

# Take Precautions: A Study on Social Credit System and Venture Capital Scale

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**Keywords:** Social Credit System, Credit Investigation System, Venture Capital.

**Abstract:** The study of social credit system can not only analyze and alleviate the problem of information asymmetry, but also provide more information about entrepreneurial characteristics for venture investors. This paper selects Shanghai as a sample and uses the data from 2010 to 2019 to make a regression analysis of the relationship between social credit system and venture capital scale. The empirical results show that with the increase of the credit score of a city, the proportion of the venture capital received by the city in the national venture capital will increase. When the credit ranking of a city declines, the proportion of venture capital received by the city in the national venture capital will decrease accordingly. Moreover, the rise of the absolute level of social credit system has a greater impact on the scale of venture capital than the rise of the relative level.

## 1 INTRODUCTION

Innovation and entrepreneurship have become a necessary requirement for transforming the pattern of economic development and improving the quality of economic development. 'The Opinions of The State Council on promoting high-quality Development of Innovation and Entrepreneurship and creating an upgraded version' clearly points out that venture capital should fully play its role in supporting innovation and entrepreneurship. Venture capital institutions often face obstacles in expanding the scale of venture capital investment when they invest in the state of information asymmetry. Therefore, a deep study of the relationship between the promotion of social credit system and the expansion of venture capital scale is of positive guiding significance for giving full play to the role of credit as a new factor of production, optimizing the allocation of resources and improving the efficiency of investment.

This paper selects Shanghai as a sample and uses the data from 2010 to 2019 to make a regression analysis of the relationship between social credit system and venture capital scale. The empirical results show that with the increase of the credit score of a city, the proportion of the venture capital received by the city in the national venture capital

will increase. When the credit ranking of a city declines, the proportion of venture capital received by the city in the national venture capital will decrease accordingly.

## 2 LITERATURE REVIEW

According to modern credit science, credit investigation is an activity of collecting, sorting out and saving the credit information of natural persons according to law, and then providing credit assessment, credit report and other services to carry out credit management and provide them to information users. Some scholars also define credit reference as tradable carbon credit based on the credit value used for social welfare or private social investment (Raji, et al, 2021). Credit bureaus and registries have become nearly universal. There are three categories of the social credit investigation system in China: the banking financial institutions represented by the Credit investigation Center of the People's Bank of China; Public institutions represented by government public credit information centers; Credit investigation of social institutions characterized by spontaneous development. The development of China's social credit investigation

institutions shows obvious government-led characteristics, and the government has a huge advantage in promoting the social credit investigation system.

The content of social credit system is extremely rich and the architecture is also quite complex. The

current viewpoints of scholars are to decompose the content of social credit system from four angles: credit form, operation form, relationship with market system and functional system. The details are shown in Figure 1.

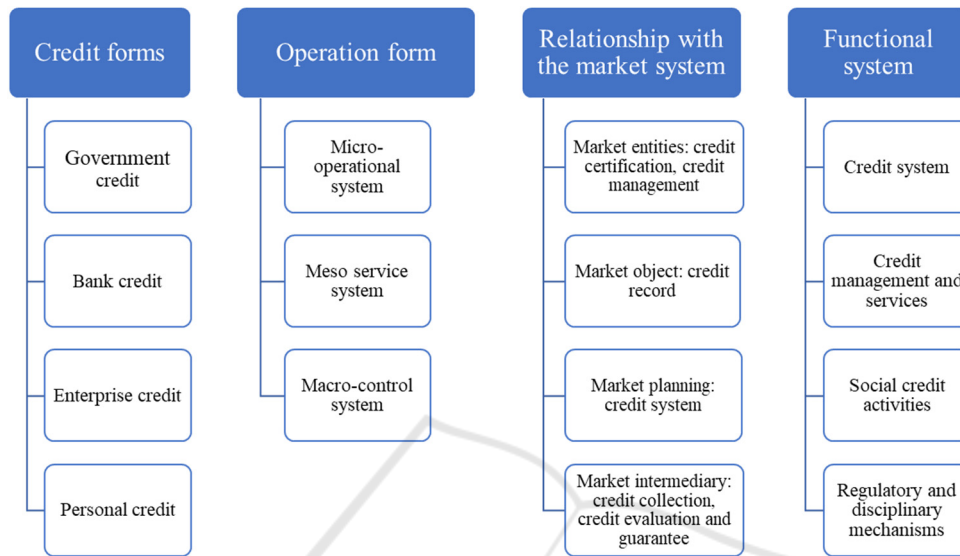


Figure 1: The content of social credit system divided by four levels.

In short, the social credit system is mainly divided into three parts: the government, banks, enterprises and individuals complete their basic credit activities in the market; the government established a series of supporting laws and regulations as the founder of the social credit system; the government also needs to carry out supervision, regulation and other work to maintain the operation of the system. Figure 1 shows that the social credit system is essentially an extension of the credit investigation system in the economic and financial field. First, the credit investigation system is managed by the People's Bank of China. The social credit system is led by the National Development and Reform Commission and the People's Bank of China, with the participation of many other government departments. Second, the credit investigation system mainly collects the negative information of market participants in lending, guarantee, lease, credit card and other activities. Social credit system involves participants in the market credit and public credit field of good and bad information. Third, credit investigation system focuses on the economic field; social credit system covers many fields of social development. Fourthly, the informatization carrier of credit investigation system is mainly the Credit investigation system of the People's Bank of China.

The informatization carrier of social credit system is the national credit information sharing platform. Fifth, from the perspective of the form of credit record presentation, the credit investigation system is presented in the form of personal credit investigation Report; The social credit system is presented in the form of individual public credit Report and enterprise legal person public credit Report.

From the perspective of complex system, social credit system can be divided into three sub-systems: narrow social credit system, social credit system and social civilization system. The three sub-systems are based on two credit data systems. The narrow social credit system is based on the basic database of financial credit information. The system mainly acts in the economic field, and its main tools are credit investigation system and rating, etc. Its main objectives are to regulate credit release, rectify and standardize the order of market economy, realize the government's market credit supervision, reshape business ethics, and establish a punishment mechanism for economic dishonesty.

Social credit system and social civilization system are based on the national public credit information sharing platform. The social credit system mainly acts on the social field, and the main tools are blacklist system and memorandum of joint

punishment for trust-breaking. Its main goal is to construct urban credit system, industrial credit system, joint punishment for trust-breaking and joint incentive for trust-breaking, establish market joint prevention mechanism, and implement credit education project. The social civilization system mainly acts in the social field and the ideological field, the main tool is the resident credit classification and blacklist system, the main goal and task is to achieve the reconstruction of social morality, the construction of advanced culture and legal society and also the innovation of social governance.

To sum up, the main content of social credit system can be summarized as Table 1. The social credit system is more than what people usually mention. From the perspective of using tools, it not only includes the credit investigation system established by the government in the economic field and the service system composed of numerous credit information service agencies in the market, but also includes the joint punishment memorandum for trust-breaking, blacklist system, residents' credit rating system, which can play a role in the field of social credit and social morality.

Table 1: The content of social credit system.

Item	Social credit system		
	Social credit system in narrow sense	Social credit system	Social civilization system
Field	economic field	social field	the whole social ideology field
Form	economic contract	non-standard commitment	social public morality
Tool	credit reporting	blacklist system	blacklist system
State	Start from 2003	Start from 2014	Start from 2016
Objectives and tasks	Regulation and supervision of credit distribution ; Rectify and standardize the order of the market economy; Realize the government market credit supervision ; Reinvent business	Construction of urban credit system; Construction of industry credit system; Construction of joint punishment and joint incentive for trust-breaking; Establish market joint prevention	Rebuilding social morality; Building advanced culture; Building a society ruled by law; Innovating social governance

Item	Social credit system		
	Social credit system in narrow sense	Social credit system	Social civilization system
	ethics; Establish a punishment mechanism for economic dishonesty	system; Implement honesty education project	
Data platform	Financial credit information database	National public credit information sharing platform	
Management department	People's Bank of China	led by the National Development and Reform Commission and the People's Bank of China, with the participation of many other government departments	
Main role	credit	Social rules 39.58	

The advantages of establishing a credit investigation system can not only reduce the cost of screening and monitoring (Hauswald, Marquez, 2003), but also increase the credit scale (Bennardo, et al., 2015). Moreover, it can effectively reduce adverse selection problems (Libeti, et al., 2017). However, the potential cost of establishing a credit investigation system is that it may reduce the information rent of banks (Scott, et al., 2001) and reduce the credit supply (Sutherland 2018).

Credit investigation system also has a certain impact on financing cost in many ways. When evaluating commercial loan applications, especially for small and micro enterprises, banks will consider the credit score of company holders to determine their loan rate (Kamilah, et al., 2020). There is strong evidence that enterprises with high credit rating have lower financing costs. Martinez Peria and Singh (2014) showed that the credit investigation system reduced the financing cost of enterprises by 1.3 percentage points. Loan business model influences the popularization of credit investigation system (Mishra, et al., 2019, Liberti, et al., 2021). Nevertheless, by 2020, 88% of economies have had private credit investigation bureaus or public credit investigation registries (World Bank 2020).

From the perspective of credit risk, information sharing can form a reputation constraint mechanism in repeated games, punishing default behaviors, increasing default costs, and it can help reduce credit risk (Bos, et al., 2015). Some scholars have studied the relationship between credit investigation system and non-performing loans of banks and found that the

economic impact of information system reform is quite large, which reduced the non-performing loan ratio of banks by nearly 40% (Saibal Ghosh, 2019). Therefore, bank regulators can consider establishing a credit investigation system as a macro-prudential supervision over the growth of non-performing loans (Wahyoe, et al., 2017).

To sum up, information asymmetry can lead to adverse selection, moral hazard and credit mismatch in the credit market. By establishing a credit investigation system to share credit information, banks can enhance their ability to select investors from different risk categories, reduce adverse selection of borrowers and promote the increase of credit scale. At the same time, the reputation constraint mechanism can improve the default cost, reduce credit risk, and solve the financing difficulties of small and micro enterprises.

### 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 paper is as follows:

$$y_t = a + b_1CEI_{t-1} + b_2CEI_{t-2} + b_3Controls_t + \varepsilon_t$$

Where,  $y_t$  is the explained variable, which measures the scale of venture capital investment.  $CEI_{t-1}$  and  $CEI_{t-2}$  are explanatory variables, which measures the degree of perfection of a city's social credit system.  $Controls_t$  is control variable. We choose GDP per capita (ten thousand yuan), the proportion of secondary industry output value in GDP, and the proportion of tertiary industry output value in GDP to exclude the influence of local economic development level and industrial structure on venture capital scale.

All of variable names, symbols and definitions in model (1) are shown in Table 1.

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 the total national venture capital amount(%)
explanatory variables	CEI ranking	cei_rank	Ranking of urban commercial credit environment index
	CEI score	cei_score	Score of urban commercial credit environment index
	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)
	the proportion of secondary industry	second_pro	The proportion of secondary industry output value in GDP
	the proportion of tertiary industry	tertiary_pro	The proportion of tertiary industry output value in GDP

## 4 EMPIRICAL ANALYSIS

### 4.1 Descriptive Statistical Analysis

Table 3: Descriptive statistics of variables.

	mean	std	min	max
y	43.51	89.47	0.02	355.45
CEI_score	84.35	2.07	80.09	87.00
CEI_rank	2.11	0.33	2.00	3.00
gdp_pc	11.06	2.52	8.26	15.73
second_pro	33.22	4.86	26.99	41.30
Tertiary_pro	66.32	5.00	58.09	72.74

Among the sample cities selected in this paper, the average ratio of venture capital investment in cities to the total amount of national venture capital investment is 4.351%. The maximum value was 3.55%, and the minimum value was only 0.002%. The average CEI score of the city was 84.35, and the standard deviation was 2.07. The CEI scores of sample cities were higher and the differences were small. The mean and standard deviation of CEI rankings were 2.11 and 0.33 respectively. The social credit scores of selected sample cities are relatively

close, and the difference in ranking is slightly smaller. The mean value of per capita GDP was 110,600 yuan, and the standard deviation was 2.52, indicating a small difference. From the perspective of industrial structure, the average proportion of secondary industry output value in GDP is 33.22%, 26.99% on minimum, and 41.30% on maximum. The average proportion of tertiary industry output value in GDP was 66.32%, 58.09% on minimum and 72.74% on maximum. The proportion of secondary and tertiary industries in the sample cities is larger, and the output value of tertiary industry is relatively higher.

### 4.2 Regression Results

The regression results between Shanghai's social credit system and venture capital scale are shown in Table 3.

Table 4: Regression results of Shanghai (1).

	(1)	(2)	(3)	(4)
	y	y	y	y
L1_score	59.21* (22.28)	44.35 (47.27)		
gdp_pc	-11.44 (27.03)	-10.34 (72.32)	43.73 (42.82)	15.74 (42.09)
second_pro	-1792.95 (929.80)	-1612.16 (2304.28)	-128.60 (1642.48)	-1904.72 (2165.12)

	(1)	(2)	(3)	(4)
<i>tertiary_pro</i>	-1757.68 (904.14)	-1588.88 (2223.09)	-160.27 (1587.25)	-1856.36 (2107.10)
<i>L2_score</i>		20.09 (49.39)	-6.88 (39.36)	
<i>L1_rank</i>				13.59 (175.31)
<i>L2_rank</i>				
<i>cei_score</i>				
<i>_cons</i>	171454.11 (90909.89)	153826.84 (218641.06)	15205.98 (157930.46)	186350.09 (211729.29)
<i>Obs.</i>	9	8	8	9
<i>R-squared</i>	0.77	0.82	0.74	0.37
<i>Adj R-squared</i>	0.54	0.36	0.39	-0.26
<i>F</i>	3.39	1.79	2.10	0.59

Table 5: Regression results of Shanghai (2).

	(5)	(6)	(7)
	y	y	y
<i>L1_score</i>		67.97* (24.45)	
<i>gdp_pc</i>	38.86 (15.78)	-10.89 (27.43)	11.48 (40.49)
<i>second_pro</i>	-67.98 (840.93)	-2705.51 (1353.18)	-390.65 (804.03)
<i>tertiary_pro</i>	-82.78 (821.46)	-2647.68 (1317.84)	-379.53 (784.65)
<i>L2_score</i>			
<i>L1_rank</i>	193.93 (140.68)	-108.91 (115.77)	
<i>L2_rank</i>	243.22 (94.34)		
<i>cei_score</i>			-42.61 (35.30)
<i>_cons</i>	6560.71 (82644.99)	260279.92 (132001.87)	41807.81 (79779.02)
<i>Obs.</i>	8	9	10
<i>R-squared</i>	0.96	0.82	0.40
<i>Adj R-squared</i>	0.85	0.53	-0.17
<i>F</i>	9.06	2.81	0.56

Standard errors are in parenthesis

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

The econometric analysis of this part is developed in Model (1). In the case of columns (1) and (6), the first-order lag term of the city's credit score, as an explanatory variable, is significant at the level of 10%. At this point, the coefficients of *L1\_score* are 59.21 and 67.966 respectively. This means that when the urban social credit increases by one point, the proportion of Shanghai's venture capital investment in the national venture capital will increase by 5.92% and 6.80%. In 2019, the proportion of venture capital investment in Shanghai accounted for 17.18%, and the CEI score was 85.488, ranking the second in China. This result indicates that the improvement of the construction level of urban social credit system will increase the scale of innovation investment.

## 5 CONCLUSIONS

### 5.1 Build a Diversified Credit Investigation System

We should speed up the construction of diversified credit investigation system, further establish and improve the long-term mechanism of credit information collection and data sharing, break information barriers, and increase credit information exchange and sharing among industries. At the same time, we should accelerate the construction of local credit investigation platforms with "database + service platform" as the core, promote information symmetry between banks and enterprises, improve the financing efficiency of micro enterprises, and promote economic development.

### 5.2 Expand the Application Scenarios of Credit Investigation System

We should strengthen the publicity of credit investigation system, expand the application scenarios of credit investigation system, and give full play to the counter-cyclical adjustment function of credit investigation system. At the same time, we should improve risk awareness, integrate internal corporate customer credit information, strengthen the connection with judicial and tax platforms, actively use fintech ways for analysis, and improve risk prevention capabilities.

However, this paper only selects Shanghai as a representative city for empirical research, and the sample is relatively single. In addition, Shanghai, as an international city, is relatively complete in the construction of social credit system. However, in China, there are many small cities that cannot achieve such an excellent credit investigation system, which may be slightly different from the conclusion of this paper. In the future, we can carry out regression statistics on the data of various counties and cities across the country to reach a more comprehensive conclusion.

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