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Screening value or influencing value—venture capitals'impact on performance of Shenzhen gem companies

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ABSTRACT

VCs' value-added effect on enterprises receives attention from all walks of life, whereas only few people pay attention to whether VC promoted business performance, or discovered firm performance and selected enterprises. Different from the previous studies, this paper focuses on analyzing the endogenous relationship between VC and firm performance in the system environment of China. Based on the sample of 281 companies which listed on Shenzhen GEM during 2009 to 2011, this paper respectively tests VCs' screening function and value-added effect on enterprise performance. The empirical results show that VCs not only have a negative impact on the GEM companies, but also have not selected the best enterprises. This conclusion is important for all walks of life to understand the VC's real effect.

KEYWORDS

Venture capital; Firm performance; Value-added; Value-selected; Endogenous.

INTRODUCTION

The main distinction between venture capital and credit capital is that venture capitalist (VC henceforth) not only provide firms with funds, but also with value-added services such as management consultancy, social network and so on (Gorman and Sahlman[1]; Zhang[2]), so that to promote rapid development of enterprises. Therefore, VC is honored as incubator of scientific and technical innovation and accelerator of economic development. The first VC was established in 1985 in China, and *Interim Regulations on Administration of Venture Capital Firms (shorter form IRAVCF)* introduced in 2005 which stipulates that one of the VC's tasks is "to provide enterprises with entrepreneurial management service". Learning from disclosing message from VC-backed companies listed Shenzhen GEM, we discover VCs usually participate in investee firms' director and supervision management. Zhang (2009)[2] found with investigation that VCs provide enterprises with value-added services as well as supervision after investing. As for the effect of VCs on the performance, the previous studies have inconsistent conclusions: some proved VC help to improve firm performance (Brav and Gompers[3]; Jia and Li 2011[4]; Tang and Tan 2008[5], some concluded VC has no impact on firm performance or even has adverse impact (Higashide and Birley 2002[6]; Tan et al. 2009[7], but few analyzed the endogenous relations between VC and firm performance. It's well known that VC must survey and screen the investee firms' performance before investing; conversely, after investing, VCs usually help the investee firms to add value so as to obtain maximum investment returns by transferring shares within shortest time. Therefore, VC and firm performance has a mutual influence, while verifying the effect of VC on the firm performance impact, it's necessary to handle the endogenous problem. Then dealing with the endogenous problem, we try to test VC's actual impact on firm performance by the sample of 281 companies listed Shenzhen GEM during 2009 to 2011 in this paper.

To test VC's actual impact on firm performance, we study respectively on VCs' screening function and value-added effect on firm performance, and focus on dealing with the endogenous problems just as follows:

(1) Instrumental variable method (Hu et al. 2012[8]; Wu et al. 2012[9]): we select Shanghai Composite Index rate of return and total annual IPO numbers at the year of investment in China stock market as the instrumental variables which correspond to endogenous variable of VC, and test VC's value-added effect in Model 2 and Model 3 with the regression analysis of 2SLS.

(2) Lagged variable model (Li and Han 2013[10]; Tang and Song 2010[11]): we construct the dynamical model just as Model 1and Model 4 to handle the endogenous problems. The Model 1 which tests actual influence of firm performance in (t-1) stage on VC's investment decision in t stage is a Quadratic Logistic Regression Model. The Model 4 tests the actual impact of VC's investment in t stage on the firm performance in t+1 stage after VC's investment. Since these models require the matched time, we select time-matched sub-sample, please refer to the specific method of sub-sample selection from the Samples Selection of this paper.

(3) Method of mean value: To measure the firm performance, Liu (2001)[12] argued that the integrated performance can be more perfect to reflect the status of firm business; to avoid fluctuations from short-term performance, Cai et al.(2013)[13] took mean value of long-term performance to check robust test. Combining the methods of both, we calculate the integrated performance score to fully reflect the firm performance, please refer to the Section 2.2 part for the special calculation.

In addition, we choose the reasonable samples. There are two methods to select the samples of VCs: one is to directly select shareholders of investment institutions from Top 10 shareholders of the listed companies from CSMAR or Wind database (Wu et al. 2012[9]), or to directly use data of China Venture or Zero2IPO Group (Zhang and Liao 2011[14]); the other is to gather from the messages disclosed by listed companies (Wang and Zhang 2012[15]; Zhang et al.[16]). We discover, during studying on 281 companies, part of VCs appearing in Top 10 shareholders or 5% shareholder are controlled by the company's original founders and internal staffs or their connected persons which set up VCs to hold shares indirectly during the period of equity adjustment, those internal VCs usually take a big proportion of equity. But some external VCs don't appear in the introduction of Top 10 shareholders or 5% shareholders due to their small proportion of equity, but are introduced in equity evolution specification.

We think there are essential differences between the internal VCs and the external VCs whose shareholders have nothing with the listed companies, so we only screen and study the external VCs. Please see Sample Selection section for details.

LITERRATURE REVIEW AND HYPOTHESIS

From the previous literatures, we find the growing literatures study the effect of VC on investee firms from multi perspectives, such as VC's impact on technical innovation of enterprise (Kortum and Lerner 2000[17]; Fu et al. 2012[18]); VC's influence on IPO underpricing rate (Jain and Kini1995; Shen et al.2013); VC's influence on business performance (Knockaert et al. 2006[19]; Jia and Li 2011)[4]. With regard to the effect of VC on business performance, existing literatures had different conclusions due to the difference of countries, samples, stages and research methods (Tan et al.[7]). Gorman and Sahlman[1], Knockaert et al.[19] found that VC provides enterprises with not only funds, but also kinds of value-added services such as management consultancy, strategic planning and social relation network etc. to rapidly promote enterprise performance. Taking North American market as sample and according to the method of time and industry pairing, Jain and Kini (1995)[20] compared the performance of VC-backed companies and no VC-backed companies before and after IPO, and discovered the firm performance and operational cash flow of the former is relatively low before IPO, but declined after IPO, and that of VC-backed companies declined less. Wang and Lu[21] discovered in Singapore market that the short-term and long-term market performances of VC-backed companies have unmarked difference from those of no VC-backed companies. Even worse, business performance of VC-backed companies is poorer after IPO.

Relatively, there are fewer literatures in China to study VC's influence on firm performance (Wang and Zhang 2012[15]). Fan and Li (2005)[21] found by survey that VC can add enterprise's value only if VC and enterprise teams had a successful cooperation. If VC performs much intervention, conflicts between VC and enterprise will be easily occurred and trigger negative effect on enterprises. Jia and Li (2011)[4] took Shenzhen SEM companies as sample to test VC's effect on business performance and market performance. By dealing with sample selection bias, he found the IPO underpricing rate of VC-backed companies is obviously higher than that of no VC-backed companies, but firm performance of VC-backed companies get remarkable declined after termination of lock-up period, and stock return rate of VC-backed companies is lower, which indicates that venture capital industry in China now tends to eager for quick success and instant benefits. In order to realize investment incomes and prove their strength, VCs will boost their invested firms to be listed at an early time, thus VCs' pursue of short-term performance will cause negative effect on long-term development of enterprises. Moreover, Zhang and Liao (2011)[14] studied the influence of VC's background on IPO performance; Wu et al.(2012)[9] discovered VC has a positive impact on the enterprise's investing activity; Hu et al. (2012)[8] found VC has an influence on accounting earnings management of companies listed in Shenzhen GEM.

As for the research methods, the previous literatures mainly used mean value comparison and multiple regression analysis of OLS to study VC's impact on firm performance, few analyze on the endogenous relation between VC and the firm performance. Whereas, no matter in practice or in theory, VC must survey and screen the firm performance before its investment, so as to reduce risks and gain maximum income. Thought there are many standards for VC's screen, it's indispensable to inspect on financial indicators. On the other hand, the aim of VCs' equity investment is not to control the enterprise, but to help the enterprise add value, then to exit and gain returns by transferring shares. To ensure the maximum returns in short-time, VC will provide value-added services to promote the enterprises' value. Therefore, the firm performance influences VC's investment selection, and VC also affects firm performance after its investment, which means that VC has an endogenous relationship with firm performance. If the empirical result shows that VC has a positive correlation with the firm performance only by OLS test and without dealing with the endogenous problem, it is hard to prove that whether VC promoted business performance, or discovered and selected enterprises with good performance, or they both exist. Similarly, the test result shows VC has negative correlation with firm performance without handling the endogenous problem is also hard to prove whether VC caused

negative effect on firm performance, or it had not screened the better firms, or both. So, we verify the VC's real influence on firm performance by handling the endogenous problem, and study respectively on VC's selection function and value-added effect on firm performance. Our theoretical analysis is as follows: Firstly, we analyze on two-way selection behavior between VC and enterprise. When VC screens enterprise, enterprise may select on VC at the same time, which means VC and enterprise are in two-way selection. So it's under discussion that whether venture capital can screen excellent enterprise, and whether excellent enterprise will accept VC. The investment purpose of VC is to share enterprise benefits, meanwhile, enterprise must pay off stock rights and even control power for VC's funds and resources (He 2005)[23], which objectively cause conflict on both parties' interests. So the best firm will not be easy to accept a second party to share its interests if it is capable of solving problems in connection with funds and other resources. While second best firms may not be able to overcome some problems, they have to introduce investors from the external, and try to choose experienced and powerful VC. While VC also takes precedence to better enterprises. Suppose both VC and enterprise have selection ability, then, under two-way selection condition, best companies will not introduce VC, so VC can only choose second best firms; and VCs with less experience will have difficulty in selecting good enterprises, the worst enterprises will sure not get investment. Then, it is obvious that VC has adverse selection behavior during its investment (Wang and Zhou 2002)[24], Cheng and Li (2013)[25], Wang et al.(2013)[26] also discovered such adverse selection of venture capital.

Secondly, we analyze VC's actions from the perspective of China's IPO system. Different from registration system of IPO issuance carried out in developed countries such as America, the IPO system of China has gone through with examining system and approving system which both have administrative examination and approval. With the present approval system of China, preferential issuance is the key principle for Issuance the Examination Committee (IEC) of China Securities Regulatory Commission (CSRC) to screen companies as well as to protect investors' interests and market stability, so companies listed in China stock market are selected preferentially. It can be inferred that the companies with no VC-backed but selected by IEC of China are the best companies, this kind of companies don't want external VCs to share their benefits. Other companies with VC-backed and screened by IEC are second best when compared with no VC-backed and listed companies, but are better than the unlisted companies which including the companies with VC-backed but failed to be selected by IEC, and these with no VC-backed and unlisted companies. Then we can conclude that VC has value-added effect on listed companies' performance, and get the following hypothesis:

Hypothesis1. VC has adverse selection behavior during its investment, which means VC-backed companies will have worse performance than no VC-backed listed companies before investing.

Hypothesis2. VC has value-added effect on performance of their supported listed companies.

RESEARCH DESIGN

Sample selection

We take 281 companies listed in Shenzhen GEM durring 2009-2011 as the research sample. Data mainly comes from the public disclosure of information of listed companies, CSMAR database, WIND database and financial websites such as Cninfo, PEdaily and so on. Firstly, we screen VCs from the listed companies' prospectus and equity evolution specification, the specific principles for screening VC are as follows: (1) VC must be the legal institutional shareholders of listed companies rather than individual investors or industrial investment institutions, their business conforms to the provisions of *IRAVCF*. The main business includes venture investment, equity investment, investment consulting, etc. The name of VCs generally contains investment/management company, investment fund, financial management company, consultation institution, private equity funds (or institution), etc. (2) we only select the external VCs whose shareholders have nothing to do with the listed companies. If VCs' shareholders are the listed companies' shareholders or founders or managers, which can be regarded as internal VCs. We kick the internal VCs out and only retain external VCs. At last, there are 189 VC-backed companies and 92 no VC-backed companies in the whole sample.

Besides, for further research on VC's screening and value-added functions in this article, we selected the time-matched sub-samples from the whole samples so as to conduct the lag variable models such as Model 1 and Model 4, the specific selection method is as follows: From 189 VC-backed companies, we selected the VC-backed companies whose VC shareholders had invested for 12 to 24 months from the earliest time of buying shares to the time of firms' IPO. Because the listed companies generally had the financial data for only 3 years before IPO, the performance of listed companies in this article is found to decline greatly after IPO, to avoid the effect of this factor, we only keep companies which have been invested by VCs at least for 1 year before IPO, and retain the data before and after VC's investment to test VC's screening function and value-added effect on the firm performance. At last we screened 69 firms. For ease of understanding and comparison, we record the time of the first VC's investment as "t". To mach the "t" time of 69 VC-backed companies, we record the time of the second year before IPO of 92 no VC-backed companies as "t". Then, we get 69 VC-backed companies and 92 no VC-backed companies in the time-matched sub-sample.

Research model and main variable declaration

To test VC's real impact on the firm performance, we respectively test VC's screening function and value-added effect on firm performance by handling the endogenous problem between VC and firm performance. The methods and models are as follows:

Firstly, to test VC's screening function, we compare the firm performance between VC-backed companies and no VC-backed companies before VC's investment by the Independent Samples Test and Mann-Whitney U test. When the performance of VC-backed companies is poor, it indicates that VC hasn't chosen the best enterprises. To further research on the VC's screening function on the performance, we handle the endogenous problem with lag variable method (Tang and Song 2010[11], Li and Han[10]) in the time-matched sub-sample, and construct quadratic logistic regression model just as the Model 1 to study the firm performance of (t-1) stage impact on the investment probability of VC's screening in t stage. In Model 1, t stands for the time of VC investing year; the dependent variable (VCt) is a dummy variable, 1 stands for VC-backed companies and o stands for no VC-backed companies; independent variables take the firm financial indicators of (t-1) period such as quick ratio (QRAt-1), working capital ratio (WCRt-1), asset-liability ratio (LEVt-1), sales net interest rate (ROSt-1), rate of return on net assets (ROEt-1),financial expense rate (FERt-1),operating cost rate (OCRt-1), management fee rate (MFRt-1). In addition, we set the following control variables just as Wu et al. (2012)[9]: the state-owned property (record as Property) supposes as a dummy variable, if the firms have state-owned shareholders then it records as 1, others are 0; "Dis" is a dummy variable too, when firm is registered in relatively developed areas of Beijing, Shanghai, Guangdong, Zhuhai, Shenzhen, Fujian, Hainan, Zhejiang, Jiangsu, Shandong, Tianjin then records as 1, others are 0. The firms in the sub-sample are located in 9 industries according to the classification of China Securities Regulatory Commission, so "Ind" factor has 8 dummy variables.

$$VC_t=\beta_0+\beta_1 QRA_{t-1}+\beta_2 WCR_{t-1}+\beta_3 LEV_{t-1}+\beta_4 ROS_{t-1}+\beta_5 ROE_{t-1}+\beta_6 FER_{t-1}+\beta_7 OCR_{t-1}+\beta_8 MFR_{t-1}+\beta_9 Property+\beta_{10} Dis+\sum_{i=11}^{18}\beta_i Ind_i \quad (1)$$

Secondly, to study VC's effect on firm performance, we compare mean performances of VC-backed companies with those of no VC-backed companies, and construct Model 2 and Model 3 just as equation (2)and (3).

$$Performance = \beta_0+\beta_1 VC+\beta_2 Size+\beta_3 Staff\text{-}Share+\beta_4 LEV+\beta_5 Dis+\sum_{i=6}^{15}\beta_i Ind_i+u \quad (2)$$

$$Performance= \beta_0+\beta_1 VC\text{-}Share+\beta_2 Size+\beta_3 Staff\text{-}Share+\beta_4 LEV+\beta_5 Dis+\sum_{i=6}^{15}\beta_i Ind_i+u \quad (3)$$

Among the Model 2 and Model 3, "Performance" is the firm's integrated performance score which is calculated by the following process: trying to maintain original and complete data from four indicator system which reflect enterprise's solvency, profitability, Shareholder profitability and development ability, we select eight indicators such as current ratio, quick ratio, net assets income rate, rate of return on total assets, net asset value per share, operation revenue per share, net profit growth rate and increase rate of business revenue. Then, for VC-backed firms, we take mean value of all annual data from the year of VC's buying shares to the first year after listing; for no VC-backed firms, take mean value of all annual data from the last 3 years before listing to the first year after listing. From the mean value of 8 indicators, we got the principal divisors with the principal component analytical method, and calculated the integrated performance score which is used for measuring long-term and integrated enterprise performance. "VC" is a dummy variable, the VC-backed firms are 1, others are 0; "VC-share" is the sum of all VCs' shareholdings ratio before IPO. In addition, we take enterprise scale, ownership structure, industry factors, Regional differences, asset-liability ratio of firms as control variables (Wu et al.[9],Wang and Zhang[15]. "Lev" is the asset-liability ratio which is a mean value getting by the method of the mean value of 8 indicators above. The firm scale (Size) gets by natural logarithm's mean value according to the annual total assets of firms for 2 years after listing. "Staff-Share" is the sum of executives' shareholding ratio which including the individual direct ownership among directors, supervisors, senior of firm. "Dis" just as model 1. There are 10 industries in the whole samples, and 9 dummy variables of "Ind" are set up.

Then, to verify VC's real effect on firm performance, we focus on dealing with the endogenous problems. Taking model 3 for example, we first judge whether there is endogenous problem, under the endogenous case, we handle the endogenous problem with the instrumental variable method and the lagged variable method. In order to choose the best instrumental variables, we combine with instrumental variable selection principle and the research problems, select two instrumental variables which are the return rate of Shanghai Composite Index and the total number of IPO in the year of VC first investing. Generally, VC's investment activities are affected by the economic situation, and the stock market index especially Shanghai Composite Index is the economic barometer, so fluctuations of Shanghai Composite Index affect VC's investment. Meanwhile, Shanghai Composite Index is exogenous for the unlisted firm performance, so the Shanghai Composite Index is fitted to be the instrumental variable of VC and VC-share. Similarly, the quantity of IPO is also a good instrumental variable for VC factor. Since the IPO channel is the best way for VC exiting, the number of IPO is more, VC's returns expectation is more optimistic, and VC's investment intention is stronger, which promotes VC's investment. So the quantity of IPO influences VCs' investment but is exogenous for the firm performance. We also test the validity of the two instrumental variables. Then, we test the instrumental variable method by 2SLS method.

Finally, to construct the lag variable model for further studying VC's effect on the firm performance, we set up Model 4 to test VC's investment at t period impact on firm performance at (t+1) period in the time-matched sub-sample. Since the time of VC investment is fixed, we push performance indicators forward, so ROEt+1 is the dependent variable which took mean value of all annual rate of return on net assets from the year of VC's buying shares to the year of listing. "VCt" is VCs' investment situation at t stage, 1 stands for the firms with VC investment at t stage, and others are 0. "ROEt" is the lag variable of dependent variable, "LEVt+1" is the mean value of asset-liability ratio just as the dependent variables over the same period. The control variables of "Dis" and "Ind" are just the same as mode l.

$$\mathbf{ROE_{t+1} = \beta_0+\beta_1 VC_t+\beta_2\ ROE_t +\beta_3 Size +\beta_4 Staff\text{-}Share +\beta_5 LEV_{t+1}+\beta_6 Dis +\sum_{i=7}^{15}\beta_i Ind_i} \quad (4)$$

EMPIRICAL TESTS

The main variables of descriptive statistics

Since this article contains many variables, TABLE 1 merely carries on descriptive statistical of main variables. In TABLE 1, because the integrated performance score is the data handling by the normalized processing, the value is relatively small. The mean value of integrated performance score and the shareholding ratio of executives of VC-backed companies are much lower than those of no VC-backed companies. In VC-backed firms, the average shareholding ratio of VC is approximate 16.0457%. The scale of VC-backed firms is greater than that of no VC-backed firms. VCs tend to invest in developed provinces and cities.

TABLE 1 : Descriptive Statistics of Main Variables of VC-backed Companies and no VC-backed Companies

	VC	N	Mean	Std. dev.	Min	Max
Performance	No-VC	92	0.068	0.479	-0.670	1.880
	VC	189	-0.033	0.416	-0.810	1.830
Size	No-VC	92	20.411	0.519	19.420	21.481
	VC	189	20.578	0.528	19.336	22.229
Staff-Share (%)	No-VC	92	41.628	22.419	0	73.517
	VC	189	34.448	20.957	0	72.264
Dis	No-VC	92	0.772	0.422	0	1
	VC	189	0.720	0.450	0	1
VC-Share (%)	No-VC	92	0	0	0	0
	VC	189	16.046	10.841	0.344	68
VC	No-VC	92	0	0	0	0
	VC	189	1	0	1	1

Inspection of VC's screening function

To test VC's screening function on firm performance, we first compare the performance of VC-backed companies with that of no VC-backed companies before VC investment (t-1 period), the TABLE 2 shows the results. Then we carry out logistic regression analysis on model 1and get the regression results in TABLE 3. In this paper, *, **, ***Significant at the10%, 5% and 1% levels, respectively.

In TABLE 2, we first do the descriptive statistics of the financial indicators of t-1 period between VC-backed firms and no VC-backed firms, then carry out Independent Samples Test and Mann-Whitney U tests. TABLE 2 shows that only the debt to assets ratio of VC-backed firms is greater than that of no VC-backed firms, which are significant within 5% level. In addition, the current ratio and working capital ratio only pass 10% significant level test in Mann-Whitney U test, and the mobility of VC-backed firms is relatively small. Other indicators do not pass the significant tests. Comprehensively, the performance of VC-screened companies is worse than that of no VC-backed companies. It verifies the hypothesis 1 which means VCs screen the firms with the poor performance, VC has an adverse selection during its investment.

TABLE 3 shows that the regression result is not significant as a whole. All of the coefficients, only sales net profit rate and firms' state-owned properties pass the 5% significant level test; asset-liability ratio which is a negative index to the performance indicators has a significant positive correlation with VC's investment at 10% level; other variables are not significant, which indicates that firm performance impacts the VC's selecting less obviously. Then, we carry out logistic regression analysis on the model 1 by using the independent variable through condition entering method, the result shows only state-owned property variable enters into regression result, all performance indicators are eliminated, which proves the firm performance has no influence on the VC's screening and investment decision. According to the comparison results of mean performance above, we comprehensively conclude that VC doesn't select the firm with best performance, and firm financial indicators have certain influence on VC's screening decision, but the effect is not prominent, which means VC has adverse selection behavior during its screening and investment.

Test on VC's value-added function

To test VCs' value-added function, we mainly focus on the regression analysis of Model 2 and Model 3, and also compare the firm performance between VC-backed companies and no VC-backed companies by Independent Samples Test and Mann-Whitney U tests. Since the enterprise's long-term and comprehensive performances reflects the essential characteristic of enterprise's state of operation, we obtain the mean value of financial indicators by the same way as the 8 financial indicators in the process of integrated performances score, that is, for VC-backed firms, we take mean value of all annual data from the year of VC's buying shares to the first year after listing; for no VC-backed firms, take

TABLE 2 : Descriptive Statistics and Comparison of Pre-investment Performance

Descriptive Statistics					Independent Samples Test						Nonparametric tests	
						Levene's Test For Equality of Variances		t-test for Equality of Means			Mann-Whitney U tests	
Financial indicators (t-1 stage)	Type	N	Mean	Std.		F	Sig.	t	Sig. (2-tailed)	Mean Difference	Z	Sig. (2-tailed)
Current ratio	no-VC	92	1.957	1.373	Equal variances assumed	1.677	.197	1.317	0.190	0.256	-1.653	.098*
	VC	69	1.701	0.979	Equal variances not assumed			1.381	0.169	0.256		
Quick ratio	no-VC	92	1.547	1.408	Equal variances assumed	1.848	.176	1.278	0.203	0.253	-1.366	.172
	VC	69	1.294	0.975	Equal variances not assumed			1.345	0.181	0.253		
Working Capital ratio	no-VC	92	0.323	0.366	Equal variances assumed	1.707	.193	0.851	0.396	0.045	-1.910	.056*
	VC	69	0.279	0.273	Equal variances not assumed			0.887	0.377	0.045		
Debt to Assets ratio	no-VC	92	0.477	0.159	Equal variances assumed	2.012	.158	-1.992	0.048**	-0.054	-2.125	.034**
	VC	69	0.531	0.183	Equal variances not assumed			-1.954	0.053 *	-0.054		
Rate of return On net assets	no-VC	92	0.299	0.145	Equal variances assumed	.026	.873	-0.968	0.334	-0.022	-1.308	.191
	VC	69	0.321	0.143	Equal variances not assumed			-0.971	0.333	-0.022		
Financial expense rate	no-VC	92	0.012	0.016	Equal variances assumed	.023	.879	-0.338	0.736	-0.001	-.441	.659
	VC	69	0.013	0.018	Equal variances not assumed			-0.331	0.741	-0.001		
Operating Cost ratio	no-VC	92	0.593	0.186	Equal variances assumed	.281	.597	-1.091	0.277	-0.032	-1.305	.192
	VC	69	0.625	0.183	Equal variances not assumed			-1.093	0.276	-0.032		
Management Fee rate	no-VC	92	0.109	0.061	Equal variances assumed	3.440	.065	1.054	0.293	0.010	-.830	.406
	VC	69	0.099	0.052	Equal variances not assumed			1.078	0.283	0.010		

TABLE 3 : Analysis of the Impact of Firm Performance on VC's Investment Decision

Dependent variable	VC_t		
	Coefficient	t	P value
Constant	184.343	0.000	0.999
QRA_{t-1}	0.000	0.000	0.999
WCR_{t-1}	0.425	0.253	0.615
LEV_{t-1}	3.112	3.012	0.083*
ROS_{t-1}	7.441	4.221	0.040**
ROE_{t-1}	0.258	0.027	0.869
FER_{t-1}	-0.614	0.002	0.962

OCR_{t-1}	2.798	1.691	0.193
MFR_{t-1}	0.016	0.000	0.997
Dis.	-0.031	0.006	0.940
Property	-1.476	5.974	0.015**
Ind.	Control		
N	161		
Chi-square (Sig.)	24.754(.132)		
Cox & Snell R^2	.143		

The mean value of all annual data from the last 3 years before listing to the first year after listing. TABLE 4 shows the comparing results, and the results of regression analysis are the part of OLS in TABLE 5.

In TABLE 4, it shows that the total assets turnover ratio, net profit rate of total assets, rate of return on net assets pass the 1% significance level test; the debt to assets ratio is significant in 5% level; the integrated performance score is significant in 10%, which indicates that the performance of VC-backed enterprises is poorer than those of no VC-backed enterprises, the assumption 1 is proved again. Because the mean difference of the comprehensive and long-term performances of firms reflects the essential difference of the enterprise's business state, VCs don't select the best enterprises.

From the results of OLS of Model 2 and Model 3 in TABLE 5, we know that the overall effect of regression is good: the values of F tests and t tests are both significant, all Coefficients are stabling. The experimental variables of VC and VC-Share have Significant negative correlations with the dependent variable of integrated performance score at 1% significance level. The control variables like the Size, Staff-Share, LEV are significant and stable as well. So it can be seen that VC has negative correlations with the enterprise performance. But only with these test results, it can not conclude that VC does to lower the enterprise performance, because that the negative correlations between VC and the firm performance may be caused by the fact that VC selected the enterprises with poor performance, just as the assumption1. So, we should deal with the endogenous problems in the models before concluding that VC has a real negative impact on the firm performance.

TABLE 4 : Descriptive Statistics and Comparison of the Long-time Performances

Descriptive Statistics						Independent Samples Test					nonparametric tests	
						Levene's Test for Equality of Variances		t-test for Equality of Means			Mann-Whitney U tests	
Financial indicators	Type	N	Mean	Std.		F	Sig.	t	Sig. (2-tailed)	Mean Difference	Z	Sig. (2-tailed)
Current ratio	0	92	6.026	5.407	Equal variances assumed	.243	.623	-0.117	0.907	-0.082	-.094	.925
	1	189	6.108	5.580	Equal variances not assumed			-0.118	0.906	-0.082		
Total assets turnover ratio	0	92	0.749	0.286	Equal variances assumed	.110	.741	2.907	0.004***	0.101	-3.887	.000***
	1	189	0.648	0.267	Equal variances not assumed			2.839	0.005***	0.101		
Debt to assets ratio	0	92	0.320	0.122	Equal variances assumed	.054	.817	2.367	0.019**	0.036	-2.201	.028**
	1	189	0.284	0.118	Equal variances not assumed			2.340	0.020**	0.036		
Net profit rate of total assets	0	92	0.131	0.054	Equal variances assumed	13.964	.000	3.586	0.000***	0.021	-2.929	.003***
	1	189	0.110	0.040	Equal variances not assumed			3.256	0.001***	0.021		
Rate of return on net assets	0	92	0.214	0.064	Equal variances assumed	11.663	.001	6.332	0.000***	0.044	-5.885	.000***
	1	189	0.170	0.050	Equal variances			5.828	0.000***	0.044		

					not assumed							
Earnings per share	0	92	0.681	0.343	Equal variances assumed	.132	.717	0.522	0.602	0.021	-.317	.751
	1	189	0.660	0.311	Equal variances not assumed			0.505	0.614	0.021		
Growth rate of net profit	0	92	1.056	5.341	Equal variances assumed	4.456	.036	1.334	0.183	0.537	-1.004	.315
	1	189	0.520	1.022	Equal variances not assumed			0.955	0.342	0.537		
Integrated performance score	0	92	0.068	0.479	Equal variances assumed	2.385	.124	1.817	0.070*	0.101	-1.757	.079*
	1	189	-0.033	0.416	Equal variances not assumed			1.730	0.086*	0.101		

TABLE 5 Regression Analysis of OLS and 2SLS Based on Model2 and Model 3

Dependent variable	**Performance.**							
	Model2				**model 3**			
	OLS		**2SLS**		**OLS**		**2SLS**	
	Coefficient	**T (Prob.)**	**Coefficient**	**T (Prob.)**	**Coefficient**	**T (Prob.)**	**Coefficient**	**T (Prob.)**
VC	-.190	-4.218*** (.000)	-.264	-4.227*** (.000)				
VC-Share					-.005	-2.793*** (.006)	-.017	-3.823*** (.000)
Size	.319	7.697*** (.000)	.329	7.827*** (.000)	.298	7.139*** (.000)	.311	6.918*** (.000)
Staff-Share	.270	2.776*** (.006)	.248	2.513** (.013)	.240	2.337** (.020)	.046	.356 (.722)
LEV	-2.014	-10.830*** (.000)	-2.087	-10.891*** (.000)	-1.843	-10.009*** (.000)	-1.872	-9.473*** (.000)
Dis.	.073	1.565 (.119)	.070	1.491 (.137)	.068	1.421 (.157)	.039	.737 (.462)
Ind.	**Control**							
(Constant)	-5.148	-5.511*** (.000)	-5.329	-5.641*** (.000)	-4.752	-5.031*** (.000)	-4.904	-4.837*** (.000)
N	281		281		281		281	
Adjusted R^2	.428		.426		.407		.383	
F value	15.981*** (.000)		15.837*** (.000)		14.749*** (.000)		13.393*** (.000)	

The endogenous problems tests

To handling the endogenous problem, we first identify whether there are endogenous problems, and then test the instrumental variable model and lag variable model by dealing with the endogenous problem. Taking Model 3 as the example, to identify whether there is endogenous problem in Model 3, we only identify the experimental variable of VC-Share, the other independent variables are not identified due to limited space which are taken as control variables. To identify the endogenous existence of VC-share in Model 3, we directly compared the results of OLS with 2SLS, if the results are alike, the model has no endogenous; if different, there are endogenous problems (Hausman 1987[27]). From TABLE 5, the results of OLS and 2SLS are different, so VC-share is an endogenous variable in model 3. The other method to identify the endogenous is the Two Steps Method as follows: the first step of OLS is to take VC-Share as dependent variable, the instrumental variables (referring to Shanghai composite index's rate of return and the total IPO numbers of China stock market) and other

independent variables (such as Size, Staff-Share, LEV, Dis, Ind) as the independent variables. Then we can get the residual serial of the first step regression of OLS. The second step of OLS is to take the integrated performance score (Performance) as dependent variable, the residual serial from the first step, VC-Share, and other independent variables (such as Size, Staff-Share, LEV, Dis, Ind) as the independent variables, then we get the coefficient of the residual serial. If this coefficient is not 0, there is endogenous problem in the model. Finally, we get the residual serial's coefficient of 0.026 at the 1% significance level, so VC-share has an endogenous relation with the performance.

Then, we test on the validity of the instrument variables of Shanghai composite index's rate of return and the total IPO numbers of China stock market in this article. Still take Model 3 as the example, because the number of the instrument variables is larger than the number of the endogenous variable of VC-share, we only conduct the over- identification test to prove whether the instrument variables are related with the perturbing term ("u") in model 3, if the instrument variables haven't relation to the "u", it indicates the instrument variables are effective. Our result shows that within 1% level, the instrument variables are uncorrelated to the disturbing item ("u"), so the Shanghai composite index's rate of return and total annual IPO numbers are valid. Then, with the instrument variables, we test Model 2 and Model 3 by the 2SLS method. The regression results of 2SLS in TABLE 5 show VC is still significant negative to the performance. Now, we can conclude that VC really make a negative effect on the firm performance, this is contrary to the Hypothesis2. To explain the conclusions, we handle the problem of "selective samples mode" (Heckman1979). Wu et al.[9],Wang and Zhang (2012)[15] used this method to handle the endogenous problem. But, after adding the inverse Mills ratio into the regression equations of Model 2 and Model 3, we find that VC's influence on performance is still significant negative.

Finally, to further study the real effect of VC on firm performance, we conduct test the lag variable model 4 under the simulated environment condition in the time-matched sub-sample, and get the result in TABLE 6. The result shows that VC's investment during t period is still negatively correlated to the enterprise performance (ROEt+1) during (t+1) period. Therefore, it can be concluded that VCs cannot improve the enterprise value, and even have a significant negative influence on the firm performance. Wang and Jia got the similar conclusion as well.

TABLE 6 : Analysis of VC Influence on the Firm Performance Based on the Lag Variable Model

Dependent variable	ROE_{t+1}		
	Coefficient	t	Prob.
(Constant)	**.388**	**1.996****	**.048**
VC_t	-.034	-4.102***	.000
ROE_t	.245	6.864***	.000
Size	-.014	-1.577	.117
Staff-Share	-.001	-.073	.942
LEV_{t+1}	.155	4.481***	.000
Dis.	.010	.996	.321
Ind.	Control		
N	161		
Adjusted R^2	.377		
F value	7.913(.000)***		

CONCLUSIONS

VC can offer the enterprise not only capital when conducting equity investment, but also value-added services, which is the original intention for China to develop the venture capital industry. Yet, do these funds and appreciation services of VCs really add the firm performance in China's system

environment? To answer this question, we first researched the precious literatures to find the inconsistent conclusions. Then, different from the literatures, we focus on analyzing the endogenous relationship between VC and the firm performance in the China system environment. Taking 281 companies listed Shenzhen GEM during 2009~2011 as samples, we test VC's value-added effect and its screening function, and deal with the endogenous by the methods of Instrumental variable model and Lagged variable model.

By dealing with the endogenous, we come to the following empirical conclusions: (1) the firm performance of VC-backed companies, whether the pre-investment performance or the long-time average performance, or the integrated performance, is all poor to that of no VC-backed companies, which means VCs don't select the best enterprises and even make adverse selections during its investment. (2) VC and VC-share both have a negative effect on the firm performance by dealing with the endogenous problem, this conclusion is different from our expectation. It may be caused by the differences in China system, sample selection and analysis perspective. Since the firm performances between the China's main board market and GEM market are so different, that VCs will make a different strategic decision in different market. Our conclusions can provide another perspective of VC's effect on the performance of companies listed in Shenzhen GEM. In further research, we will enlarge the sample to study the difference in VC's function among the different market; and conduct field investigation to extensively study VC's effect in practice.

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