



Private Equity Characteristics, Earnings Management & Firm Value

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ABSTRACT

The relationship among private equity investment, earnings management and enterprise value were studied using the data of small and medium-sized enterprises listed in Chinese Shenzhen Stock Exchanges from 2008 to 2012. This paper examines not only whether private equity affects the enterprise value, but also examines the influence degree of microscopic characteristics of private equity firms on the enterprise value. We find that, the involvement of private equity investment can promote enterprise value effectively and reduce earnings management behavior of enterprise management, accompanying the positive correlation from the private equity firms' stake to the holding time to the performance of the enterprise value on the micro level. High reputation for private and foreign private equity is positively related to the enterprise value, while earnings management is negatively related to the firm value. Earnings management plays a partial mediating role during the process of private equity investment promoting enterprise value.

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1. Introduction

In recent years, with the continuous advancement of international economic integration, private equity investment has entered China's capital markets and continues to grow and develop. At present, it has become the third largest investment and financing mode after bank lending and public offerings, and is an indispensable emerging force in China's capital markets. As a long-term equity investment, private equity will provide financial support and help the invested enterprise improve its level of corporate governance. Meanwhile, private equity (PE) enhances the investment value of the enterprise, promotes the invested enterprise's stock market performance, and then exits for a profit. Given its interest and reputation, PE has invested in enterprises and has become for the invested enterprises a significant stockholder. Afterwards, PE participates in the invested enterprise board of directors, use their own social network resources to provide cutting-edge information and social resources for the enterprises, assist enterprises to recruit senior management personnel, strengthen the supervision of investment enterprises, provide value-added service for enterprises from many aspects, bringing about the value promotion of the invested enterprise.

As an important part of China's economy and technological innovation, small and medium-sized enterprises have faced a lot of problems such as a shortage of funds, information blockage, etc., due to their small asset size, relatively low social influence and social credibility. At present, small and medium-sized enterprises have confronted many challenges, such as raising funds needed for daily business operations and future development, optimizing their enterprise management systems, improving incentive mechanisms, and maximizing advantages of flexible technology innovation in small and medium-sized enterprises. Private equity investment institutions, which take long-term investment and services for invested enterprises as ideas, not only can bring enterprise funds, but also use their own social influence and social network to bring the frontiers of knowledge and rich experience in management for the enterprise. Therefore, private equity investment based on non-public investment in small and medium-sized enterprises is increasingly accessible to the favor of small and medium-sized entrepreneurs to help them achieve listing as a financing channel. Private equity investment is more willing to invest in small and medium-sized enterprises, supporting its development, thus achieving their own smooth exit and obtaining the benefits private equity investors deserve. Such a win-win situation promotes the development and growth of private equity investment. Private equity investment and its different characteristics affecting the direction and extent of its impact on the value of the invested enterprise have also attracted attention from all walks of life, which is also one of the key aspects of this paper.

Earnings management is a focus in the research of modern capital market accounting. In capital markets, because of the separation between ownership and management, in order to maximize its interests, management often implements a certain extent of earnings manipulation within the scope of legal and accounting policies. In the short term, it is likely to promote corporate performance, but from long-term consideration, the negative impact on the enterprise value should not be underestimated. Accordingly, earnings management is considered in this research to explore whether there will be some impact on the value of private equity investment and enterprise value. On the one hand, this can verify whether the relationship between them is consistent with the existing theoretical results. On the other hand, it can provide some reference for the follow-up for the healthy development of private equity investment.

The research contributions of this paper are: First, in the exploration of the impact of private equity investment and enterprise value, it examines the specific characteristics of private

placement agencies and closely investigates the impact of private equity investment on enterprise value. This is conducive to promote the introduction of scientific and appropriate private equity investment in China's small and medium-sized enterprises. Second, there exists a negative correlation of private equity investment institutions on the earnings management of invested enterprises. Thus, we can see if private placement indeed, to some extent, inhibits enterprise earnings management behavior, with the intention of delivering a more realistic financial report to the outside world, proving Private Equity's role of supervision and certification. Third, earnings management is negatively correlated with enterprise value, which shows that earnings management will not have a positive impact on the development of an enterprise in the long run. Fourth, earnings management has played an intermediary role in the positive relationship between private equity investment and enterprise value.

The other parts of this paper are as follows: The second part is the literature review and research hypothesis; the third part is the research design; the fourth part is the empirical test results and analysis; the fifth part is the robustness test; and finally the conclusion and inspiration of this paper will be summarized.

2. Literature review and research hypothesis

On the research of the relationship between private equity investment and enterprise value, scholars from various countries have not reached a unanimous conclusion at present. The related research of the western capitalist countries find a positive correlation between private equity investment and enterprise value, which got the recognition of the vast majority of scholars in various countries. The results of this study support the three hypotheses. First, private equity investment can give full play to a "screening effect." Related research such as: Welch (1989) and Sahlman (1990) report that there is a two-way relationship between private equity investment institutions and invested enterprises. The companies' operating performance is better with private equity investment. Tang and Tan (2008) took the Hong Kong GEM listing of corporations as their research object. The empirical research showed that after controlling for factors such as earnings management, the companies keeping venture capital institutions shareholding staged an IPO. Their operating performance is in the same direction as the proportion of private equity investment institutions and better than those of the companies without the venture capital institutions share-holding after the IPO (Hu et al., 2012; Li et al., 2015). This indicates that venture capital had a positive effect on the operating performance of the companies after the IPO. Second, private equity investment institutions can play a "supervisory role." Supporting views such as: W. Megginson, K. Weiss (1991) and K. William (1991) took 670 listing corporations in the United States from 1983 to 1987 as the research sample and found that a company with a private participation can effectively save the cost of listed shares issued. Private equity investment institutions will continue to play a supervisory effect after the invested enterprise staged an IPO successfully. Cotter, Tarca and Wee (2010) analyzed the performance of enterprises before and after their IPOs and find that the earnings management of the enterprises is relatively low before the IPO. Xu, (2011) and Zhang et al. (2012) find that private equity investment has played a "supervisory role." Third, private equity investment institutions can play a "role in the certification." Because the private equity investment institutions have high-quality fund managers and rich social network resources for their own long-term development and existing reputation, together with the trust of the invested companies, they will play an important role in certification. Related studies are as follows: Li (2014) investigating the reputation effect of private institutions found that after private equity

investment institutions come into the invested enterprises, they tend to take on the role of the third party certification, and let the invested enterprises find their own strength, and fully improve the management of the target enterprise. Based on this, the paper puts forward the hypothesis 1:

H1: Private equity investment is positively correlated with the value of the invested enterprise

After putting forward hypothesis 1 about the relationship between private equity investment and enterprise value, in order to further explore the related influence that characteristics of China's private institutions have on the enterprise value, this paper will continue to test the micro factors in private equity investment, and put forward the corresponding sub hypothesis for hypothesis 1.

As an important part of corporate shareholders, the number of private equity investors' shareholding ratio in an invested enterprise will determine whether the private sector is more enthusiastic to a certain extent, double-heartedly devoted to the management of the invested enterprise, and the shareholding ratio also determines the extent of private equity's influence on the enterprise. In view of the stock ownership structure of "one share one power," we believe that the higher of the PE investors holding, the better-invested enterprise value. PE can bring working capital and a series of other value-added effects for enterprises, further playing a governance function, providing a positive effect for the listing. The length of the holding time of the private equity investment determines its understanding of the overall operating conditions of the invested enterprise. If PE holds shares of the invested enterprise for a long time, it can effectively reduce the information asymmetry phenomenon, improving the decision-making efficiency, further realizing the development of enterprise. Moreover, as for the "reputation hypothesis" theory, Sahlman (1990) found that if the company with private equity certification fails to issue, the private equity firm suffers a huge loss of reputation. Gompers (1996) undertook an empirical study and found that in order to gain a higher reputation, relatively young private investors will tend to utilize a high underpricing strategy so as to promote the successful listing of enterprises. However, this move causes a lot of immature invested enterprises to list, and after that there are signs of IPO performance decline. Therefore, this kind of speculation is not able to meet the needs of private-equity investors to obtain a higher reputation. By comparison, to obtain the high reputation that mature private equity investment institutions have and high-quality fund managers have enjoyed or that they strive for, they all have to have a strong sense of maintenance. In the face of increasing fierce competition in the current private sector, they will even bear more costs to enhance the value of target enterprises in order to maintain the reputation of the industry. Liu et al. (2012) and Khaled et al. (2014) found that the difference of PE background also has a great influence on enterprise value. Foreign private equity investments, led by western developed countries, have relatively sound investment experience, and their screening and monitoring ability for invested enterprises is relatively mature. To a varying extent some foreign literature has confirmed a good momentum for the development of domestic private equity investment. To further open the Chinese market, firms must be willing to reflect their own private strength in the near term, and get a good income. According to the analysis of the characteristics of private equity investment, this paper puts forward four sub hypotheses based on the assumption of 1.

H1a : The proportion of private equity investment is positively correlated with the value of the

invested enterprise

H1b : The holding time of private equity investment is positively correlated with the value of the invested enterprise

H1c : The reputation of private equity investment is positively correlated with the value of the invested enterprise

H1d : Foreign capital background private equity investment is positively correlated with the value of the invested enterprise

Foreign scholars have done many years of research about the mutual influence of private equity investment and corporate earnings management. Most of these conclusions verify that private equity can effectively restrain the earnings management behavior. Representative conclusions are as follows: For the "supervision" hypothesis of private equity investment: Sahlman (1990) pointed out that there are dual agency problems of private institutions: The first layer of principal agent relationship is established between the private equity institutions and investors that inject capital into the private equity institutions. The private equity institutions have the obligation to provide financial analysis reports for the investors. The second layer principal-agent relationship is established between private equity institutions and managed enterprises. At this point PE with an external board of directors will have more in-depth access to internal information and participate in the management of a target enterprise. Such a dual principal-agent relationship will inhibit the earnings management behavior to a certain extent, by providing a high quality financial report, and giving full play to the role of supervision. Morsfield et al. (2006) and Wu et al. (2011) selected empirical data of 2,630 listed companies from 1983 to 2001 and found that the discretionary accrued profit indicators that measure the earnings management behavior of enterprises in private equity supported companies significantly less than those of companies without private equity in the IPO year, and the operating performances are better after the IPO. For the reputation hypothesis of private equity investment: Lu (2007) found that private equity institutions, for the maintenance of positive image effects that have obtained or strive for future reputation, will focus on the disclosure of external financial reports, and tend to avoid the internal earnings management behavior. Agrawal and Cooper (2010) analyzed the relationship among the private equity institutions' reputation, experience of private equity and earnings management and verified that there is a significant negative correlation between private equity reputation and enterprise earnings management through empirical research. Chen (2010) selected 199 IPO companies listed on the Shenzhen SME board from 2004 to 2007 as the research object, took discretionary accrual as an alternative to earnings management, and used the modified JONES model and method of multiple regression analysis to validate. They found that the earnings management behavior of listed companies that have a private equity background are much lower.

Through the above literature reviews, we can see that earnings management is not equal to accounting fraud, but it does not have a positive effect on enterprise value from the various indicators of measuring the value of the enterprise. Although private equity investment institutions hold target enterprise equity not for a long time, under the pressure of their long-term high investment they have to participate actively in the management of the target enterprise, making full use of the gettable advantages of information to help enterprises to achieve value-added, then supervising the daily business activities of enterprises, inhibiting the behavior of earnings management to the maximum extent.

At the same time, the scholar Gompers (1996) pointed out that the longer the establishment

period, the greater the holding shares of the private equity institutions, the more professional knowledge and investment experience will be accumulated, the more timely the phenomenon of management gloss over the financial statements is discovered. The vast majority of scholars in the West support this conclusion. The large number of empirical studies have confirmed that private equity institutions which have been set up for a long time have more experience, and more have greater access to the industry's high reputation and trust of small and medium-sized enterprises. Thus, we predict that the greater the proportion of private equity institutions, the longer the holding time, the higher the reputation, the greater the restrictive influence on earnings management. Since the development of foreign private equity institutions are more mature, compared to the private equity that has just started in China, their investment experience is worthwhile for China to draw lessons from. Therefore, foreign private equity firms compared to local private equity are more likely to detect and restrict earnings management behavior. Based on this, the paper puts forward the hypothesis 2:

H2 : Private equity investment is negatively related to earnings management of invested enterprise

According to the above analysis of the characteristics of private equity investment, this paper puts forward the following four sub-hypothesis of hypothesis 2:

H2a: The proportion of private equity investment is negatively related to earnings management of invested enterprise

H2b: Private equity investment holding time is negatively related to earnings management of invested enterprise

H2c: The reputation of private equity investment is negatively related to earnings management of invested enterprise

H2d: Foreign capital background private equity investment is negatively related to earnings management of invested enterprise

For the related research on earnings management and enterprise value since the 90's, most of the foreign scholars have found a phenomenon: The original idea of improving stock prices through earnings management is counterproductive. It not only induces the stock price to fall, but also further affects the value of the enterprise. Thus, we sort out the existing research and find that after the earnings management behavior of an enterprise, it will lead to an abnormal return rate decline of the quality of accounting information as well as profit and stock price after an IPO. The outstanding consequence of the performance is to reduce the enterprise value. And the main motivation for the listed company to conduct earnings management behavior is commonly to meet the needs of external information users and create a false high profit illusion. However, the specific methods of earnings management are different according to the development stage of the enterprise, the target product and other characteristics. Related studies are as follows: Barton and Simko (2002) found that listed companies regulate earnings management mainly through the two means that manipulate the operating cash flow and operating capital, and then gloss over the financial reports to avoid external investors finding the phenomenon of corporate losses and performance decline. Xu, How, and Verhoeven (2015) found that the greater the investment of R&D expenditures of listed companies, the more the external information users think that the company has a higher capacity of enterprise growth,

and the more in favor of the investment of the enterprise. Thus, enterprise internal managers often use the means of R&D expenditure for earnings management.

Gunny (2005) found that when the company's profitability is limited, in order to maximize the benefits of the current period, they usually used the reduction of controllable costs such as R&D expenses and management costs to conduct earnings management. For domestic research, the development of China's capital market is still not perfect, laws and regulations are not sound; so it provides a broad space for the listed companies to conduct earnings management. The current regulatory policy of government departments on China's securities market still heavily depends on financial data. Thus, listed companies in order to achieve their listing, additional stock, avoid special treatment and even delisting, are bound to use earnings management tools to meet the requirements of the securities regulatory authorities, which leads to the phenomenon of enterprise accounting information distortion. Liu (2005) in the analysis of the relationship between earnings management and enterprise performance of listed companies found that until now the motivation of earnings management induced by listed companies in China is to enhance the enterprise market value as far as possible, then to obtain the qualification and get a good social image to satisfy the maximizing return; but the results are not optimistic, earnings management behavior significantly reduces operating results. Accordingly, he proposed that enterprises should improve the accounting information disclosure system and promote the enterprise value.

Based on the above analysis, this paper puts forward the hypothesis H3:

H3 : Earnings management is negatively correlated with enterprise value

Through the above analysis we can see that on the macro level, the higher the degree of involvement of private equity investment and the longer the time, the more follow-up development funds and quality management experience it will bring, which brings a great degree of positive impact on the promotion of target enterprise value. However, earnings management will affect the development of the enterprise for the inconsistency between the management benefit and the target of the shareholders, which brings a series of negative effects to the enterprise value. Although the management's earnings management behavior will not directly affect the private equity participation in management and the degree of involvement and duration, its information advantage it owned help themselves provide a financial report that is not completely true. Thus, it is very likely that private equity and the original shareholders of the company make the decision to follow the interests of the management in the next step of the development of the enterprise, but this decision is likely to lead to a decline in the enterprise value. Therefore, we can speculate that influenced by earnings management behavior, the private equity investment will have a positive effect on the enterprise value, but the earnings management plays an intermediary role in the positive effect. On the micro level, according to the above theoretical analysis, we will once again join the private equity ratio, holding time, reputation and private equity background. For the "grandstanding," Gompers (1996) found that only young private equity would indulge in corporate earnings management behavior, promoting the immature enterprise to list. The greater the share of mature private equity holdings, the more it plays its own supervision effect. The study found that private characteristics still have a positive impact on the enterprise value by taking into account the factors of earnings management.

Based on the above analysis, this paper puts forward the hypothesis H4:

H4 : Private equity investment is positively correlated with the value of the invested enterprise, and earnings management plays a partial mediating effect in the positive correlation.

Based on the analysis of the characteristics of private equity investment, this paper puts forward four sub hypotheses of hypothesis H4:

H4a : The proportion of private equity investment is positively correlated with the value of the invested enterprise, and the earnings management behavior plays a partial mediating effect in the positive correlation.

H4b : The holding time of private equity investment is positively correlated with the value of the invested enterprise, and the earnings management behavior plays a partial mediating effect in the positive correlation.

H4c : The reputation of private equity investment is positively correlated with the value of the invested enterprise, and the earnings management behavior plays a partial mediating effect in the positive correlation.

H4d : The foreign private equity investment is positively correlated with the value of the invested enterprise, and the earnings management behavior plays a partial mediating effect in the positive correlation.

3. Research design

3.1 Variable definition

(1) Dependent variable: Enterprise value

Enterprise value: Tobin Q index. There are many ways to measure the enterprise value, the target enterprise asset method, the market comparison method, the income discount method, and the Tobin Q value method are quite common. But the amount of calculation of the target enterprise asset method is too large, and the results are not accurate. The market comparison method depends on similar enterprises in the market excessively, and cannot accurately measure the differential value of different enterprises. The income discount method mainly depends on the subjective judgment of the employees in the internal management. The executive quality requirement is too high and the result is too subjective and unconvincing. However, the Tobin Q value is equal to the ratio of the market value and the replacement cost of the enterprise. So it seems that the Tobin Q value is relatively easy to measure, market value can be obtained through the stock exchange, and the replacement cost can be obtained through national production accounting. So the Tobin Q value can be very good to link the entity value and the virtual value of the enterprise, and it is more objective and specific to apply to the measurement of enterprise value of the target enterprise. Thus, this paper uses Tobin Q value to measure the enterprise value. The calculation formula of Tobin Q value is as follows:

Tobin Q value = (Market value of enterprise + Book value of enterprise liabilities) / Total asset replacement

(2) Mediator variable: Earnings management

Earnings management (EM): The measurement of earnings management mainly includes the Healy model, DeAngelo model, Jones model and modified Jones model.

Determination of the Healy model and the DeAngelo model is mainly based on two assumptions: First, Sum of the non-operating accrued profit = Sum of total accrued profits. Second, it is assumed that the annual non-operating accrued profit tends to be stable. Relatively speaking, it is not practical, and considered one-sided. The observed value of earnings management is not objective enough. The revised Jones model based on the original Jones model has increased the main business revenue and accounts receivable on the impact of enterprise value, which is more comprehensive. Therefore, this paper uses the modified Jones model to measure the degree of earnings management. Specific formulas are as follows:

$$\text{First step: } TAC_{j,t} = E_{j,t} - CFO_{j,t}$$

$$\text{Second step: } \frac{TAC_{j,t}}{TA_{j,t-1}} = \beta_0 \left\{ \frac{1}{TA_{j,t-1}} \right\} + \beta_1 \left\{ \frac{\Delta SALES_{j,t}}{TA_{j,t-1}} \right\} + \beta_2 \left\{ \frac{PPE_{j,t}}{TA_{j,t-1}} \right\} + \xi_{j,t}$$

$$\text{Third step: } NDTAC_{j,t} = \beta_0 \left\{ \frac{1}{TA_{j,t-1}} \right\} + \beta_1 \left\{ \frac{\Delta SALES_{j,t} - \Delta AR_{j,t}}{TA_{j,t-1}} \right\} + \beta_2 \left\{ \frac{PPE_{j,t}}{TA_{j,t-1}} \right\}$$

$$\text{Last : } DTAC_{j,t} = \left\{ \frac{TAC_{j,t}}{TA_{j,t-1}} \right\} - NDTAC_{j,t}$$

Among them:

$TAC_{j,t}$ is the total accrued profit of J company in t period

$E_{j,t}$ is the net profit of J company in t period

$CFO_{j,t}$ is the net cash flow of J company in t period

$TA_{j,t-1}$ is the final total assets of J company in t-1 period

$\Delta SALES_{j,t}$ is the increase of main business income of J company from period t-1 to period t

$PPE_{j,t}$ is the final total fixed assets of J company in t period

$NDTAC_{j,t}$ is the total non operating accrued profit of J company in t period

$\Delta AR_{j,t}$ is the increase of final balance of receivables final balance from period t-1 to period t

$DTAC_{j,t}$ stands for operating accrued profit

The operating accrued profit calculated by this formula is the substitution variable of earnings management degree of target enterprise. Because there is a lock up period after the private equity investment listing, and the relevant financial data of the target enterprise before the listing is difficult to acquire, in view of the above, this paper selects the operating accrued profit of the second year after the IPO as the degree of earnings management in this study.

(3) Independent variable

① Private equity investment (PE)

By reading the “Initial public offering of shares and listing on the gem enterprise prospectus” of listing target corporation announced by Shanghai and Shenzhen Stock Exchange, if we find that at least one of the top ten shareholders is a private equity investment institution, then we think that the target corporation is a listed company with private equity participation. For the definition of a private equity investment institution, this paper intends to use: First, it has held shares before the target corporation listing. Second, it does not grasp the actual control and

the main business of the agency is to carry out equity investment.

② **Private equity investment shareholding ratio (Peshare)**

This paper based on the prospectus of listed company before the IPO. Considering that China's Capital Venture and Equity Private is not clearly defined, this paper no longer distinguish between the two for the time being and unify the sum of the two shareholding ratio as Peshare (If the same PE repeatedly put into or multiple PE join the company, it all took the sum of input as the final shareholding ratio of the enterprise.) index counted in.

③ **Private equity investment holding time (LntPE)**

The length of stock holding time of private equity institutions to invested enterprise can affect the private equity motivation. The longer the holding time, the deeper private equity understands the invested enterprise. Whether the private equity investment accepted by the invested enterprise is a single investment or a number of a joint investment, we calculate it from the time when the first private equity joins the enterprise, until the listing exit, represented by variable LntPE.

④ **The reputation of private equity investment institutions (UpPE)**

This is a dummy variable. According to the prospectus of listing invested enterprise, the database of Tai 'an and "50 private equity investment institutions in China" announced by Qing Ke research center in the year before listing, there are analyses of the top ten shareholders of the company one by one. If at least one of the top ten shareholders is the top 50 private equity, the company is defined as a company with a high reputation for private equity investment, that is, Up-PE is 1, otherwise 0.

⑤ **Foreign capital background of private equity investment (ForePE)**

In this paper, the foreign investment background of private equity investment institutions is set as dummy variable. Because private equity background can affect the maturity of private equity decision and overall efficiency of enterprise operation, therefore, this paper will have a division of it. If there is one or more of the private equity investment institutions with a foreign capital background, we believe that the private equity institution is foreign private equity, that is, ForePE is 1, otherwise 0.

(4) Control variables

There are a lot of factors that affect and reflect the value of the sample firms, such as assets, income and external share price, etc. Therefore, this study mainly selects the control variables to reflect the value of enterprises from the above three factors.

Reflecting the assets of the target enterprise:

① **Asset liability ratio index (Lev)** Its formula is the percentage rate of total liabilities and total assets. The index can show the proportion of total assets of corporate debt funds, aiming to reflect the equity guarantee degree of the target company to the debtor.

② **Asset size index (Lnasset):** It mainly refers to the year-end total assets, which is to reflect the size of the total assets of the company and eliminate the impact of variable size. In this paper, the size of the total assets takes a logarithmic treatment.

Reflecting the target enterprise income:

① **Earnings per share index (Eps):** It reflects the ratio of net income to shares of the target company in a certain period, which is an important indicator to measure a company's revenue and growth.

② **Sales gross margin (Sal):** This indicator reflects the ratio of gross profit to net sales of the target company in a certain period. It can reflect the target company's sales revenue and sales costs, and is an important indicator to measure the growth of enterprise.

Reflecting the external share price of the target enterprise:

Price to book index (Pb): It reflects the ratio of stock price to net assets per share. Stock prices can reflect the transaction price of the stock market, and net assets per share can reflect that the book value of the stock can measure costs. Generally the Pb of an enterprise that has good prospects can reach 3. Because the index is based on the book value, and it is more reliable, it is mostly used to reflect the high risk of growth of enterprises, which is consistent with the nature of the sample enterprises in this paper. As a result, this paper chooses the index to reflect the external share price of the target enterprise.

Finally, this paper introduces **the industry dummy variable (Ind)** and **annual dummy variable (Year)** to have industry and annual control of the sample.

3.2 Research design

Based on the theoretical analysis and hypothesis proposed above, this study uses the following four steps to verify the hypothesis, and the construction of the OLS test model is as follows:

The first step to verify the hypothesis H1: The model (1) about the positive correlation between private equity investment and enterprise value is:

$$\begin{aligned} TobinQ = & \alpha_0 + \alpha_1 PE(X_i) + \alpha_2 Lev + \alpha_3 Lnasset + \alpha_4 Eps + \alpha_5 Sal \\ & + \alpha_6 Pb + \alpha_7 Ind + \alpha_7 Year + \varepsilon \end{aligned} \quad (1)$$

The model (1) is the basic model, on which it analyzes the H1a, H1b, H1c and H1d sub models in H1. At this point, it replaces the PE index with Xi. Xi respectively stands for private equity investment shareholding ratio (Peshare), private equity investment holding time (LntPE), the reputation of private equity investment institutions (UpPE), and foreign capital background of private equity investment (ForePE). Regression analysis are carried out respectively again on the four sub hypotheses to test the impact of these four private micro feature variables on enterprise value. Once the conclusion is consistent with the sub hypothesis proposed in this paper, the corresponding coefficient α_1 of private equity investment shareholding ratio, private equity investment holding time, reputation of private equity investment institutions and foreign capital background of private equity investment is positive.

The second step to verify the hypothesis H2: The model (2) about the negative correlation between private equity investment and earnings management is:

$$\begin{aligned} EM = & \beta_0 + \beta_1 PE(X_i) + \beta_2 Lev + \beta_3 Lnasset + \beta_4 Eps + \beta_5 Sal \\ & + \beta_6 Pb + \beta_7 Ind + \beta_7 Year + \varepsilon \end{aligned} \quad (2)$$

Among them, the verification methods of sub-hypothesis H2a, H2b, H2c and H2d in the hypothesis H2 are the same as the verification methods of sub hypothesis in the hypothesis H1, and Xi is represented as the same as above. According to the theory expected in this paper, the private equity investment can restrain the earnings management behavior, and the corresponding coefficient of the model (2) is negative.

The third step to verify the hypothesis H3: The specific model about the negative correlation between earnings management and enterprise value is (3):

$$\begin{aligned} \text{Tobin } Q = & \gamma_0 + \gamma_1 EM + \gamma_2 Lev + \gamma_3 Lnasset + \gamma_4 Eps + \gamma_5 Sal \\ & + \gamma_6 Pb + \gamma_7 Ind + \gamma_7 Year + \varepsilon \end{aligned} \quad (3)$$

Finally, verify the hypothesis H4: private equity investment and enterprise value is positively related, but earnings management behavior in this positive relationship has an intermediary effect. The specific model is (4):

$$\begin{aligned} \text{Tobin } Q = & \lambda_0 + \lambda_1 PE(X_i) + \lambda_2 EM + \lambda_3 Lev + \lambda_4 Lnasset + \lambda_5 Eps \\ & + \lambda_6 Sal + \lambda_7 Pb + \lambda_8 Ind + \lambda_9 Year + \varepsilon \end{aligned} \quad (4)$$

PE and earnings management EM are included in the model to test. Among them, the verification methods of sub hypothesis in the hypothesis H4 are consistent with the validation methods of sub hypothesis in the hypothesis H1 and H2. X_i still respectively stands for private equity investment shareholding ratio, private equity holding time, private equity reputation and foreign capital private equity, which used to test the impact of these four variables on the value of the enterprise. According to the theoretical expectations, the private equity investment can effectively enhance the enterprise value. When earnings management plays a partial intermediary effect, the coefficient λ_1 will still be positive, but relative to α_1 , it will be reduced.

3.3 Data sources and descriptive statistics

Private equity investment institutions exit for the income by helping the company to list, but in the face of China's small and medium-sized market exit conditions, they can achieve the withdrawal after the lock up period of more than one year. In general, private equity investment institutions will exit within three years after the IPO. In this paper, the data collects a total of 460 valid samples of listing corporation in the five years of 2008-2012 in China's small and medium enterprises listed on board excluding poor management, incomplete data and financial enterprises, which contains 180 private equity investment listing corporation, and 280 companies without private equity investment.

Table 1 is about the descriptive statistics of variables. It can be seen from Table 1: (1) the overall enterprise Tobin Q average value is 1.462, the minimum value is 0.97, and the maximum value is 2.803. We can find that the difference of enterprise value is great in small and medium-sized enterprises. Among them, the average value of the 180 companies involved in the PE Tobin Q is 1.479, and the average value of no PE participation of 280 companies Tobin Q is 1.451. Thus it can be seen that the enterprise value of small and medium-sized enterprises with private equity participation is generally higher than that of small and medium-sized enterprises without private equity participation. Whether such a difference is due to the involvement of private institutions needs to be further verified.

(2) The average value of private equity investment (PE) index is 0.39. It can be seen that in China's SME Board Listed Companies of 2008-2012, the degree of participation of private institutions is not high, which is not up to 50% of the proportion.

(3) The average value of earnings management degree (EM) is 0.054, the minimum value is -8.911, and the maximum value is 43.569. It can be seen that the difference of earnings management degree is great in small and medium-sized enterprises. Among them, the average value of enterprise earnings management degree with PE is -0.5874, the minimum value is -8.91, and the maximum value is 8.76. The average value of enterprise earnings management degree without PE is 0.465, the minimum value is -8.86, and the maximum value is 43.569. It

further reflects that compared to enterprises without private equity participation, the earnings management of the 180 companies with PE is lower, but whether it is due to private participation in management still needs further validation. (4) There are obvious differences between the control variables in the enterprise, which indirectly verifies the necessity of considering these variables.

Table 1. Descriptive statistics of variables

variables	Full sample (460)				With PE samples (180)				Without PE samples (280)			
	Mean	Sd.	Min	Max	Mean	Sd.	Min	Max	Mean	Sd.	Min	Max
tobin Q	1.457	0.301	0.967	2.803	1.4790	0.304	1.045	2.590	1.451	0.300	0.970	2.803
PE	0.389	0.489	0	1	1	0	1	1	0	0	0	0
Peshare	0.081	0.071	0.001	0.408	0.082	0.073	0.001	0.408	0	0	0	0
LntPE	3.334	0.441	2.212	4.313	3.333	0.441	2.212	4.313	0	0	0	0
UpPE	0.351	0.478	0	1	0.350	0.478	0	1	0	0	0	0
ForePE	0.125	0.322	0	1	0.120	0.322	0	1	0	0	0	0
EM	0.051	4.323	-8.911	43.569	-0.587	2.507	-8.910	8.760	0.465	5.124	-8.860	43.569
Lev	23.523	14.678	1.273	75.207	23.226	13.522	1.273	63.931	23.711	15.391	1.772	75.207
Lnasset	21.087	0.614	19.596	24.907	21.109	0.567	19.899	22.897	21.780	0.679	19.596	24.907
Eps	0.813	0.428	0.100	4.490	0.852	0.561	0.100	4.490	0.795	0.478	0.130	24.907
Sal	14.324	8.671	1.210	55.870	14.141	8.743	1.630	55.870	14.477	8.610	1.210	42.820
Pb	3.741	1.625	1.328	12.876	3.752	1.586	1.328	10.105	3.743	1.691	1.450	12.876

4. Empirical test results and analysis

The analysis is conducted on the basis of four steps listed in the model. In the first step, the model (1) is used to make regression analysis on the related relationship of private equity and private equity characteristics and enterprise value, and the model test results are shown in Table 2.

From the results of the regression shown by the table data in column 1, we can see that Tobin Q corresponding adjustment of the R^2 value is equal to 0.777, which shows that the degree of interpretation of the model and the degree of fitting are better. In the regression results, Tobin Q corresponding regression coefficient value PE is 0.029, which indicates that there is a positive correlation between the intervention of private equity investment institutions and the enterprise value. T value and P value reflect the impact of private equity investment on enterprise value is significant at 1% significant level. This shows that private equity investment in China's small and medium-sized enterprises can play a role in the supervision of the certification, and for the subsequent development of enterprises have a positive impact, which verifies the hypothesis H1.

Table 2 from the (2) to the (5) columns further shows that the analysis of the impact of private equity investment characteristics on enterprise value from different characteristics, and the private characteristics include: shareholding ratio, holding time, private equity reputation and foreign investment background. From the results of the regression shown by the table data we can see that the (2) regression results report that Tobin Q as a dependent variable has a corresponding adjustment of the R^2 value that is equal to 0.839, which shows that the degree

of interpretation of the model and the degree of fitting are better. In the regression results, Tobin Q as a dependent variable for the corresponding regression coefficient value of private equity investment shareholding ratio Peshare is 0.168, which indicates the proportion of private equity has a positive correlation with the enterprise value. The greater the proportion of private equity in the target enterprise, the more the PE spares no effort to participate in daily operation management of a target enterprise, so as to enhance the enterprise value.

Table 2. The model test results of the influence of private equity investment and its characteristics on enterprise value

Variables	Dependent variable Tobin Q				
constant	2.809 (9.539)***	2.613 (5.963)***	2.554 (5.827)***	2.587 (5.904)***	2.616 (6.001)***
PE	0.029 (8.858)***				
Peshare		0.168 (10.12)***			
LntPE			0.022 (2.16)**		
UpPE				0.092 (2.212)**	
ForePE					0.015 (4.432)***
Lev	-0.006 (-11.493)***	-0.05 (-5.883)***	-0.005 (-6.222)*	-0.05 (-5.883)***	-0.005 (-6.351)*
Lnasset	-0.083 (-5.824)***	-0.076 (-3.575)***	-0.075 (-3.518)***	-0.076 (-3.535)***	-0.077 (-3.625)***
Eps	-0.0001 (-0.079)	-0.014 (-0.681)	-0.012 (-0.568)	-0.011 (-0.54)	-0.011 (-0.546)
Sal	0.0002 (-1.069)	0.0001 (-0.106)	0.01 (-1.571)	0.001 (-0.571)	0.0001 (-0.773)
Pb	0.143 (34.961)***	0.163 (26.02)***	0.164 (26.415)***	0.164 (26.749)***	0.164 (26.866)***
Adjusted R ²	0.777	0.839	0.838	0.838	0.84
Ind			Control		
Year			Control		

The T-value and p-value reflect the impact at the 1% level is significant, which indicates that the proportion of private equity can effectively enhance the enterprise value. The regression results of column (3) report that Tobin Q as a dependent variable for the corresponding regression coefficient value of private equity holding time LntPE is 0.838, which shows that private equity holding time is positively related to enterprise value. The longer private equity holding shares is in the target enterprise, the more determined to create long-term value inside, and is not only limited to the speculative profit. The T-value and p-value reflect the impact on the 5% level significantly, which indicates that private equity holding time can effectively enhance the enterprise value. The regression results of column (4) report that Tobin Q as a dependent variable's corresponding regression coefficient value of private equity reputation UpPE is 0.092, which shows that private equity reputation is positively related to enterprise value. High reputation private institutions can bring more value-added benefits for the target

enterprise. The possibility of inducing adverse selection and moral hazard is low, and it is more conducive to promoting the value of the upgrade. The T-value and p-value reflect the impact on the level of 5% is significant, which indicates that high reputation private equity can effectively enhance the value of enterprise. The regression results of column (5) report that Tobin Q as a dependent variable corresponding regression coefficient's value of foreign capital private equity ForePE is 0.015, which shows that foreign private equity that has entered China's small and medium-sized market has a positive correlation with the enterprise value of the target corporation. The T-value and p-value reflects the impact on the level of 1% significant, which shows that foreign private equity can effectively enhance the value of enterprise. As a result, all the four sub hypotheses of H1 are verified.

Table 3 model test results of the impact of private equity investment and its characteristics on earnings management

variables	Dependent variable EM				
constant	4.765 (0.548)	4.851 (0.56)	4.756 (0.545)	4.273 (0.492)	0.574 (4.996)
PE	-2.134 (-14.628)***				
Peshare		-0.391 (-3.17)**			
LntPE			-0.121 (-2.224)**		
UpPE				-0.114 (-2.115)**	
ForePE					-0.103 (-1.856)**
Lev	-0.09 (-6.7)***	0.01 (0.654)	0.11 (1.693)*	-0.09 (-6.7)***	0.011 (0.724)
Lnasset	-0.279 (-0.645)	-0.341 (-0.804)	-0.346 (-0.815)	-0.344 (-0.812)	-0.343 (-0.806)
Eps	-0.102 (-0.24)	-0.06 (-0.146)	-0.048 (-0.116)	-0.059 (-0.142)	-0.056 (-0.141)
Sal	0.0001 (-0.106)	0.001 (0.097)	0.007 (0.103)	0.001 (0.09)	0.001 (0.09)
Pb	0.405 (3.124)***	0.394 (3.227)***	0.386 (3.17)***	0.386 (3.182)***	0.37 (3.168)***
Adjusted R ²	0.171	0.265	0.563	0.262	0.241
Ind			Control		
Year			Control		

The second step, through the model (2) there is a regression analysis on the related relationship between private equity and earnings management, and model test results are shown in Table 3. From the results of the regression shown by the table data we can see that in the (1) earnings management EM as a dependent variable, the corresponding adjustment of the R² value is equal to 0.171, which indicates the degree of the model and the fitting degree of the model are better. The impact of private equity characteristics on earnings management specifically is shown in Table 3 from the (2) to the (5). Introspectively, this indicates the influence direction and degree of private equity shareholding ratio, holding time, private equity reputation and foreign private equity to earnings management, and the regression coefficients of the model respectively are -0.391, -0.121, -0.114 and -0.103. This shows that the

characteristics of private equity investment and earnings management behavior have a negative correlation. Whether it is the background of foreign private equity or local private equity are hoping to reduce the earnings management behavior of enterprises in order to obtain more real financial data. But relatively speaking, the impact of foreign private equity investment on enterprise earnings management behavior is more significant, and the effect of enterprise development planning and guidance for the next step is more obvious. The T-value and p-value reflect the significant effect on the 5% level, indicating that the regression results show that the hypothesis H2 is fully verified.

Table 4. Model test results of the influence of private equity investment and earnings management on enterprise value

variables	Dependent variable Tobin Q					
constant	2.786 (9.437)***	2.779 (6.635)***	2.622 (5.395)***	2.547 (5.789)***	2.581 (5.871)***	2.609 (5.965)***
EM	-0.017 (-2.077)**	-0.008 (-1.93)*	-0.012 (-1.036)*	-0.004 (-1.17)*	-0.003 (-1.82)*	-0.015 (-1.085)*
PE		0.025 (1.793)*				
Peshare			0.078 (1.672)*			
LntPE				0.016 (1.71)*		
UpPE					0.071 (1.703)*	
ForePE						0.013 (1.276)*
Lev	-0.006 (-11.564)***	-0.006 (-11.484)***	-0.005 (-5.869)***	-0.005 (-6.208)***	-0.005 (-6.2)***	-0.005 (-6.345)***
Lnasset	-0.082 (-5.699)***	-0.084 (-5.828)***	-0.077 (-3.552)***	-0.075 (-3.481)***	-0.076 (-3.499)***	-0.077 (-3.587)***
Eps	-0.001 (-0.002)	-0.0009 (-0.069)	-0.013 (-0.61)	-0.012 (-0.561)	-0.011 (-0.531)	-0.011 (-0.541)
Sal	-0.001 (-1.276)	-0.0001 (-1.066)	-0.0001 (-0.466)	-0.002 (-0.642)	-0.001 (-0.539)	-0.001 (-0.774)
Pb	0.143 (34.817)***	0.143 (34.926)***	0.162 (25.026)***	0.163 (52.514)***	0.164 (25.862)***	0.163 (25.966)***
Adjusted R ²	0.775	0.777	0.839	0.838	0.836	0.840
Ind			Control			
Year			Control			

The third step uses model (3) to make a regression analysis on the related relationship between earnings management and enterprise value and model test results are shown in Table 4 (1). Among them, Tobin Q as a dependent variable corresponding adjustment of the R² value is equal to 0.775, which indicates the degree of the model and the fitting degree of the model are better. In the regression results, Tobin Q as a dependent variable corresponding regression coefficient value of earnings management degree EM is -0.017, which indicates that the internal management of enterprises will induce earnings management behavior and has a negative correlation with the value of the enterprise. Earnings management is not conducive for shareholders and outside investors to obtain true accounting information, which easily leads to

the error estimates of private equity and shareholders of the company in the next development plan for the company, and for a long time there will be a loss of enterprise value. The T-value and p-value reflect the influence of earnings management on enterprise value at 5% significant level. According to this, the H3 is verified.

The fourth step in the model (4) the private equity investment and its characteristics and earnings management are included in the enterprise value model to test to analyze whether the earnings management can play a certain intermediary effect, and the model test results are shown in Table 4. The (2) shows the regression results of Tobin Q and PE after taking into account the earnings management EM index. Tobin Q as a dependent variable corresponding adjustment of the R^2 value is equal to 0.777, and the model interpretation and fitting degree is good. After the earnings management and private equity investment are included in the model, though the coefficient is still positive for the value of the enterprise, the coefficient between private equity investment and enterprise value is reduced from 0.029 in the (1) of Table 2 to 0.025 in the (2) of Table 4. At the same time the significance is reduced significantly from the 0.01 level in the model (1) to the level of 0.1. The correlation coefficient and the significance all decreased. This shows that the earnings management does play a mediating role in the related relationship between private equity investment and enterprise value, and it is the part of the intermediary effect. The columns (3) to the (6) of Table 4 report the regression results of earnings management in the relationship between different characteristics of private equity investment and enterprise value.

From the comparative analysis of Table 2 and Table 4 of the correlation coefficient and the significant degree between the characteristics of private equity investment and enterprise value we can see that the coefficient between the private equity shareholding ratio and the enterprise value is reduced from 0.168 in the (2) of Table 2 to 0.078 in the (3) of Table 4, and the significant is also reduced significantly from the 0.01 level in the model (3) to the level of 0.1. The correlation coefficient and the significance all decreased. This shows that the earnings management does play a mediating role in the related relationship between private equity shareholding ratio and enterprise value, and it is the part of the intermediary effect. The correlation coefficient between the private equity holding time and the enterprise value is reduced from 0.022 in the (3) of Table 2 to 0.016 in the (4) of Table 4, and the significance also reduced significantly from the 0.05 level in the model (1) to the level of 0.1. The correlation coefficient and the significance all decreased. This shows that the earnings management does play a mediating role in the related relationship between private equity holding time and enterprise value, and it is the part of the intermediary effect. The correlation coefficient between the private equity reputation and the enterprise value reduced from 0.092 in the (4) of Table 2 to 0.071 in the (5) of Table 4, and the significance also reduced significantly from the 0.05 level in the model (1) to the level of 0.1. The correlation coefficient and the significance all decreased. This shows that the earnings management does play a mediating role in the relationship between private equity reputation and enterprise value, and it is the part of the intermediary effect. The correlation coefficient between the foreign capital private equity and the enterprise value reduced from 0.015 in the (5) of Table 2 to 0.013 in the (6) of Table 4, and the significance is also reduced significantly from the 0.01 level in the model (1) to the level of 0.1. The correlation coefficient and the significance are decreased. This shows that the earnings management does play a mediating role in the relationship between foreign capital private equity and enterprise value, and it is the part of the intermediary effect.

From this, we can find that earnings management does play a mediating effect in the

relationship of private equity investment enhancing the value of enterprises. Accordingly, the hypothesis H4 and the relevant sub hypothesis are all verified.

5. Robustness check

In order to increase the reliability of the research conclusions, we have carried out the following robustness tests on the above research results.

- (1) After winsorize treatment of 1% and 99% of the continuous variables in the sample, the regression of the above model is remade and the results are not substantially different.
- (2) For the measurement of the dependent variable enterprise value, we use “revenue growth in target enterprise from IPO year to third year” to take natural logarithm as the measure index of enterprise value, and remake the regression of the above model. The results do not affect the main conclusions of this paper.
- (3) For the measurement of the dependent variable enterprise value, in this paper, all regression data in the paper are measured by Tobin Q, in addition, we once again use the return on net assets (ROE): that is the ratio of net profit to balance of shareholders' equity, which is an important indicator to measure the profitability of listing corporation, enterprise value and development potential. Once again to measure the value of the enterprise, there is no substantial difference between the results of the regression and Tobin Q.
- (4) The characteristics of the company may be related to the enterprise value and growth potential of the company, but the company's characteristics may affect the decision-making of private equity investment institutions, that is, the existence of endogenous problems. For the endogenous problem, we generally use the two-stage model proposed by Heckman and propensity score matching method put forward by Rosenbaum to solve. This paper uses the propensity score matching method that recent literatures use more, solving the above problems by constructing the control group. The regression results are consistent. Although the significance is lower than before, this may be the reason for the decrease of sample size, and does not change the main conclusions of this paper.

6. Research conclusions and implications

This paper selects 480 companies listed in China's small and medium-sized board from 2008 to 2012 as sample data, and studies the related relationship of private equity investment and earnings management and enterprise value. Empirical test results show that private equity investment and corporate value have a significant positive correlation. Among them, private equity shareholding ratio, holding time, high reputation private equity and foreign capital private equity are positively correlated with the value of the enterprise. The private equity investment is negatively correlated with earnings management, and the corresponding four characteristics of private equity also have a negative correlation with earnings management. Earnings management is negatively correlated with enterprise value. In exploring the relationship among private equity investment, earnings management and enterprise value, the empirical tests show that the earnings management behavior has significantly weakened the positive correlation between private equity investment and corporate value, in which the behavior of earnings management plays an intermediary effect. At the same time, private equity shareholding ratio, holding time, high reputation private equity and foreign capital private equity also exhibit an intermediary effect. The above conclusions fully prove that the involvement of private equity investment can bring the development funds and management experience to the small and medium-sized enterprises of our country, effectively restraining the

earnings management behavior of the internal management of enterprise, and have a positive impact on the promotion of enterprise value.

The research conclusions of this paper give us some inspiration:

- (1) The small and medium-sized enterprises of our country can introduce private equity investment moderately, and in the selection of private institutions, we should choose the private equity of long established life and rich experience with high reputation as far as possible. Let these private equity institutions of high quality provide funds management experience and R & D technology for the development of small and medium enterprises, so as to effectively solve the difficulties encountered by the target enterprise in the growth phase of the target enterprise.
- (2) Private institutions in China should learn from foreign mature private equity, improving their ability to discriminate, at the same time providing more value-added services for enterprises. Don't limit the profit path to the speculative profit. That the fast of growth of the invested enterprises is in exchange for high returns should be taken as the real standard of measuring the success or failure of private equity, so as to push the listing corporation of more invested value to the Chinese private equity market. In the private equity internal operation, it should widely absorb financial talents, using performance compensation and other methods to encourage internal employees of enterprises, playing the role of private enterprises to enhance enterprise value in the true sense.
- (3) Government departments should establish and improve the macro operation environment of private equity investment as soon as possible. At present, the positive impact of private equity institutions on enterprise value has been revealed; however, the development of China's capital market is still not perfect. There is no specific guidance for the development of private equity investment institutions. This cannot guarantee the interest of private equity institutions and target companies. Therefore, we should construct a multi-level capital market to improve the private institutions, promote the healthy development of private placement, and let it play a greater role in the promotion of the value of small and medium-sized enterprises in China.

Conflict of Interests:

The authors declare that there is no conflict of interest regarding the publication of this paper.

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