A Study of the Impact of Private Equity Funds on the Value of SMEs

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Abstract. Private equity (PE), a type of equity investment in unlisted companies, has gradually become more popular in the domestic market as a result of China's economy's rapid development. According to certain experts, private equity significantly affects businesses. Less research has been done, though, on how private equity funds affect business value. The focus of this article is therefore the impact of PE on the valuation of SMEs. Based on the GEM data from 2019 to 2022, the empirical analysis of the results by means of multi-linear regression model indicates that the value of private equity firms is higher than that of non-private equity investors, and the lower the balance sheet ratio, the higher the return on net assets ratio, or the higher the research and development intensity of the enterprises participated by private equity institutions, the more conducive it is to increase the value of small and medium-sized enterprises.

Keywords: Private equity funds; SMEs; value.

1. Introduction

As the global economy continues to develop, SMEs are playing an increasingly important role in driving economic growth, creating employment and promoting innovation. However, due to credit constraints, financing difficulties and other issues, SMEs face many challenges in their development process. In recent years, private equity funds, as a new type of financing channel, have provided financial support to SMEs to help them overcome obstacles to their development. Private equity funds have an impact on firm value in terms of funding, management and exit. This study aims to investigate how private equity funds affect SMEs' valuations. The empirical inquiry will shed light on how private equity funds affect the value of SMEs in terms of capital infusion, company development promotion, and corporate governance optimization.

The theoretical significance of this study is to cite the data of Chinese GEM-listed companies, quantify the value of the company using Tobin's Q value, and analyze experimentally how private equity investments affect the value of SMEs' businesses using capital structure-related financial metrics., corporate governance, business performance and innovation ability, so as to provide a reference for the subsequent research based on the improvement of the existing research. The practical significance of this study is to broaden the financing channels of SMEs by confirming the influence of company value and the function of private equity on the growth of SMEs, to impart knowledge to SMEs on the best ways to use private equity capital to spur expansion and improve their competitiveness in the market, and to offer empirical references for the growth of the Growth Enterprise Market (GEM) and the private equity sector in China, thereby enhancing the efficiency of resource allocation in the capital market.

2. Literature Review

2.1. Definition of the Private Equity

Private Equity, referred to as PE. private equity fund is a kind of fund that raises funds and carries out equity investment for a small number of institutional and individual investors with strong financial strength through non-public means. Private equity funds in China are mostly invested in the early stage of the development of unlisted enterprises or non-publicly raised funds of listed companies,

which has a very positive effect on the promotion of the early growth of enterprises [1]. In the study of this paper, the concept of private equity investment is included in the venture capital VC.

2.2. Research Related to Private Equity

Many scholars have conducted research on private equity, which can indirectly affect enterprise value through business performance and corporate governance.

One way to gauge an organization's worth is through its business performance. A company that receives private equity investments can list more quickly and draw in more investors if its share of private equity investment increases. As the share of PE investment increases, so is the effect of private equity investment on the innovation performance of China's listed companies, which can range from suppression to support [2]. To accomplish the goal of the final exit profit, private equity institutions can support the value-added enterprise, enhance the corporate governance framework, and take part in the management of the business. Shares may also be held by private equity firms in order to maximize business success [3-5].

Based on research on private equity's role in corporate governance, private equity investment institutions invest in businesses, and in addition to lending money to businesses, they will also take part in day-to-day management of the enterprise. These investment institutions can also be empowered by their own management expertise and access to top-notch resources to reform the business, improve the effectiveness of corporate governance, and increase the intrinsic value of the business to address issues where a major shareholder owns the majority of the business, which forces the business to diversify its equity and enhance specialized services for the growth of the business. creation and enhancement of professional services, which aids in raising the enterprise's corporate value by strengthening its level of governance. Greater involvement of the board of the investment company with a higher number of independent board members in the management activities of the company results in a sounder corporate governance framework and improved corporate performance [6–9]. The favorable impact on the enterprise's value and governance level is more evident the larger the scale, longer the time, and higher the quantity of private equity investments [8]. The corporate governance structure of SMEs can be significantly impacted by the presence of private equity investment in SMEs since it can lower ownership concentration and establish a robust monitoring mechanism of independent directors [10].

Through the above literature analysis, it is found that most of the existing studies use the combination of theoretical and empirical methods to study Analyze how private equity affects enterprise value by examining business performance and corporate governance. The impact of private equity (PE) on the level of innovation of SMEs is not investigated, this paper will increase the variables of the innovation level, selected GEM listed companies as a sample focus on the innovation level for empirical testing, more targeted.

3. Research Design

3.1. Research Design

This study identifies important traits associated with private equity investment and enterprise value in order to Investigate the impact of private equity funds on the value of SMEs. This paper takes Tobin's Q as the explanatory variable, selects the indicators corresponding to the four aspects of capital structure, corporate governance, business performance, and innovation ability as the control variables, and classifies the enterprise into whether it has private equity investment as the explanatory variable to study influence of PE Investments on Business Value.

Referring to the classical multiple linear regression model, assuming that Tobin's Q, PE reputation, gearing ratio, and operating performance satisfy the linear constraints, the theoretical model in general form is set as:

$$Y_i = \beta_0 + \beta_i X_i + u_i (i = 1,2, \dots, n) \quad (1)$$

where denotes Y_i denotes Tobin's Q, X_i denotes the explanatory variables plus each control variable, and u_i is the random error term. where denotes Y_i denotes Tobin's Q, X_i denotes the explanatory variables plus the individual control variables, and u_i is the random error term.

3.2. Research Hypotheses

Capital structure theory states that by optimizing the ratio of debt to equity, an enterprise can reduce its cost of capital and increase its value. Private equity provides SMEs with a form of equity financing that helps to reduce the risk of over-reliance on debt financing, thereby optimizing the capital structure and improving the financial stability and flexibility of the enterprise.

In terms of corporate governance, an effective corporate governance mechanism can alleviate agency problems and improve the operational efficiency of enterprises. Private equity investors usually participate in corporate governance, and through the introduction of professional management teams, sound monitoring mechanisms and incentive mechanisms, they help enterprises establish more transparent and efficient governance structures, thereby enhancing the overall value of the enterprise.

Regarding business performance, private equity not only provides financial support to SMEs, but is often accompanied by the transfer of management knowledge and experience. This support can help enterprises improve their business strategies, optimise business processes and increase productivity, thereby significantly enhancing their profitability and market competitiveness.

Finally, the ability to innovate is key to the continued growth of enterprises and the maintenance of their competitive advantage. Private equity supports the R&D activities of enterprises by providing the required capital and resources to promote technological and product innovation. In addition, the industry experience and resource network of private equity investors can help enterprises accelerate the innovation process and improve market responsiveness, thus enhancing their innovation capability and market adaptability.

Comprehensively analysing the four theoretical aspects of capital structure, governance structure, business performance and innovation ability, this paper puts forward the following hypotheses.

H1: The corporate value of companies invested with PE is greater than that of companies that are not.

H2: A company's value increases with a lower gearing ratio of private equity investments.

H3: The value of the company invested in will rise along with the reputation of the private equity investor.

H4: The firm value increases with the private equity investee firm's return on net assets.

H5: The higher the R&D intensity of the private equity investee, the higher the firm value.

H6: The firm value increases with the private equity investee's expense ratio.

3.3. Sample Selection and Data Sources

The initial sample selected for this paper includes a total of 3,933 Chinese GEM market-listed enterprises all companies during the period from January 2019 to December 2022.Relative to the companies on the main board, GEM-listed enterprises are generally smaller in size, with high growth potential and rapid development, and this high growth is exactly in line with the investment needs of private equity investment institutions. Therefore, the empirical analysis conducted by GEM firms is exactly in line with the research carried out in this document on the impact of PE on SMEs' value.

This paper screens the original sample to guarantee the study's timeliness: (1) Companies that have not operated for two consecutive years and companies with incomplete data, as well as ST and ST* listed companies are excluded. (2) Companies with missing correlation coefficients were excluded. The data were finally grouped by whether they were private placements or not, and two groups with the same number of samples were obtained, totalling 650. The PE reputation data in this paper comes from the China Equity Investment Annual Ranking, and the rest of the data comes from the Cathay Pacific CSMAR database.

3.4. Variable Selection

In this paper, we choose to add Tobin's q as the dependent variable, the presence of private equity as the independent variable and some relevant control variables to the model (see Table 1).

Table 1. Variable-related information

Variable type	variable name	Variable meaning
dependent variable	TQ	tobin q
independent variable	PE	Whether there is private equity investment
control variable	LEV	Capital structure - asset-liability ratio
	SR	Corporate governance - Ownership concentration, the proportion of shares held by the largest shareholder to the total share capital
	REP	Corporate governance -PE reputation, "China Equity Investment Annual Ranking Ranking" top 50 is 1, otherwise 0
	ROE	Operating performance - Return on equity
	RDA	Innovation capability -R&D intensity: the ratio of R&D expenditure to total assets
	RDI	Innovation capability - R&D expenditure ratio: the proportion of R&D expenditure in operating revenue

4. Empirical Results Analysis

4.1. Descriptive Statistical Analysis

4.1.1. Descriptive summary data statistics

This paper conducts a descriptive statistic of the overall data, which can provide a preliminary and comprehensive understanding of the data set and provide a basis for subsequent data analysis and hypothesis testing. The descriptive statistics of the overall data are shown in Table 2: the mean value of Tobin's Q is 1.34, the mean value of equity concentration index is 32.574, the mean value of return on equity is 0.045, the mean value of asset-liability ratio is 0.334, and the mean value of total assets is 5.975×10^{9}.

Table 2. Descriptive statistics of the overall data

variate	N	minimum value	maximum value	mean value	standard deviation
Tobin's Q value	650	0.873	4.040	1.340	0.360
Ownership concentration index	650	8.087	89.991	32.574	14.415
net assets income rate	650	-2.994	0.404	0.045	0.175
asset-liability ratio	650	0.020	0.924	0.334	0.199
Total assets dollar	650	5.478×10^{8}	2.279×10^{11}	5.975×10^{9}	1.594×10^{10}
R&d intensity	650	0.00%	25.00%	2.04%	0.016
R&d expenditure ratio	650	0.00%	61.00%	4.94%	0.044

The quantity of reputation is compared to the presence or absence of private equity in Table 3. It can be seen from the results of Table 3 that there are half of private equity investment and half of private equity investment, while enterprises with high reputation account for 0.6% and enterprises with low reputation account for 99.4%.

Table 3. Descriptive statistics

variate	classification	frequency	percentage	valid percent	cumulative percentage
Private placement or not	None	325	50	50	50
	Yes	325	50	50	100
PE reputation	Low	646	99.4	99.4	99.4
	High	4	0.6	0.6	100

4.1.2. Classified statistic

This article classifies descriptive statistics, separates the data into groups based on or without private equity participation, and maintains the same number of enterprises in each category, so a better comparison can be made. From the average value in Table 4, We can observe the distinction in valuation and other factors between companies with and without private equity participation, and the average Tobin q without private equity investment is 1.130. Tobin's average q with private equity is 1.550.

Table 4. describes the statistics

Grouping	Variate	N	Minimum value	Maximum value	Mean value	Standard deviation
Non-private placement	Tobin's Q value	325	0.873	1.238	1.130	0.077
	Ownership concentration index	325	8.087	89.991	30.549	15.435
	net assets income rate	325	-2.994	0.404	0.003	0.235
	asset-liability ratio	325	0.053	0.924	0.433	0.197
	Total assets dollar	325	7.96×10^{8}	2.28×10^{11}	9.71×10^{9}	2.18×10^{10}
	R&d intensity	325	0.00%	25.00%	1.83%	0.018
	R&d expenditure ratio	325	0.00%	36.00%	4.69%	0.038
Private placement	Tobin's Q value	325	1.053	4.040	1.550	0.406
	Ownership concentration index	325	10.712	76.232	34.599	13.029
	net assets income rate	325	-0.016	0.391	0.088	0.051
	asset-liability ratio	325	0.020	0.748	0.235	0.146
	Total assets dollar	325	5.48×10^{8}	2.18×10^{10}	2.24×10^{9}	2.22×10^{9}
	R&d intensity	325	0.00%	9.00%	2.24%	0.014
	R&d expenditure ratio	325	0.00%	61.00%	5.20%	0.049

4.2. Correlation Test of Empirical Results

This paper analyzes the influence of private placement on Tobin's Q value through independent sample t test and Mann-Whitney test, and the results are presented in Table 5. It can be seen that the concomitant probability P corresponding to the t test and Mann-Whitney test results is less than 0.05, that is, the null hypothesis is rejected with a 95% confidence level. There are significant differences in the impact of private placement on Tobin's Q value. Specifically, the average value of Tobin's Q corresponding to companies without private placement is 1.129, and the average value of Tobin's Q corresponding to companies with private placement is 1.549.

Table 5. Analysis of the impact of private placement on Tobin's Q value

variate	Whether there is a private placement	N	mean value	standard deviation	t test	Mann-Whitney test
Tobin's Q value	None	325	1.129	0.077	t=-18.334 P＜0.05	Z=-18.536 P＜0.05
	Yes	325	1.549	0.405		

4.3. Hypothesis Testing

To examine the link between the variables, this paper conducts correlation analysis on the sample data (as shown in Table 6). It is generally believed that the correlation coefficient R values range in 1 ~ 1, namely $1 \leqq R \leqq 1$, and the bigger the | R |, the greater the relations between the two variables. Both variables are positive correlation when R > 0, and negative correlation exists when R < 0.

The data presented in Table 6 indicates a statistically significant positive correlation between Tobin's Q value and private placement, so H1 is valid. The asset debt ratio has significantly negative correlation with Tobin's Q value, that is, H2 holds. H3 cannot be verified. H4, H5, and H6 hold as there is a strong positive relationship between ROI, research and development intensity, the proportion of research and development spending, and the Tobin Q.

Table 6. Correlation analysis

variate	Ownership concentration index	net assets income rate	asset-liability ratio	Total assets dollar	Level of reputation	R&d intensity	R&d expenditure ratio	Whether there is a private placement	Tobin's Q value
Ownership concentration index	1								
net assets income rate	0.175**	1							
asset-liability ratio	-0.113**	-0.240**	1						
Total assets dollar	0.199**	-0.025	0.287**	1					
Level of reputation	-0.025	0.004	0.036	0.024	1				
R&d intensity	-0.036	0.064	-0.161**	-0.131**	-0.003	1			

R&d expenditure ratio	-0.132**	-0.089*	-0.246**	-0.121**	-0.032	0.590**	1		
Whether there is a private placement	0.141**	0.242**	-0.496**	-0.235**	-.079*	0.129**	0.058	1	
Tobin's Q value	0.075	0.207**	-0.386**	-0.180**	-0.049	0.163**	0.129**	0.584**	1

Note: ***, ** and * indicate significant at 0.001, 0.01 and 0.05 levels respectively.

This research conducts additional analysis using regression to examine the quantitative connection between dependent and independent variables. In this section, the inclusion of private placement is divided into Model 1 and Model 2. The projected outcomes are displayed in Table 7. In Model 1, return on equity has a significantly positive impact on Tobin's Q value, asset-liability ratio has a significantly negative impact on Tobin's Q value, and total assets have a significantly negative impact on Tobin's Q value. R&d intensity has a significant positive effect on Tobin's Q; In Model 2, whether there is private placement is included in the equation, and the model has changes, in which the asset-liability ratio influences Tobin's Q value in a statistically significant negative way, and private placement status influences Tobin's Q value in a statistically significant positive way (β=0.367, $P < 0.001$).

Table 7. Analysis of regression

variate	Tobin's Q value	
	M1	M2
(constant)	1.457**	1.173**
control variable		
Ownership concentration index	0.001	0.001
net assets income rate	0.24**	0.131
asset-liability ratio	-0.567**	-0.168**
Total assets dollar	-1.828E-12**	-4.152E-13
Level of reputation	-0.162	-0.017
R&d intensity	2.13**	0.992
R&d expenditure ratio	-0.006	0.427
independent variable		
Whether there is a private placement		0.367***
R^2	0.18	0.364
Adjust R^2	0.171	0.356
F	10.150**	45.941**

Note: M1 and M2 represent Model 1 and Model 2 respectively; ***, ** and * show significance at 0.001, 0.01 and 0.05.

In order to obtain a more accurate model, this paper conducts regression analysis on capital structure, corporate governance, empirical performance, innovation ability and whether private placement is made. M1-M5 respectively represent the influence degree of capital structure, corporate governance, business performance, innovation ability and private placement on Tobin's Q value. As shown in Table 8, in terms of capital structure (M1), The asset-liability ratio influences Tobin's Q value in a substantial negative manner, and H2 is established. In terms of corporate governance (M2), reputation has no significant impact on Tobin's Q value, and H3 cannot be verified; In terms of enterprise performance (M3), return on equity influences Tobin's Q value in a substantial and positive manner, and H4 is established; In terms of innovation capability (M4), the intensity of R&D has a

substantial positive effect on Tobin's Q value, and H5 is established. In terms of private placement or not, private placement or not has significant positive influence on the Q value of Tobin, and H1 is established. See Table 8 for the specific data.

Table 8. The multivariate regression analysis

Model	Tobin's Q value				
	M1	M2	M3	M4	M5
constant	1.573**	1.341**	1.321**	1.26**	1.13**
capital structure					
asset-liability ratio	-0.697**				
corporate governance					
PE reputation		-0.226			
financial performance					
net assets income rate			0.425**		
innovation ability					
R&d intensity				2.965**	
R&d expenditure ratio				0.407	
Private placement or not					0.42**
R^2	0.149	0.002	0.043	0.028	0.342
Adjust R^2	0.148	0.001	0.041	0.025	0.341
F	113.540**	1.565	28.966**	9.369**	336.132**

Note: M1 represents capital structure, M2 represents corporate governance, M3 represents firm performance, and M4 represents innovation capability. ***, **, and * indicate significant at the 0.001, 0.01, and 0.05 levels, respectively.

5. Conclusion

The results of the above empirical analyses are summarised in the following four main conclusions. One, companies invested in private equity have a higher business value than non-private equity investors. Secondly, the lower the gearing ratio of the firms involved in private equity institutions, the more it is conducive to increasing the value of SMEs. Thirdly, the higher the return on net assets of the firms in which private equity firms participate, the more favourable it is to increase the value of SMEs. Fourthly, the higher the R&D intensity of enterprises participated by private equity institutions, the more favourable it is to increase the value of SMEs. Shortcomings of this paper: external factors such as economic environment, policy changes and market conditions also have an impact. It is difficult to completely isolate the impact of external factors in the analysis. Moreover, for SMEs, the four-year sample size for 2019-2022 may be small. Through the analysis of this article, it can be seen that private equity funds can bring a lot of incentives as well as motivation to SMEs, but more detailed suggestions need to be analysed more deeply in order to be obtained, private equity funds are undoubtedly advantageous to the value of SMEs. However, the perspective of the article may not be comprehensive enough, and there is still much room for research. In the next study, the paper will select specific samples for more in-depth analysis, hoping that the article will be more representative.

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