location and venture capital scale, as well as the availability and completeness of data, this article chooses Changsha as the analysis object. All the investment events of all venture capital institutions in the sample cities from 2010 to 2019, the per capita GDP data of the sample cities from 2010 to 2019, and the proportion of the output value of the secondary and tertiary industries in GDP are all taken from the wind database. The City Business Credit Environment Index (CEI) is mainly taken from the "CEI Blue Book". For years with missing data, the mean value of two consecutive years is used as an interpolation substitute. In particular, due to the lack of data in 2014, data of 2013 is the average of previous years, and the 2014's is the average of 2013 and 2015.

3.3 Variable Definition and Model Setting

According to the research purpose and related literature, this paper chooses the ratio of venture capital investment to the national total venture capital investment to measure the scale of entrepreneurship.

This article chooses city's commercial credit index as the measure of the level of social credit system construction. The Urban Commercial Credit Index is jointly compiled by the Integrity Research Center of the Chinese Academy of Management Science and other institutions. It is based on the theory of social credit system, urban credit system, and enterprise credit management theory. It provides financial credit instruments, commercial credit sales, and enterprise comprehensive evaluation of factors. Finally get the social credit score of each city and rank it. The social credit score ranges from 1 to 100. The higher the score, the higher the construction level of the city's social credit system. Existing research results show that CEI is a reliable indicator to measure the degree of perfection of the city's credit system and the results of its operation. Considering that the changes in the social credit system may not have an immediate impact on the decision-making of venture investors, this article chooses the first-order lag and second-order lag of CEI as explanatory variables.

The model established in this article is as follows:

$$y_t = a + b_1 CEI_{t-1} + b_2 CEI_{t-2} + b_3 Controls_t + \varepsilon_t \quad (1)$$

Among them, y_t is the explained variable, which measures the scale of venture capital. CEI_{t-1}, CEI_{t-2} as two explanatory variables, they measure the degree of perfection of the city's social credit system. This paper selects per capita GDP (ten thousand yuan), the proportion of secondary industry output value in GDP, and the proportion of tertiary industry output value in

Table 2: Variable Definitions.

Variable types	Variable names	Variable symbols	Variable definitions
Explained variable	Scale of venture investment	y	The permillage of venture capital amount to total venture capital amount (‰)
Explanatory variables	CEI ranking	cei_rank	Ranking of CEI
	CEI score	cei_score	Score of CEI
	First order lag of CEI score	L1_score	First order lag of CEI score
	Second order lag of CEI score	L2_score	Second order lag of CEI score
	First order lag of CEI ranking	L1_rank	First order lag of CEI ranking
	Second order lag of CEI score ranking	L2_rank	Second order lag of CEI score ranking
Control variables	GDP per capita	gdp_pc	GDP per capita (ten thousand yuan)
	Proportion of secondary industry	second_pro	Proportion of secondary industry output value in GDP
	Proportion of tertiary industry	tetiary_pro	Proportion of tertiary industry output value in GDP

Table 3: Descriptive Statistics of Variables.

	mean	std	min	max
y	4.45	3.05	1.69	10.96
CEI_score	73.78	1.23	71.27	75.52
CEI_rank	27.84	2.46	23	32
gdp_pc	10.64	2.33	6.72	13.99
second_pro	50.20	5.82	38.36	56.13
tertiary_pro	45.83	6.23	39.58	58.54

GDP as control variables $Controls_t$ in order to exclude the influence of local economic development level and industrial structure on the scale of venture capital. The variable names, symbols and definitions in model (1) are shown in Table 2.

4 EMPIRICAL ANALYSIS

In the sample cities selected in this article, the average value of the city's venture capital investment to the country's total venture capital is 4.45‰. The maximum value is 10.96‰, and the minimum value is only 1.69‰, which is quite different. The average CEI score of the city is 73.78, and the standard deviation is 1.23. The average value of CEI ranking is 27.84, and the standard deviation is 2.46. The social credit scores of the selected sample cities are relatively close. The average per capita GDP is 106,400 yuan, and the standard deviation is 2.33, which is a small difference. From the perspective of industrial structure, the average value of the secondary industry's output value in GDP is 50.20%, the minimum is 38.36%, and the maximum is 56.13%. The average value of the output value of the tertiary industry as a proportion of GDP is 45.83%, the minimum is 39.58%, and the maximum is 58.54%. The secondary and tertiary industries in the sample cities have a relatively large proportion, and the output value of the secondary industry is relatively higher.

4.1 Regression Results

Table 4 shows the multiple regression results of Changsha's social credit system and venture capital scale.

4.2 Descriptive Statistical Analysis

It can be seen from Table 4 that in the case of column (5), the city credit ranking lags first, the city credit ranking lags first, per capita GDP, the proportion of the secondary industry, and the tertiary industry can all be reached at the 1% significant level.

The coefficients of the proportion of the secondary industry and the proportion of the tertiary industry are 7.107 and 5.992 respectively. This means that when the proportion of the secondary industry increases by 1, it will increase the proportion of venture capital received by Changsha to the national venture capital by 0.71% when the proportion of the tertiary industry increases by 1, it will increase the proportion of venture capital investment obtained by Changsha City to the national venture capital

Table 4: Regression Results of Changsha.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	y	y	y	y	y	y	y
L1_score	-2.16** (0.56)	-0.22 (1.10)				-0.97 (0.51)	
gdp_pc	-0.45* (0.1768)	-0.43 (0.16)	-0.43** (0.13)	-1.33*** (0.18)	-1.35*** (0.03)	-1.02** (0.22)	-0.66* (0.32)
second_pro	-4.42 (3.99)	-1.73 (3.47)	-1.38 (2.48)	6.75* (3.11)	7.11*** (0.32)	2.58 (3.27)	0.43 (6.92)
tetiary_pro	-4.25 (3.71)	-1.53 (3.28)	-1.19 (2.30)	5.79 (2.86)	5.99*** (0.28)	2.02 (2.98)	0.25 (6.38)
L2_score		0.29 (0.46)	0.28 (0.38)				
L1_rank				-0.44*** (0.08)	-0.43*** (0.02)	-0.29* (0.09)	
L2_rank					-0.14*** (0.01)		
cei_score							-0.711 (1.054)
_cons	584.64 (383.98)	158.95 (369.07)	110.15 (229.85)	-571.84 (285.10)	-593.92*** (27.70)	-126.08 (323.15)	29.74 (621.43)
Obs.	9	8	8	9	8	9	10
R^2	0.88	0.90	0.90	0.937	0.99	0.97	0.54
Adj-R^2	0.77	0.64	0.75	0.873	0.99	0.92	0.17
F	7.62	3.48	6.38	14.78	1548.9	20.23	1.45

Standard errors are in parenthesis

*** p<0.01, ** p<0.05, * p<0.1

investment by 0.60%. The improvement of the urban industrial structure will also expand the scale of venture capital.

The coefficients of L1_rank and L2_rank are -0.432 and -0.138, respectively. When the first-order lag and second-order lag of a city's credit ranking increase by one place (ranking decline), the proportion of venture capital investment obtained by Changsha in the country's venture capital investment declines 0. 0432%, 0.0138%.

The coefficient of gdp_pc is -1.352, which means that when the per capita GDP increases by 10,000 yuan, the proportion of venture capital investment in Changsha will decrease by 0.135%.

5 CONCLUSIONS

This paper selects Changsha as the sample city and uses data from 2010 to 2019 to conduct empirical tests on the research hypotheses. The results show that if the city's credit score increases, the proportion of the city's venture capital investment in the country's venture capital will increase; the city's credit ranking declines the proportion of the city's venture capital investment in the country's venture capital will also decrease accordingly. Moreover, the increase in the absolute level of the social credit system has a greater impact on the scale of venture capital than the increase in the relative level. The empirical results also show that the relationship between urban GDP per capita and the scale of venture capital presents a more complicated form, which requires further research to determine.

Based on the above conclusions, this article has the following three policy recommendations:

5.1 Improving the Credit Guarantee System

The credit guarantee system is an important way to solve the problem of corporate financing, and it is also an important link to perfect and perfect the social credit system. Relevant departments should improve laws and regulations to provide policy guarantees for the credit guarantee mechanism. By building a credit information sharing platform, strengthen the circulation of credit data, alleviate the problem of information asymmetry, and promote the smooth flow of the guarantee process. In addition, make good use of the advantages of supervision, streamline handling procedures, implement classified supervision, dynamic supervision, and precise supervision of credit subjects; strengthen the whole-process supervision before and after the event, improve the credit commitment before the event, the

credit supervision during the event, and the credit reward and punishment mechanism after the event.

5.2 Improving the Construction of Credit Information Sharing System

Whether the credit data is perfect or not is related to the long-term and healthy development of China's credit service agencies, and the construction of the credit data system can promote the improvement of China's entire credit system. Currently, information between government departments cannot be shared, social information is not transparent enough, and it is difficult for credit service agencies to obtain relevant credit data. Therefore, we should vigorously support the construction of industry credit databases, encourage credit service agencies to cooperate with Internet platforms, and promote the construction of credit data. Second, establish a characteristic credit database. Credit service agencies should study the credit data that is urgently needed in China, especially the data that is urgently needed by national development strategies, and the current credit data needed for corporate development, and establish a distinctive professional credit database to be more effective to improve the social credit system.

5.3 Guiding Enterprises to Enhance Their Credit Awareness

Corporate credit awareness is the fundamental support point of China's credit system construction. By continuously enhancing its credit awareness, encouraging them to improve their credit records, accelerating credit accumulation, enhancing mutual trust between banks and enterprises, and reducing information opacity. At the same time, speed up the development of the credit guarantee industry, speed up the establishment of corresponding circulation and disposal platforms for intellectual property, accounts receivable and other intangible assets and current assets, and standardize its evaluation, registration, and management procedures. In addition, financial product innovation should also be increased. When banks design financial products, they should develop and design products in a targeted manner according to the characteristics of the investment and financing activities of different types of enterprises. Promote the orderly development of digital finance, improve the digital financial credit system, and create diversified digital financial products on the premise of abiding by financial ethics.

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