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Earnings management, Ownership concentration and Capitalization of Research & Development expenditure

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ABSTRACT

This study investigates the relationship between earnings management (*EM*) and capitalization of research and development (*R&D*) expenditure from the perspective of major shareholders expropriation, using Modified Jones Model and Bidirectional Fixed Effect Model for the period 2009–2018. And the study further discusses the moderating effect of ownership concentration on the relationship between earnings management (*EM*) and capitalization of research and development (*R&D*) expenditure. Our results confirm that the level of accrued earnings management (*EM*) presents a positive impact on capitalization of research and development (*R&D*) expenditure. The effect of the shareholding ratio of the biggest shareholder on the relationship between accrued *EM* and capitalization of *R&D* expenditure is inverted U-shape.

KEYWORDS

Earnings management; major shareholders expropriation; capitalization of research & development expenditure; ownership concentration

JEL

G3; L2; O3

1. Introduction

In corporate governance, with the increasing prevalence of high ownership concentration, the analysis of the role of major shareholders is gaining attractive. The main contradiction of corporate governance has also changed from the principal-agent issue between shareholders and managers to the conflict between major and minority shareholders. The major shareholders have the capability and inclination to make use of the advantage to empty the listed company and encroach on the interests of the company, thus harming the interests of the minority shareholders. The development of China's capital market is relatively backward, and the special background results in a "one dominant share" phenomenon of enterprises in China. Shleifer and Vishny (1997) found that in countries where investor protection is insufficient, major shareholders tend to seize the interests of minority shareholders. In generally, the encroachment of major shareholders is mainly due to three reasons: high level of ownership concentration, insufficient supervision and restriction on the behavior of major shareholders, and inadequate legal protection for investors. The main ways of major shareholders' expropriation include the direct and indirect occupation of resources, such as earnings management (*EM*), related party transactions and dividend distribution, etc. Xu, Huang, and Wang (2014) believes that the absolute right of controlling shareholders improves the probability of financial fraud and earnings management (*EM*). LaPorta et al. (2000) found that major shareholders in the absolute controlling position would obtain private benefits through related party transactions, accrued *EM*, and other ways to realize the interest expropriation of minority shareholders. Morck, Shleifer, and Vishny (1988) argued that the inconsistent interests of major shareholders and minority shareholders led to conflicts between them. In the absence of an effective supervision mechanism, major shareholders would use their control right over the company for their personal gains, which would harm the interests of minority shareholders. As a means of management and control of the company, accounting treatment

can reflect the execution of the contract and has a moderating effect on the interests of all parties in the enterprise. In this case, major shareholders will exert influence on accounting information in the process of encroachment on the interests of listed companies, and the qualified capitalization accounting treatment of *R&D* expenditure may become an important means.

Recently, enterprises have started paying more attention to *R&D* investment (Figure 1) and accounting recognition, measurement, and disclosure related to *R&D* investment have gradually expanded their impact on the company's financial reports. Therefore, capitalization accounting treatment of *R&D* expenditure may become an important method for major shareholders to realize and cover up their encroachment behavior. From Figure 2, it displays the *R&D* expenditure in terms of activity types and it shows that most of the *R&D* expenditure is spent on experimental development.

The new Accounting Standards for Business Enterprises of China was issued in 2006, where the accounting standards for intangible assets require that enterprises' *R&D* activities should be split into two stages, namely research and development. The expenditure bore by enterprises in the research stage shall be expensed and recorded into the statement of profit or loss. In the development stage, the expenditures that meet the criteria of capitalization recognition can be capitalized and will be recorded as intangible assets in balance sheet. The expenditures that do not satisfy the capitalization criteria will also be expensed, recorded in the current profit or loss. This means that compared with the expensed *R&D* expenditure, capitalization of *R&D* expenditure is more value relevance. At the same time, capitalization of *R&D* expenditure has the following benefits: firstly, capitalization of *R&D* expenditure improves the quality of accounting information, such as reliability and relevance, which could help the users of financial information to make more appropriate decisions; secondly, the conditional capitalization accounting treatment alleviates the pressure of the sharp decline in profits brought by the high investment in research and development. It could restrain the behavior of enterprises to reduce *R&D* expenditure to improve profits and encourage enterprises to invest in *R&D* to a certain degree. And the core competitiveness and sustainable development ability of the enterprises could be enhanced by enterprise innovation; in addition, the conditional capitalization of *R&D* expenditure also leads to the continuous convergence of Chinese and International Accounting Standards, which is conducive to providing a more effective basis for the improvement of market economic policies. However, the new accounting standards also have its defects. There is no clear quantitative criterion for the capitalization conditions of the development stage and the degree of capitalization is often determined by subjective judgment of management. In this situation, the management has greater discretion, and to some degree, the problem of information asymmetry between enterprises and users

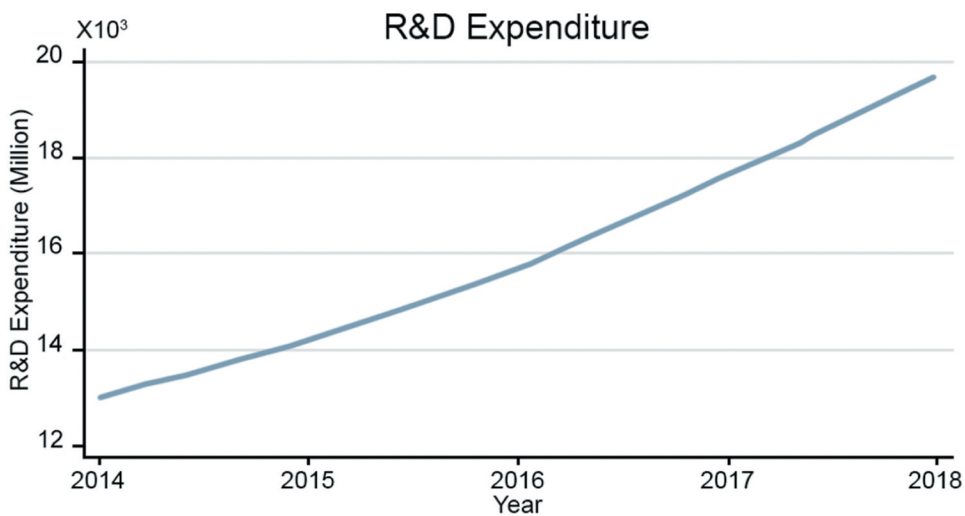


Figure 1. China's *R&D* expenditure trend from 2014 to 2018 (unit: million).

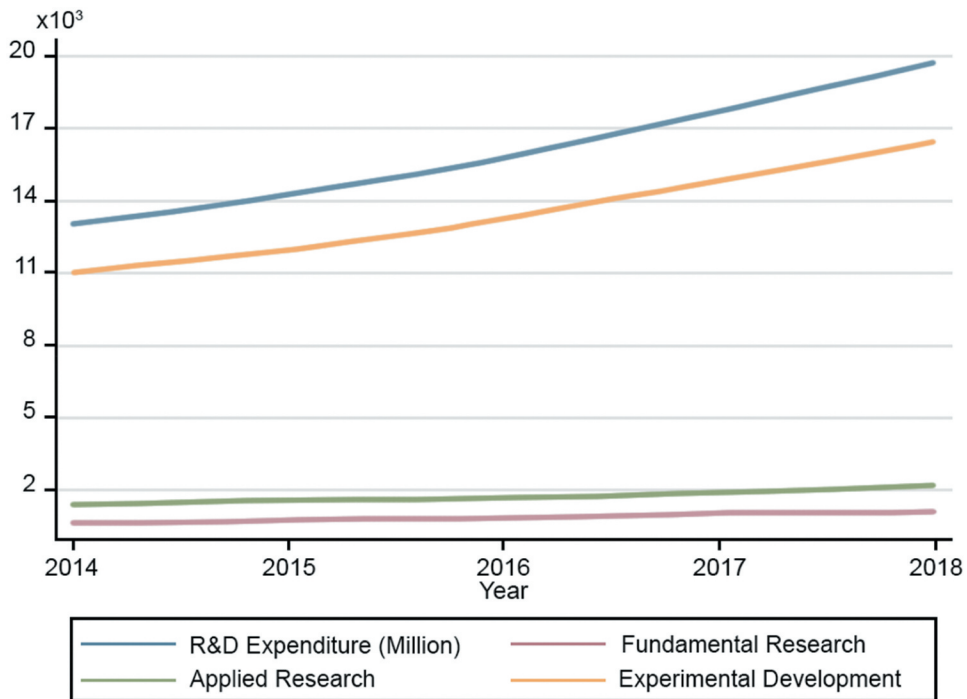


Figure 2. Evolution of China's R&D expenditure from 2014 to 2018 (unit: million).

of accounting information has increased. Therefore, the different choice of accounting treatment of *R&D* expenditure is a way for major shareholders expropriation. The research on the capitalization of *R&D* expenditure in foreign countries started earlier. The study of Jeff, Boone, and Raman (2001) believes that the choice of accounting treatment of *R&D* spending has become a means of profit manipulation. In China, Zhao, He, and Yang (2017) took the financial data of listed companies of *GEM* (Growth Enterprise Market) from 2009 to 2015 as samples to draw the conclusions: when the science and technology enterprises increased investment in *R&D*, the capitalization of the *R&D* spending will be used for earnings management behavior.

While, in the existing literature, how the ownership concentration affects the relationship between the expropriation of major shareholders and the capitalization of *R&D* expenditure is rarely considered. At present stage, Chinese companies are still characterized by highly concentrated ownership. Major shareholders have strong control ability, and there is no effective restraint mechanism for major shareholders' behavior inside and outside the company. It is common for major shareholders to harm minority shareholders by using their control right. The status of ownership structure of listed companies determines the roles of different shareholders in corporate governance, which is of great importance to the quality of accounting information. Therefore, it is worth exploring whether enterprises with a high concentration of ownership could realize the occupation of minority shareholders by manipulating *R&D* expenditure.

In view of this, a sample of A-share listed companies that have disclosed the capitalized development expenditure from 2009 to 2018 is used to analyze the following issues: (1) the relationship between accrued *EM* and capitalization of *R&D* expenditure, and (2) the moderating effect of ownership concentration. Compared with the existing literature, this paper has the following contributions: First, although there are a few studies on the relationship between earnings management and the capitalization of *R&D* expenditure, these studies are based on the perspectives of debt contracts, profit smoothing, or capital markets. This paper discusses the relationship between the two from the perspective of major shareholders expropriation, and finds that the capitalization of *R&D* expenditure

is a means of expropriation of interests, which is helpful to deepen the understanding of the accounting treatment of *R&D* expenditure capitalization in China's standard setting institutions. Second, the existing literature on the economic consequences of earnings management mainly focuses on financial risk, business performance and enterprise value, and pays little attention to the capitalization of *R&D* expenditure. By analyzing the influence mechanism of earnings management on the capitalization of *R&D* expenditure, this paper enriches the research on the economic consequences of earnings management, which can provide useful guidance for relevant departments to formulate accounting policies and regulatory arrangements. Third, by including ownership concentration into the research scope, it is found that with the increase of the shareholding ratio of the largest shareholder, the moderating effect of ownership concentration on the relationship between accrued *EM* and capitalization degree of *R&D* expenditure is inverted U-shape, which is a useful supplement to the existing literature.

The rest of the paper is organized as follows: Section 2 describes *R&D* accounting in China. Section 3 discusses the research hypothesis. Section 4 provides the research methodology, data source, variable measurements, descriptive statistics and correlation analysis. Section 5 presents the empirical results and reports a range of robustness tests. Finally, conclusions and implications are drawn in section 6.

2. R&D Accounting in China

In 2006, China released the new Accounting Standards for Enterprises. The accounting standard for intangible assets required that the *R&D* activities of enterprises should be divided into two stages, i.e., research and development. The expenditure bore by enterprises in the research stage should be expensed and recorded into the current profits and losses. In the development stage, the expenditure that satisfies the criteria of capitalization can be capitalized and recorded in enterprise intangible assets. The conditions for capitalization recognition are as follows: (1) It is technically feasible to complete the *R&D* project; (2) The board intends to complete the intangible assets for using or selling it; (3) It is probable that the intangible assets could produce economic benefits and cash inflows. (4) Adequate technical and financial resources to finish the development of the intangible assets, and to have the capability of using or selling the intangible assets; (5) The expenditure in the development stage can be measured reliably.

The condition stated by the China accounting standard of *R&D* accounting treatment is similar to those stated by IAS 38 in International Accounting Standards. Concerning the subsequent measurement of intangible assets, amortization or impairment test shall be carried out in a certain way, as well as relevant disclosure. To be specific, for intangible assets whose useful life can be determined, amortization shall be conducted; for intangible assets whose useful life is indefinite, the impairment test shall be conducted annually.

3. Theoretical Analysis and Hypothesis Development

3.1. Definition of Earnings Management

For the concept of earnings management (*EM*), different researchers have different definitions. Schipper (1989) described *EM* as the behavior of corporate management to obtain private benefits by intervening in corporate financial reports. He believed that *EM* included not only the manipulation of profits but also the manipulation of other useful information in financial statements. Scott (1997) believed that the purpose of *EM* is for management to maximize self-interest through choose the most favorable accounting policies and accounting estimates within the scope of the law. Although different scholars have different understandings of *EM*, we still can find some characteristics about *EM*: first, the implementation subject of *EM* is the internal staff of the enterprise; Second, *EM* has a clear purpose, namely to maximize their own interests; Third, *EM* manipulation is within the scope of legal and accounting standards. The two main forms of *EM* are accrued *EM* and real *EM*.

Accrued *EM* is the earliest and most common used method for earnings manipulation. Accrued *EM* is to manipulate the earnings through the choice of accounting procedures and the judgment of accounting estimations within the scope of current accounting standards, such as adjusting the useful life of assets or the valuation methods of inventory, etc. Generally speaking, this kind of *EM* behavior has no impact on the cash flow of the enterprise and only involves accruals. Moreover, due to the accruals can be reversed, accrued *EM* will only affect the distribution of accounting profits in each accounting period without changing the total amount of earnings of the enterprise. It is a short-term profit manipulation and will not affect the intrinsic value and the long-term development strategy of the enterprise.

Real *EM* discusses the earnings manipulation behaviors which affect current profits by establishing actual trading activities or controlling the time of trading activities, such as reducing *R&D* expenses and administrative expenses, relaxing credit policies, manipulating production and sales activities, etc. Real *EM* involves real transactions and business activities, which affect both the profit and the cash flow of the enterprise. Although expenses can be saved in the short term, which is beneficial to earnings, in the end, it may affect the competitiveness and sustainable development of the enterprise, and decrease the value of the company. This paper is about whether the expropriation behavior of major shareholders will have an impact on the accounting treatment of *R&D* expenditure. That is, whether it will affect the choice and judgment of accounting policy or estimation, so the accrued *EM* is chosen to be the object of study.

3.2. Accrued Earnings Management and Capitalization of R&D Expenditure

Information asymmetry is a main cause of *EM*, which will lead to the adverse selection and the moral hazard of major shareholders to some extent. The hypothesis of rational man holds that human is rational and rational man carries out actions based on the purpose of maximizing his own interests. In modern corporate governance, major shareholders can exert strong influence and control over the company (Li 2005; Liu, Li, and Yao 2007; Shleifer and Vishny 1997; Xu, Huang, and Wang 2014). The major shareholders in the controlling position choose the operation and management strategy purposefully by virtue of the information advantage, forcing the company to carry out earnings management, thus plunder the interests of the minority shareholders and external stakeholders (LaPorta et al. 2000; Leuz, Nanda, and Wysocki 2004; Shleifer and Vishny 1997).

The *R&D* activities increase the degree of information asymmetry between internal and external personnel and create conditions for *EM* through the accounting treatment of *R&D* expenditure. For the users of information outside the enterprise, it is very difficult or even impossible to obtain complete information about research and development projects. At the same time, they also lack enough professional knowledge to correctly judge the rationality of enterprises' *R&D* activities and *R&D* expenditure. They cannot identify the *EM* behavior which through the manipulation of the capitalization of *R&D* expenditure. In addition, the disclosure of *R&D* expenditure required by current accounting standards is not comprehensive, and the users of information can only understand the *R&D* situation of enterprises through capitalization and expense amount as well as other *R&D* information disclosed in annual reports. According to current research, enterprises tend to choose more covert means to prevent the *EM* behavior being detected. Because of the capitalization of *R&D* expenditure does not involve changes in accounting policies or adjustments in accounting estimates, there is no need to get the approval of the board or to make an announcement. Therefore, the accounting treatment of *R&D* expenditure becomes an effective and invisible means for enterprises to carry out *EM*.

About the link between capitalization of *R&D* expenditure and *EM*, Landry (2003) took Canadian-listed companies as empirical research samples and the results demonstrated that the capitalization of *R&D* expenditure has become a means to manipulate earnings to meet the conditions of debt contracts and achieve the purpose of profits smoothing. A study of Oswald and Zarowin (2007) finds that the accounting treatment of capitalization of the *R&D* expenditures plays a role in management

manipulation. In China, Xiao and Zhou (2012) compared the financial data before and after the change of accounting standard and believed that the conditional capitalization of *R&D* expenditure affects the *EM* behavior of enterprises. Before 2006, enterprises reached the expected profit level by reducing *R&D* investment, and after 2006, they would conduct earnings manipulation by increasing the capitalization amount of *R&D* expenditure. The research of Su (2014) shows that enterprises are likely to carry out accrued *EM* through capitalizing the *R&D* expenditure.

Based on the above analysis, this study raises the following research hypothesis:

Hypothesis 1. The accrued *EM* and capitalization of *R&D* expenditure is positively related.

3.3. Moderating Effect of Ownership Concentration

In the study of the relationship between ownership concentration and *EM*, most researchers believe that they are positively related. This also indicates that with the increasing concentration of ownership, major shareholders will realize profit encroachment through *EM* behaviors (Bai and Qiu 2016; Fan and Wong 2002; LaPorta et al. 1998; Lei and Liu 2006; Wang and Tong 2006). However, a few scholars believe that ownership concentration is negatively correlated with *EM*. In other words, with a higher ownership concentration, the interests of major shareholders are consistent with the interests of the company. So managers' behaviors can be effectively supervised by the major shareholders and the probability of *EM* can be inhibited (Du and Wen 2007; Erivelto and Fernando 2016; Hart 1995; Liu and Du 2003; Shleifer and Vishny 1986). Besides, some scholars also put forward an inverted U-shape relationship between *EM* degree and ownership concentration.

According to information asymmetry theory, on the one hand, with the increasing of ownership concentration, the shareholders with the large shareholding ratio will have more and more control over the company, and they will be more likely to influence the operation and management decisions of the company to maximize their own interests. From this point, it virtually creates an environment for major shareholders to seek personal gains and conduct *EM*; On the other hand, when the ownership concentration reaches a certain degree, the major shareholders will have the same benefits and losses as listed companies. This means that major shareholders will pay more attention to the goodwill, as well as the sustainable and healthy development of the company. In this case, the company will reduce the *EM* behavior, in which to enhance the quality of accounting information. Therefore, the research hypothesis is proposed:

Hypothesis 2. The influence of the shareholding ratio of major shareholders on the link between *EM* and capitalization of *R&D* expenditure is in an inverted U-shape.

4. Research Methodology

4.1. Sample Selection

This research is mainly about the relationship between accrued *EM* and capitalization of *R&D* expenditure, and we choose A-share listed companies which disclosed capitalization of *R&D* expenditure from 2009 to 2018 as the initial samples. The reason for choosing 2009 as the starting point of the sample interval in this paper is as follows: The outbreak of the global financial crisis in 2008 depresses the global economy and increases financial risks of enterprises. To reduce the impact of the financial crisis on the financial position of enterprises, capitalization of *R&D* expenditure may be used as a method to manipulate the profits and the authenticity of the capitalization of *R&D* spending is affected. Compared with other countries, China's economy is the first to pick up in year 2009, so it is more suitable for the sample to start from 2009. To ensure the validity of the results, the data is processed as

follows: (1) The sample data of listed companies in the financial industry are excluded; (2) Sample data of ST and *ST are eliminated; (3) Remove the data missing sample; (4) To avoid the extreme value problem, the winsorize treatment is adopted for the continuous variable of upper and lower 1%. Finally, 1709 listed companies with a total of 6553 sample data were obtained.

4.2. Variables

4.2.1. Dependent Variable

CAPRD is used to represent the capitalization of R&D expenditure. It refers to the ratio of capitalized development expenditure to total R&D expenditure.

4.2.2. Independent Variable

DA is the variable which is used to represent accrued EM. At present, the most commonly used technique to calculate the level of EM is the accrual separation method and the main econometric models include the Healy model, Deangelo model and Jones model. Among them, the Modified Jones Model is most widely used, so the altered Jones model is used in this paper to calculate the accrued EM. The model analysis steps are as follows:

- (1) The least-square method is used to estimate the parameters $\beta_0, \beta_1, \beta_2$

$$\frac{TA_{i,t}}{A_{i,t-1}} = \beta_0 \left(\frac{1}{A_{i,t-1}} \right) + \beta_1 \left(\frac{\Delta REV_{i,t} - \Delta REC_{i,t}}{A_{i,t-1}} \right) + \beta_2 \left(\frac{PPE_{i,t}}{A_{i,t-1}} \right) + \varepsilon_{i,t} \quad (1)$$

$TA_{i,t}$ is the total accrued profit at the end of the current period, that is, the difference between the current operating profit and the net cash flow from operating activities;

$A_{i,t-1}$ is the total assets at the end of the previous period;

$REV_{i,t}$ is the difference between the operating income of the current period and that of the previous period;

$REC_{i,t}$ is the difference between current and previous receivables;

$PPE_{i,t}$ is the cost of tangible non-current assets.

When the formula (1) is used for the annual regression of different industries, the Industry Classification Guidelines (2012) is adopted by this paper. In detail, the second-level classification for the manufacturing industry is used, while other industries adopt the first-level classification for the regression.

- (2) An estimation of the non-discretionary accrual ($NDA_{i,t}$): substitute the parameter $\beta_0, \beta_1, \beta_2$ into the formula

$$NDA_{i,t} = \beta_0 \left(\frac{1}{A_{i,t-1}} \right) + \beta_1 \left(\frac{\Delta REV_{i,t} - \Delta REC_{i,t}}{A_{i,t-1}} \right) + \beta_2 \left(\frac{PPE_{i,t}}{A_{i,t-1}} \right) \quad (2)$$

- (3) Calculate discretionary accrual $DA_{i,t}$

$$DA_{i,t} = \frac{TA_{i,t}}{A_{i,t-1}} - NDA_{i,t} \quad (3)$$

Generally, to prevent the offset of DA caused by different direction, the measurement of accrued EM takes the absolute value of $DA_{i,t}$. But in this study, the direction of accrued EM needs to be considered, so that the absolute value of accrued EM is not used.

4.2.3. Moderating Variable

FIRST, which is used to represent the ownership concentration of an enterprise, is calculated by the shareholding ratio of the biggest shareholder. The paper studies the influence of ownership concentration on the link between the accrued *EM* and the capitalization of *R&D* expenditure. To test the inverted U-shape, *FIRST2*, the square of the shareholding ratio of the biggest shareholder is used as the moderating variable.

4.2.4. Control Variables

The scale of the company is used as a control variable due to capitalization of *R&D* spending may be influenced by the size of the firm. It is the natural logarithm of the total assets of the company at the end of the current period, represented as *SIZE*. Large companies, on the one hand, are likely to have a strong ability on *R&D* activity and the success rate of *R&D* project is higher. On the other hand, the public often has higher expectations for the *R&D* success rate of large-scale companies. So the larger companies may tend to capitalize more development expenditure than the smaller companies. The intensity of *R&D* is the ratio of total *R&D* expenditure to operating income, expressed as *RD*, which is a relative number index. The more a company spends on *R&D*, the more likely it is to capitalize the *R&D* spending to meet the expectations of success. *ROA* is the return on assets, equal to the ratio of net profit before capitalization to the total assets, used to measure the profitability of an enterprise. The higher the profitability of an enterprise, the more it can afford to the *R&D* investment, that is, the more likely the *R&D* expenditure will be expensed. *ChROA* is the change in return on total assets which is equal to the difference between the current year's return on assets (*ROA*) before capitalization and the return on assets (*ROA*) of the previous period. *LEV* is the ratio of debt to asset. A higher debt level means that enterprises have higher financial risks, which will affect the performance and value of enterprises.

4.3. Descriptive Statistics and Correlation Analysis

Table 1 illustrates the descriptive statistics on the selected samples of A-share listed companies that disclosed the capitalized amount of *R&D* expenditure from 2009 to 2018. It shows that the average capitalization degree of *R&D* expenditure is 0.1478, the standard deviation is 0.2326, which means the amount of capitalized *R&D* expenditure in different enterprises is quite different. The minimum value is -0.1497 , and the negative capitalization of *R&D* indicates that part of the capitalization amount of previous year is converted into expense in the current period. The mean, maximum, and minimum amount of accrued *EM* are 0.0638, 11.5963, and -0.7781 , respectively. It indicates that there is an upward accrued *EM* behavior in most of the A-share listed companies in China. However, there are also cases where accrued *EM* goes down for earnings persistence or smoothing.

Table 1. Descriptive statistics of variables.

Variables	Sample	Mean	Maximum	Minimum	Standard Deviation
<i>CAPRD</i>	6553	0.1478	1.0000	-0.1497	0.2326
<i>DA</i>	6553	0.0638	11.5963	-0.7781	0.2839
<i>SIZE</i>	6553	9.7812	12.2699	8.3379	0.5933
<i>RD</i>	6553	0.0455	1.6943	0.0000	0.0627
<i>ROA</i>	6553	0.0369	0.3986	-1.0436	0.0654
<i>ChROA</i>	6553	-0.0096	0.9845	-0.9802	0.0583
<i>LEV</i>	6553	0.4438	1.6869	0.0158	0.1999
<i>FIRST</i>	6553	0.3567	0.8909	0.0220	0.1540
<i>FIRST2</i>	6553	0.1510	0.7937	0.0005	0.1240

The key variables are *CAPRD* and *DA*. From the statistics above, we could get a general understanding of the capitalization of *R&D* expenditure and earnings management.

Table 2. Coefficient matrix of Pearson correlation.

Variables	CAPRD	DA	SIZE	RD	ROA	ChROA	LEV	FIRST
CAPRD	1.0000							
DA	0.0001 (0.9955)	1.0000						
SIZE	-0.0095 (0.4419)	0.2116*	1.0000					
RD	0.1985* (0.0000)	-0.1418* (0.0000)	-0.2516* (0.0000)	1.0000				
ROA	-0.0531* (0.0000)	0.1034* (0.0000)	-0.0063 (0.6125)	-0.0415* (0.0008)	1.0000			
ChROA	-0.1152* (0.0000)	-0.1557* (0.0000)	0.0610* (0.0000)	-0.1783* (0.0000)	0.5975* (0.0000)	1.0000		
LEV	-0.0022 (0.8599)	0.0498* (0.0006)	0.5326* (0.0000)	-0.2747* (0.0000)	-0.3328* (0.0000)	-0.0001 (0.9920)	1.0000	
FIRST	-0.1184* (0.0000)	0.0356 (0.0146)	0.2562* (0.0000)	-0.2096* (0.0000)	0.0860* (0.0000)	0.0621* (0.0000)	0.1020* (0.0000)	1.0000

*Represents significant at the 1% level. From the correlation coefficient among the variables, the correlation coefficients are all less than 0.6, and it is apparent that there is no multicollinearity problem.

For the control variables, the mean of *R&D* intensity is 0.0455. The minimum amount of return on total assets is negative, but the overall mean value is 0.0369. The mean of *ChROA* (-0.0096) indicates that the *ROA* of the current period before capitalization is generally lower than the *ROA* of the previous year, and enterprises may increase the *ROA* through capitalize the *R&D* investment. The maximum amount of asset-liability ratio is 1.6869 and there is a possibility of insolvency. But the average value is only 0.4438, which indicates that the capital structure is reasonable for most of the companies. The maximum amount of shareholding ratio is 89.09%, and the average value is 35.67%. The amounts inform us that the high ownership concentration in China's listed companies is very common.

Table 2 can be used to find the Pearson correlation coefficient between the variables. The correlation coefficient between the accrued *EM* (*DA*) and the capitalization of *R&D* expenditure (*CAPRD*) is 0.0001. To some extent, we can verify that the accrued *EM* has a positive correlation with the capitalization of *R&D* expenditure.

5. Empirical Tests and Analysis of Results

5.1. Model Specification

To verify hypothesis H_1 , this paper takes the capitalization of *R&D* expenditure (*CAPRD*) as the explained variable, and the accrued *EM* (*DA*) calculated by the Modified Jones Model as the explanatory variable. Simultaneously, the scale of the company (*SIZE*), *R&D* intensity (*RD*), return on assets (*ROA*), change in return on assets (*ChROA*), asset-liability ratio (*LEV*), and shareholding ratio of the largest shareholder (*FIRST*) are taken as control variables, and individual effects (μ_i) and year effects (μ_t) were controlled to construct a bidirectional fixed effect regression model (4).

$$CAPRD_{i,t} = \beta_0 + \beta_1 DA_{i,t} + \beta_2 Control_{i,t} + \mu_i + \mu_t + \varepsilon_{i,t} \quad (4)$$

For hypothesis H_2 , an interaction term $DA \times FIRST2$ is introduced into the model (4) to test whether the effect of moderating variable has an inverted U-shape and we thus construct a bidirectional fixed effect regression model (5) expressed as follows:

$$CAPRD_{i,t} = \beta_0 + \beta_1 DA_{i,t} + \beta_2 DA_{i,t} \times FIRST2_{i,t} + \beta_3 FIRST2_{i,t} + \beta_4 SIZE_{i,t} + \beta_5 RD_{i,t} + \beta_6 ROA_{i,t} + \beta_7 ChROA_{i,t} + \beta_8 LEV_{i,t} + \beta_9 FIRST_{i,t} + Year + Firm + \varepsilon_{i,t} \quad (5)$$

5.2. Regression Results and Analysis

5.2.1. Accrued Earnings Management and Capitalization of R&D Expenditure

In order to avoid the impact of omission variables that do not change with time on the research results, the individual heterogeneity of different enterprises is taken into account, and the fixed effect model or random effect model is determined by Hausman test. The result of Hausman test shows that the *P* value is 0.0000, which rejects the null hypothesis, thus the fixed effect model is chosen. Table 3 shows the regression results between accrued *EM* (*DA*) and the capitalization of *R&D* expenditure (*CAPRD*). The first column is the test of the relationship between *DA* and *CAPRD* without considering the control variables. The individual fixed effect regression results indicate that *DA* is positively correlated with *CAPRD*, which is significant at 5% level. The second column is the individual fixed effect regression result of *DA* and *CAPRD* after taking the control variables into account. The results show that *DA* is positively correlated with *CAPRD*, with a coefficient of 0.0160, which is significant at 1% level. The third column is the bidirectional fixed effect regression result after adding control variables and controlling year and individual effect. The results still show that *DA* is positively correlated with *CAPRD*, with a coefficient of 0.0132 and significant at 1% level, which is consistent with the hypothesis H_1 in this paper. It indicates that the higher of the degree of accrued *EM*, the higher of the capitalized amount of *R&D* expenditure. In other words, major shareholders can manipulate corporate profits through earnings management, and take capitalization of *R&D* expenditure as a means of earnings management to encroach on the interests of minority shareholders. Based on the bidirectional fixed effect regression results about control variables, *R&D* intensity is positively correlated with capitalization of *R&D* expenditure at a significant level of 1%, indicating that companies with higher *R&D* investments are more likely to capitalize *R&D* expenditure to meet external expectations of their *R&D* success. The size of the firm is positively correlated with capitalization of *R&D* expenditure, which has a significance level of 10%. It indicates that larger enterprises may have stronger *R&D* capabilities and are more likely to capitalize the *R&D* expenditure. In addition, the change of return on total assets (*ChROA*) is negatively correlated with capitalization of *R&D* expenditure.

Table 3. The results of accrued *EM* and the capitalization of *R&D* expenditure.

Variables	Fixed Effect Model (Model 4)		
	<i>CAPRD</i>	<i>CAPRD</i>	<i>CAPRD</i>
<i>DA</i>	0.0112** (2.04)	0.0160*** (3.31)	0.0132*** (3.01)
<i>SIZE</i>		-0.0009 (-0.04)	0.0484* (1.79)
<i>RD</i>		0.5656*** (3.20)	0.5801*** (3.25)
<i>ROA</i>		0.0559 (0.73)	0.0043 (0.05)
<i>ChROA</i>		-0.1161** (-2.23)	-0.0902* (-1.75)
<i>LEV</i>		0.0733** (2.22)	0.0482 (1.39)
<i>FIRST</i>		0.0416 (0.69)	-0.0004 (-0.01)
<i>Firm</i>	YES	YES	YES
<i>Year</i>	-	-	YES
<i>_cons</i>	0.147*** (420.37)	0.079 (0.39)	-0.2832 (-1.12)
<i>Observations</i>	6,553	6,553	6,553
<i>R-squared</i>	0.001	0.026	0.032

***Means significant at 1% level, ** means significant at 5% level, * means significant at 10% level; The value of T-value is in parentheses.

5.2.2. Analysis of the Moderating Effect of Ownership Concentration

To verify hypothesis H₂, we use bidirectional fixed effect regression for model (5) and the regression results were shown in Table 4. As can be seen from the results, after considering the moderating variable, the interaction item ($DA \times FIRST2$) is negatively correlated with $CAPRD$ with a coefficient of -0.308 and is significant at the 10% level. This is consistent with the hypothesis H₂ discussed before. That is to say, with the increase of ownership concentration, the positive relationship between DA and $CAPRD$ is strengthened. After the shareholding ratio reaches a certain degree, the influence of DA on $CAPRD$ decreases gradually with the increasing shareholding ratio of the biggest shareholder. The reason for inverted U-shape is that the control rights of major shareholders will become larger with the increase of ownership concentration, and it will be easier for them to maximize their own interests through earnings management. Secondly, when the ownership concentration reaches a certain degree, the interests of major shareholders and the interests of company tend to be consistent, which may reduce short-term earnings management behavior and the capitalization degree of $R\&D$ expenditure.

5.3. Endogeneity Test

Endogenous problem refers to the correlation between explanatory variables and random perturbation term. As a result, the ordinary least squares (OLS) method cannot obtain unbiased estimation. The endogenous of variables is often caused by omission of variables, mutual causality and error of measurement. In the study of the relationship between accrued EM and capitalization of $R\&D$ expenditure, endogenous problem cannot be ignored. To enhance the stability of the results and overcome the endogenous problem, the two-stage least square method (IV-2SLS) in instrumental variable method is used for further testing. Reference to the previous research, lag values of the explanatory variable (DA_{-}) is used as the instrumental variable. To improve the correlation of the instrumental variable, winsorize treatment is also adopted for variable DA_{-} . The results are shown in Table 5. At the same time, $ChCAPRD$ is used to be a substitution variable for the explained variable. In the first column, the DA_{-} is positively related to $CAPRD$ (0.300) at a significant level of 10%. The second column also shows there is a positive link between accrued EM and the change of capitalization of $R\&D$ ($ChCAPRD$), which is significant at the level of 1%. It means that after considering the endogenous problem, the positive relationship between explanatory variable and explained variable is still valid.

5.4. Robustness Test

To further ensure the robustness of our results, the explained variable of hypothesis H₁ and H₂ is replaced. The moderating effect of ownership concentration is tested by grouping regression. Due to the ability of research and development is stable or slowly ascend during a period, to some extent, the rate of change of the capitalized $R\&D$ expenditure could also reflect the capitalization of $R\&D$ expenditure in the current period, which is the difference between the ratio of capitalization of $R\&D$ to total $R\&D$ at the current period with that of previous period. Therefore, $ChCAPRD$ is treated as the substitution variable for the explained variable.

In Table 6, the first column shows the robustness test results of accrued EM and capitalization of $R\&D$ expenditure. After replacing the explained variable with the rate of change in capitalization of $R\&D$ expenditure, the regression results of two-way fixed effect show that accrued EM (DA) is positively related with the change of capitalization of $R\&D$ expenditure ($ChCAPRD$) at the significance level of 5%, which verify the previous empirical results. After the effect of interaction term ($DA \times FIRST2$) is considered, the results of the second column still shows that an inverted U-shape is existed, which is consistent with the previous results.

Table 4. Regression results of the moderating effect of ownership concentration.

Fixed Effects Model (Model 5)		
Variables	CAPRD	CAPRD
DA	0.048*	0.098**
	(1.81)	(2.48)
DA*FIRST2		-0.308*
		(-1.71)
FIRST2	0.163	0.213
	(1.11)	(1.43)
SIZE	-0.003	-0.002
	(-0.25)	(-0.19)
RD	0.566***	0.567***
	(10.09)	(10.11)
ROA	0.038	0.033
	(0.62)	(0.54)
ChROA	-0.111**	-0.113**
	(-2.39)	(-2.42)
LEV	0.076***	0.076***
	(3.19)	(3.17)
FIRST	-0.093	-0.112
	(-0.72)	(-0.87)
Firm	YES	YES
Year	YES	YES
_cons	0.120	0.113
	(1.01)	(0.95)
Observations	6,553	6,553
R-squared	0.0389	0.0375

***Means significant at 1% level, ** means significant at 5% level, * means significant at 10% level; The value of T-value is in parentheses.

Table 5. The regression results of the instrumental variable method.

IV-2SLS		
Variables	CAPRD	ChCAPRD
DA_	0.300*	0.099***
	(1.95)	(3.18)
SIZE	0.017**	0.001
	(2.06)	(1.27)
RD	0.779***	0.500***
	(9.10)	(5.16)
ROA	0.407***	0.078***
	(3.82)	(3.97)
ChROA	-0.142**	-0.007
	(-2.04)	(-0.40)
LEV	-0.013	0.011
	(-0.56)	(1.37)
FIRST	-0.131***	0.010
	(-5.73)	(1.63)
Firm	YES	YES
Year	YES	YES
_cons	-0.005	-0.032***
	(-0.07)	(-2.86)
Observations	4,703	4,703
R-squared	0.071	0.563

***Means significant at 1% level, ** means significant at 5% level, * means significant at 10% level; The value of Z-value is in parentheses.

Table 6. Robustness test results of hypothesis H₁ and H₂.

Variables	<i>ChCAPRD</i>	
	Model (4)	Model (5)
<i>DA</i>	0.064** (2.48)	0.017*** (2.83)
<i>DA*FIRST2</i>		-0.050*** (-2.71)
<i>FIRST2</i>		0.035 (1.15)
<i>SIZE</i>	-0.002 (-0.10)	-0.004 (-1.56)
<i>RD</i>	0.672*** (6.01)	0.687*** (4.19)
<i>ROA</i>	0.054 (0.67)	0.027 (1.54)
<i>ChROA</i>	-0.080 (-1.08)	-0.006 (-1.05)
<i>LEV</i>	0.009 (0.27)	0.026** (2.50)
<i>FIRST</i>	0.103* (1.86)	-0.028 (-0.93)
<i>Firm</i>	YES	YES
<i>Year</i>	YES	YES
<i>_cons</i>	-0.051 (-0.26)	0.007 (0.37)
<i>Observations</i>	6553	6553
<i>R-squared</i>	0.028	0.027

***Means significant at 1% level, ** means significant at 5% level, * means significant at 10% level; The value of T is in parentheses.

The grouping regression method is also used for the robustness test. According to the shareholding ratio of the largest shareholder, the samples were divided into three groups: low, medium, and high. Samples with the shareholding ratio lower than 33.33% are sub-sample of low concentration degree, samples with the shareholding ratio higher than 66.67% are sub-sample of high concentration degree, and the rest are sub-sample of medium concentration degree.

The grouping regression results are reported in Table 7. As a result, in the samples of low concentration and high concentration, the relationship between accrued *EM (DA)* and the capitalization of *R&D* spending (*CAPRD*) is not significant. And in the sample of medium concentration, they

Table 7. Robustness test results of hypothesis H₂.

Variables	<i>CAPRD</i>		
	Low	Medium	High
<i>DA</i>	0.005 (0.86)	0.026** (2.38)	-0.032 (-1.07)
<i>SIZE</i>	0.033 (0.79)	0.037 (0.81)	0.130 (1.39)
<i>RD</i>	0.501** (2.41)	0.997*** (3.15)	-1.596 (-1.62)
<i>ROA</i>	0.122 (1.04)	-0.118 (-0.89)	-0.175 (-0.72)
<i>ChROA</i>	-0.106 (-1.32)	-0.076 (-1.03)	0.248 (0.67)
<i>LEV</i>	0.058 (1.20)	0.017 (0.30)	-0.249 (-0.88)
<i>FIRST</i>	0.120 (0.63)	0.009 (0.08)	0.098 (0.30)
<i>Firm</i>	YES	YES	YES
<i>Year</i>	YES	YES	YES
<i>_cons</i>	-0.271 (-0.69)	-0.040 (-0.09)	-1.116 (-1.16)
<i>Observations</i>	3185	3164	204
<i>R-squared</i>	0.043	0.043	0.065

***Means significant at 1% level, ** means significant at 5% level, * means significant at 10% level; The value of T is in parentheses.

are significant under 5% level. At the same time, according to the coefficients of DA in the 3 subsamples, we can conclude that the influence of the shareholding ratio of the largest shareholder on the relationship between accrued EM and $R\&D$ capitalization is inverted U-shape, which is consistent with the regression result of the interaction term above.

6. Conclusions

The expropriation of major shareholder has a negative effect on the quality of accounting information which will affect the decision making of users, but also restricts the healthy development of the capital market. Recently, the capitalization of $R\&D$ expenditure has been used as a means of major shareholder expropriation. Therefore, it is worthy to examine the relationship between accrued EM and capitalization of $R\&D$ expenditure from the perspective of major shareholder expropriation. And we also proposed that ownership concentration plays a moderating effect role in the study. The empirical analyses show that: (1) accrued EM has a positive effect on the amount of capitalized development expenditures. (2) the effect of ownership concentration is inverted U-shape in the relationship between accrued EM and capitalization of $R\&D$ expenditure. What's more, endogeneity test and robustness test were carried out in this paper to verify the reliability of the finding.

The policy implications run as follows. After the accounting standard of Intangible assets changed in 2006, China's $R\&D$ investments have enjoyed rapid and vigorous development. Thus, the favorable policy for $R\&D$ investments creates a positive environment for the development of enterprise innovation. However, we should mention that the capitalization of $R\&D$ has not received enough attention in the accounting literature. Irrational capitalization of $R\&D$ expenditure is becoming a way for the management to manipulate the earnings and the main reason for that is the current accounting standards are not clear on the division of the research stage and the development stage, as well as the capitalization amount. Over-capitalization of $R\&D$ expenditures can lead to overinvestment in continuing projects and destroy the firm value. Therefore, the standard-setting body should improve and refine the existing provisions of $R\&D$ expenditure and reduce the space for earnings management through capitalization of $R\&D$ expenditure.

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