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The Impact of Venture Capital Participation on the Quality of Information Disclosure of Listed Companies

Empirical Research Based on China GEM Data

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Abstract—Based on the data from the China Growth Enterprise Market during 2010 to 2017, this paper studies the impact of venture capital participation on the quality of information disclosure. The research finds that: the participation of venture capital can significantly improve the quality of information disclosure of listed companies; venture capital institutions with different property rights can effectively improve the quality of information disclosure, among which foreign venture capital institutions perform best. The research results of this paper will be a reference to the regulatory authorities, investors and GEM listed companies.

Keywords—venture capital; information disclosure; GEM; stock price synchronization

I. INTRODUCTION

With the further deepening of the domestic economic transformation, innovation and entrepreneurship have been strongly supported by the government, which has also brought the rapid development of venture capital. Venture capital combines financial capital and industrial economy to promote the rapid development of high-tech enterprises. On the contrary, the industrial economy has also brought great returns to venture capital. At the same time, professional venture capital institutions not only provide financial support for enterprises, but also provide strategic guidance and market resource support for them to become bigger and stronger.

The capital market is essentially an information market, and investors make investment decisions based on information. The information disclosure behavior of enterprises is an important means to reduce information asymmetry, and it is also a prerequisite for effective allocation of resources in the capital market. At the same time, information disclosure is closely related to issues such as corporate governance efficiency and internal control, and is one of the important factors that investors should consider when evaluating companies. However, the Chinese GEM market, which was established less than ten years ago, is still

in the initial stage of development. The behavior of listed companies using information superiority to manipulate the market and arbitrage has been repeatedly prohibited. Severe information asymmetry not only makes the quality of corporate information disclosure questioned by investors, but also reduces the efficiency of resource allocation in the capital market.

At present, relevant research on the quality of information disclosure is constantly enriched. From the perspective of investors, academic research mostly focuses on institutional investors, but institutional investors play different roles with venture capital institutions in corporate information disclosure, so the reference is limited. Based on this, this paper takes the companies listed on the China Growth Enterprise Market in 2010-2017 as the research object, and empirically analyzes the impact of the participation of venture capital and the different backgrounds of venture capital on the quality of information disclosure. The results show that: venture capital participation can significantly improve the quality of information disclosure of invested companies; venture capital institutions with private backgrounds can play a more positive role in the quality of information disclosure than state-owned venture capital institutions.

The rest of the paper is organized as follows. The second part is literature review. The third part is the research design. The fourth part is empirical results and the last is the conclusion.

II. LITERATURE REVIEW

The relationship between the participation of venture capital institutions and the quality of information disclosure of listed companies should start from the four functions of "screening, financing, supervision and certification" of venture capital. The simple explanation is that venture capital can select excellent enterprises with its professional vision. In turn, it can provide growth funds for outstanding enterprises, and supervise or intervene in the daily business



decisions of the company by holding important positions in the enterprise. Meanwhile, it can also pass the signal to the capital market with its good reputation to certify the value of the company. It can be seen that venture capital can affect the quality of information disclosure of listed companies from both internal and external perspectives. In the related research, scholars have generated different opinions based on the four functions of venture capital and its own operation mode, which are mainly divided into two groups.

A. Venture Capital Is Positively Related to the Quality of Information Disclosure

Based on the "value certification hypothesis" and "supervised screening hypothesis", one group believes that venture capital has a positive effect on the quality of information disclosure. The "Value Accreditation Hypothesis" was proposed by Megginson and Weiss [1] in 1990. They believed that venture capital institutions, as more experienced and professional intermediaries, are most familiar with the business management of the company, and its shareholding in the enterprise itself represents the value of enterprise. Therefore, information asymmetry is indirectly reduced. In the same year, Barry [2] found that venture capital firms can use their professional analysis to identify outstanding and promising companies in a mixed market. Then they will take professional management of the company and urge the company to improve the quality of information disclosure, in order to improve the information asymmetry in the principal-agent relationship. The research later developed into the "supervised screening hypothesis". These two hypotheses illustrate that venture capital can effectively reduce information asymmetry from both direct and indirect perspectives. Based on these two hypotheses, venture capital institutions have large investment scales, strong information analysis capabilities, large voices in the company, and high requirements for profitability. Therefore, they have full motivation and ability to require enterprises to improve the quality of information disclosure. Although there have been few studies on this topic in China in recent years, there have been some progress. Ji Xinlong and Ma Ning (2016) [3] take China's Shenzhen GEM listed companies as research objects, and empirical analysis shows that when venture capital becomes the company's top ten shareholders, the accounting information of listed companies is more transparent, and the proportion of shares is larger, information Transparency will be further enhanced. Wang Yanhua's (2016) [4] research conclusion not only affirmed the correlation between venture capital and information disclosure quality, but also proposed that the shareholding ratio, shareholding period and frequency of participation all have a positive effect on the quality of information disclosure. He Zhelin (2015) [5] has similar conclusions from the perspective of signal transmission theory. The internal control system of venture capital participation is more perfect, the quality of information disclosure is better, and the higher the participation of venture capital, the more significant the correlation.

B. Venture Capital Is Negatively Correlated with the Quality of Information Disclosure

From the perspective of "moral hazard", the other party believes that venture capital institutions bear the dual pressure of rapid exit and excess return, so they may strive for more controllable space and advantage of internal information in order to achieve their own profit targets. As a result, the quality of corporate information disclosure has decreased. Tan Yi (2009)[6] and Zhang Feng (2009) [7] believe that under the current unsound institutional background and immature market environment in China, the role of supervision or certification of venture capital is not fully reflected, but more moral hazard problem. Some scholars have studied the relationship between venture capital and information disclosure quality from the perspective of earnings management, and further explained the negative effects brought by venture capital. Lee & Masulis (2011) [8] found that venture capital institutions did not have good performance in improving the quality of corporate information disclosure, and almost did not play a role in curbing the earnings management behavior of listed companies. The research results of Hu Zhiying et al. (2012) [9] show that the participation of venture capital does not play a role in certification or supervision of the quality of accounting information before and after the lock-up period.

In summary, it can be inferred that the participation of venture capital institutions is related to the quality of corporate information disclosure, but whether the positive or negative relationship still needs further research.

In addition, according to the background of controlling shareholders, venture capital can be divided into state-owned venture capital, private venture capital and foreign investment venture capital. They have differences in capital advantages, investment preferences and investment objectives. Will these differences affect the quality of information disclosure? In theory, private venture capital and foreign investment venture capital should be more professional and more concerned about the performance of the invested companies. At present, there are few related studies, and this article will make further research in this regard.

III. DATA AND METHODOLOGY

A. Sample Selection and Data Sources

Among the listed companies in China, the GEM enterprises have the characteristics of high growth and high technology content, which are favored by a large number of venture capital institutions and can be used as a sample to study the quality of venture capital and information disclosure. Therefore, this article takes GEM listed companies as research objects. The China Growth Enterprise Market was officially listed on October 30, 2009, so the research area of this paper is from 2010 to 2017. The samples were screened according to the following criteria: (1) In order to have sufficient observation and assessment period for the quality of information disclosure of listed companies, this article excludes samples that were listed after January 1,



2017; (2) Due to the large gap between the disclosure of annual reports of financial enterprises and other industries, this paper excludes listed companies in finance, securities and insurance; (3) Excluding companies that have been processed by ST or ST* in the observation interval; (4) Excluding companies with missing key data. A total of 3,255 records were recorded.

The relevant data of venture capital comes from database CSMAR, company prospectus and manual verification. The quality of information disclosure is expressed by the stock price synchronization, and the data required for calculation also comes from database CSMAR. The size of the company, the rate of return on assets, the asset-liability ratio, and the size of the board of directors are from the database CSMAR. The software used is STATA14.0.

B. Variable Definitions

The data definition is represented in "Table I".

1) Venture capital: This paper refers to the previous research and judges whether shareholders belong to venture capital institutions according to the following principles: (1) The main business of the company will be checked through the website Qichacha if "risk investments" or "start-up investments" is includes in the names of shareholders. And if it conducts "risk investment" or "start-up investment", it will identify such shareholders as venture capital. (2) If the above words are not found in the company's shareholder name, their nature is determined by reference to the introduction in the prospectus or equity change statement.. (3) Refer to the 2014 edition of "China Venture Capital and Private Equity Investor List" prepared by the Qingke database to check whether the shareholder enters the catalogue. According to the above criteria, if there is risk investment in the company's shareholders, IFVC=1, and vice versa. VCNUM is the number of venture capital institutions, and VCSTOCK is the shareholding ratio of venture capital. In this paper, according to the nature of the actual controller of venture capital, it is divided into stateowned venture capital (SOEVC), private venture capital (PRIVC) and foreign investment venture capital (FOREVC).

2) Quality of information disclosure: This paper draws on the methods of Durnev (2003) [10] and Huang Jun (2014)[11] to measure the quality of information disclosure by using stock price synchronization. The reason why the Shenzhen Stock Exchange Information Disclosure Quality Rating is not used as the explanatory variable is that the sample with a rating of "good" is the majority, and the difference in the quality of information disclosure between different companies cannot be carefully measured.

Stock price synchronicity refers to the relationship between changes in the company's stock price and the average price of the stock market. After years of research, the relationship between stock price synchronicity and the quality of information disclosure has been divided into two factions. In response to emerging markets, Kelly (2015) [12] found that stock market volatility in emerging markets is

mainly affected by market noise. The company reduces the impact of some unfair and unreasonable information in the market on stock prices by improving the quality of information disclosure. This move allows the company to maintain and even improve share price synchronicity. This view indirectly reflects the positive correlation between the quality of information disclosure and stock price synchronicity. Wang Yaping (2009) [13], Wang Fenghua (2009) [14], and Jin Zhi (2010)[15], based on China's market environment, also concluded that the quality of information disclosure and information transparency are positively correlated with stock price synchronization. Shi Yong (2013)[16] further studied that the higher the quality of information disclosure, the less private information is incorporated into the stock price through trading, and the higher the stock price synchronization. Because the research object of this paper is China's GEM, which belongs to the emerging and irrational market, this paper uses stock price synchronization to measure the quality of information disclosure. It believes that the higher the stock price synchronization, the better the quality of information disclosure. The stock price synchronization is calculated as follows.

$$RET_{it} = \propto_0 + \propto_1 \times MARET_t + \varepsilon_{it} \tag{1}$$

$$SYNCH_i = LN(\frac{R_i^2}{1 - R_i^2}) \tag{2}$$

Among them, RET_{lt} is the stock return rate of company i in week t. $MARET_t$ is the market yield in week t. R^2 is the annual goodness of fit of model (1)."

3) Control variable: Regarding the choice of control variables, Wang Bin and Liang Xinxin (2008) [17] found that the size of the company is positively related to the quality of information disclosure, because large companies are more worried that improper information disclosure will bring huge political costs and economic consequences. At the same time, financial leverage is also worthy of attention in information disclosure because it represents financial risk and may result in the company's value being undervalued by the capital market. In order to eliminate the adverse effects of high asset-liability ratio, the management of the company often manipulates information disclosure. The company's profitability will also affect the quality of information disclosure. Companies with good general performance expectations have higher quality of information disclosure. Finally, the factors of corporate governance are also considered because the nature of information disclosure is an institutional result of the company's external financing and the resulting corporate governance issues. So this article also included the size of the board of directors in the control variables.

In summary, control variables are as follows: the natural logarithm (SIZE), asset-liability ratio (Lev), total return on assets (ROA), and board size (BOARD).



TABLE I. VARIABLE DEFINITION

Varia	ble Name	Variable Definition			
SYNCH	Stock price synchronicity	Calculated using model (1) and model (2)			
IFVC	Whether venture capital is involved	If there are venture capital among the top ten shareholders, then IFVC=1, otherwise 0.			
VCNUM	Number of venture capital	Number of venture capital institutions disclosed in the top ten shareholders			
VCSTOCK	Venture capital shareholding ratio	The sum of the shareholding ratios of venture capital institutions disclosed in the top ten shareholders			
PRIVC	Private venture capital	Number of private venture capital institutions			
PRIVCSTO	Private venture capital shareholding ratio	Private venture capital institution shareholding ratio			
SOEVC	State-owned venture capital shareholding ratio	Number of state-owned venture capital institutions			
SOEVCSTO	State-owned venture capital	State-owned venture capital institution shareholding ratio			
FOREVC	Foreign investment venture capital	Number of foreign investment venture capital institutions.			
FOREVCSTO	Foreign investment venture capital shareholding ratio	Foreign investment venture capital institution shareholding ratio			
SIZE	Company Size	The natural logarithm of the company's total assets			
LEV	Asset-liability ratio	Total liabilities/total assets			
ROA	Return on Assets	Net profit/total assets at the end of the period			
BOARD	Board size	Number of company directors			

C. Model Building

This paper is divided into two parts. The first part is to study the impact of venture capital participation on the quality of information disclosure. The second part is to study whether the impact of venture capital with different property rights background on the quality of information disclosure is different.

The main models are as follows.

$SYNCH_{it} = \propto_0 + \beta_1 IFVC_{it} + \beta_2 Control_{it} + \varepsilon_{it}$	(3)
$SYNCH_{it} = \propto_0 + \beta_1 VCNUM_{it} + \beta_2 Control_{it} + \varepsilon_{it}$	(4)
$SYNCH_{it} = \propto_0 + \beta_1 VCSTOCK_{it} + \beta_2 Control_{it} + \varepsilon_{it}$	(5)
$SYNCH_{it} = \propto_0 + \beta_1 PRIVC_{it} + \beta_2 Control_{it} + \varepsilon_{it}$	(6)
$SYNCH_{it} = \propto_0 + \beta_1 PRIVCSTO_{it} + \beta_2 Control_{it} + \varepsilon_{it}$	(7)
$SYNCH_{it} = \propto_0 + \beta_1 SOEVC_{it} + \beta_2 Control_{it} + \varepsilon_{it}$	(8)
$SYNCH_{it} = \propto_0 + \beta_1 SOEVCSTO_{it} + \beta_2 Control_{it} + \varepsilon_{it}$	(9)
$SYNCH_{it} = \propto_0 + \beta_1 FOREVC_{it} + \beta_2 Control_{it} + \varepsilon_{it}$	(10)
$SYNCH_{it} = \propto_0 + \beta_1 FOREVCSTO_{it} + \beta_2 Control_{it} + \varepsilon_{it}$	(11)

IV. EMPIRICAL RESULT

A. Summary Statistic

In order to eliminate the interference of extreme outliers, the continuous variables in the paper are processed with 1% tail end. Descriptive statistics of all variables in this paper are shown in "Table II".

It can be seen that the standard deviations of SYNCH and IFVC are 0.346 and 0.445, respectively, indicating that there is a certain difference between the samples. The standard deviation of VCNUM is 0.717, and the standard deviation of VCSTOC is 4.771, indicating that the participation amount of venture capital is quite different.

TABLE II. SUMMARY STATISTICS

Variable	N	Min	Max	Mean	Std. Dev.
SYNCH	3255	-1.099	0.139	-0.609	0.346
IFVC	3255	0.000	1.000	0.271	0.445
VCNUM	3255	0.000	3.000	0.385	0.717
VCSTOCK	3255	0.000	26.060	2.062	4.771
PRIVC	3255	0.000	2.000	0.227	0.519
PRIVCSTO	3255	0.000	19.950	1.117	3.248
SOEVC	3255	0.000	2.000	0.130	0.389
SOEVCST O	3255	0.000	0.667	0.007	0.024
FOREVC	3255	0.000	1.000	0.016	0.126
FOREVCS TO	3255	0.000	0.068	0.001	0.007
LEV	3255	2.945	70.455	26.951	16.389
ROA	3255	-10.083	22.800	6.457	5.180
SIZE	3255	19.563	23.263	21.109	0.778
BOARD	3255	5.000	12.000	8.071	1.404

B. Unit Root Test

Since the sample interval is from 2010 to 2017, involving multiple listed companies on the GEM, the data studied in this paper belongs to panel data. Because some non-stationary economic time series often show a common trend, and these sequences are not necessarily directly related. At this point, if the data is regressed, although the result has a higher R square, the result is not of any practical significance. In order to avoid false regression, this paper conducted a unit root test.

This panel is an unbalanced panel. Maddala and Wu (2000)[18] pointed out that the Fisher test can be used in the unbalanced panel, so this article uses the xtfisher command in Stata to perform a unit root test on variables. The Fisher test is performed on the explained variable SNYCH and its lagging phase. The p is 0.000, rejecting the null hypothesis, indicating that there is no single root, and the sequence is stationary.

C. Hausmann Test

In the processing of panel data, in order to judge whether the fixed effect model or the random effect model is used, the model (3)-(11) is subjected to the Hausmann test. The test results show that P is 0.0000, the original hypothesis of



the random effects model is strongly rejected, and the fixed effect model is selected for the models (3)-(11)."

D. Venture Capital Participation and Quality of Information Disclosure

This chapter examines whether venture capital plays a role of "certification and supervision" or shows more moral hazard in the disclosure of information in listed companies. IFVC, VCNUM and VCSTOCK are used as explanatory variables and other control variables are added for multiple regressions. The specific regression results are shown in "Table III".

The regression results show that companies with venture capital participation are significantly positively correlated with stock price synchronicity. And the more the venture capitalists are involved, the greater will be the shareholding ratio, and the greater will be the stock price synchronization. They are all significant at the 1% level. This means that venture capital institutions can play the role of certification supervision to a certain extent and improve the quality of information disclosure of the company. In the control variables, the asset-liability ratio and the company size are significantly negatively correlated with the stock price synchronization, indicating that companies with large scale and high financial leverage have low quality of information disclosure. The return on assets is positively correlated with stock price synchronicity, indicating that companies with good performance are more inclined to disclose high-quality information.

TABLE III. REGRESSION RESULT 1

	SYNCH	SYNCH	SYNCH
	(1)	(2)	(3)
IFVC	0.199***		
	(9.37)		
VCNUM		0.142***	
		(11.51)	
VCSTOCK			0.024***
			(8.21)
SIZE	-0.149***	-0.144***	-0.139***
	(-11.60)	(-9.24)	(-10.69)

	SYNCH	SYNCH	SYNCH
	(1)	(2)	(3)
LEV	-0.006***	-0.006***	-0.006***
	(-9.14)	(-9.24)	(-9.65)
ROA	0.015***	0.014***	0.014***
	(8.34)	(8.29)	(7.61)
BOARD	0.018**	0.018**	0.018**
	(2.08)	(2.02)	(1.97)

a. T-statistics in parentheses.

E. Venture Capital of Different Property Rights and Ouality of Company Information Disclosure

In order to further study the relationship between venture capital participation and information disclosure quality, from the perspective of heterogeneity of venture capital, venture capital institutions are divided into state-owned venture capital, private venture capital and foreign-funded venture capital according to the background of actual controllers. Using the models (6)-(11), regression analysis was carried out from the two aspects of the number of shares held and the proportion of shares held. The results are shown in "Table IV".

From the perspective of the number of venture capital institutions, compared with the results of (1) (3) (5), the coefficients of private, state-owned and foreign-funded are 0.158, 0.152, and 0.187, and the results are all significant at the level of 1%. This shows that all three venture capital institutions have a positive effect on the quality of information disclosure, among which the role of foreign capital ventures is the most significant, and the impact of private venture capital and state-owned venture capital on the quality of information disclosure is not much different. From the shareholding ratio, the results in the comparison (2) (4) (6) are similar to the previous results. This result may be due to the fact that foreign-invested venture capital institutions are often more professional and have more management experience. Therefore, compared with domestic venture capital institutions, the role of certification and supervision is more fully exerted, which is conducive to the improvement of information disclosure quality.

TABLE IV. REGRESSION RESULT 2

•	SYNCH	SYNCH	SYNCH	SYNCH	SYNCH	SYNCH
	(1)	(2)	(3)	(4)	(5)	(6)
PRIVC	0.158***					
	(9.63)					
PRIVCSTO		0.027***				
		(7.03)				
SOEVC			0.152***			
			(5.34)			
SOEVCSTO				0.031***		
				(6.04)		
FOREVC					0.187***	
					(2.66)	
FOREVCSTO						0.038***
						(2.91)
SIZE	-0.153***	-0.151***	-0.159***	-0.155***	-0.167***	-0.167***
	(-11.94)	(-11.57)	(-12.29)	(-11.87)	(-12.72)	(-12.73)

b. *** p<0.01, ** p<0.05, * p<0.1



	SYNCH	SYNCH	SYNCH	SYNCH	SYNCH	SYNCH
	(1)	(2)	(3)	(4)	(5)	(6)
LEV	-0.006***	-0.007***	-0.007***	-0.007***	-0.007***	-0.007***
	(-9.41)	(-9.76)	(-10.14)	(-10.24)	(-10.61)	(10.47)
ROA	0.014***	0.014***	0.016***	0.015***	0.015***	0.015***
	(8.18)	(7.91)	(8.51)	(8.22)	(8.36)	(8.37)
BOARD	0.022**	0.022**	0.027***	0.027***	0.029***	0.029***
	(2.46)	(2.43)	(3.02)	(3.01)	(3.13)	(3.13)

T-statistics in parentheses.

V. CONCLUSION

This paper selects the China GEM listed companies in 2010-2017 as the research object, and studies the relationship between venture capital participation and information disclosure quality. The research finds that the participation of venture capital can significantly improve the quality of information disclosure of listed companies. The more the number of venture capital institutions in the company, the higher the shareholding ratio, the higher the quality of information disclosure. In terms of property rights, three different types of venture capital institutions can effectively improve the quality of information disclosure. Among them, foreign-funded venture capital institutions have the strongest professionalism. This may be because foreign-funded venture capital are more efficient, more mature and more professional while state-owned venture capital is greatly affected by government policies and private venture capital is still mostly in the growth period.

The research results of this paper have reference significance for participants in capital markets such as regulators, investors, and GEM listed companies. For regulators, supervision of the truthfulness, timeliness and completeness of information disclosure should be strengthened. At the same time, regulators should continue to improve the legal system for information disclosure. For investors, when making stock market investment decisions, refer to the number and shareholding ratio of venture capital institutions of the company's shareholders to determine whether the company's disclosure of internal management is accurate. This helps to improve information asymmetry, reduce investment risks, and increase investment returns. For GEM listed companies, the company should improve its governance structure, ensure the effectiveness of information disclosure channels, and make full play of the governance role of venture capital. At the same time, listed companies should strengthen internal and external supervision, conduct real disclosure, and strive to attract more venture capital participation which can bring more value-added services to the company.

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b. *** p<0.01. ** p<0.05. * p<0.1