A Study on the Relationship between Earnings Quality and Capital Cost-Takes the China Listed Companies as a Sample

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Authors' contributions

This work was carried out in collaboration among all authors. Author CYH designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors H-HK and H-LL managed the analyses of the study. Author J-LL managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

The phenomenon of false financial statements still exists. However, in addition to the risk of being punished, what kind of price do companies have to pay? In recent decades, with China's rapid progress in economic, the relevant accounting system and corporate governance standards are actively improving, and the earnings quality is improving. This paper takes China's listed companies from 2015 to 2019 as samples, and adopts quantile regression supplemented by ordinary least square method to explore the relationship between earnings quality and capital cost. The research findings show that the higher the earnings management, the higher the capital cost, especially for the company with low capital cost. Nevertheless, for the extremely company with high capital cost, earnings management can reduce the capital cost. The research results can provide the focus of regulators of listed companies and reference for the revision of relevant accounting system.

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1. INTRODUCTION

With the rapid development of China's economy, the news about financial fraud is still emerging one after another, and most of the main reason is improper earnings manipulation. The earnings quality of enterprises has attracted close attention of relevant regulatory departments. The "White paper on information quality of China's capital market and information transparency index of listed companies" [1] investigated and analyzed the earnings quality and data of financial statements of listed companies; it found that among the constituent stocks of CSI300 index, there are only 126 enterprises with high transparency index. Scott [2] pointed out that earnings management is a concrete manifestation of the economic consequences of the choice of accounting policies. Nevertheless, at the same time, some people think that earnings management will have a negative impact on the quality of accounting information, there is a risk of interfering with the market order, and it is very likely to mislead investors' decisions [3]. The new accounting standards implemented in China since January 1, 2007 still give enterprises the right to choose accounting policies. Managers can choose the accounting policies applicable to enterprises according to their needs and judgments. However, at the same time, the new accounting standards raise the requirements for the value relevance of accounting information, pay attention to the improvement of accounting information transparency, and minimize the situation of earnings manipulation, to improve the earnings quality of enterprises. Theoretically, speaking, high surplus quality can reflect the real operating results of accounting enterprises, reduce the asymmetry of internal and external information, reduce the investment risk of investors, so as to enhance their investment willingness and confidence, which is conducive to enterprise financing and financing, and then reduce the capital cost of enterprises. However, it still needs further empirical research combined with China's national conditions and various factors. If the degree of earnings management is too strong, it will not only bear the risk of punishment and damage to the company's reputation, but also bear the higher expected return of investors, so, is this beneficial for enterprises? Refer to the previous research literatures from China, although there are many researches on earnings manipulation, accounting conservatism, the relationship between accounting information and earnings management, the motivation and influencing factors of earnings management in China, there are few researches on the impact of earnings quality on capital cost. The purpose of this paper focuses on the relationship between earnings quality and cost of capital; and to explore whether the foreign research findings can practice in China, which is helpful to enrich the theoretical research of earnings quality and cost of capital, enrich the relevant literature, and provide more evidence that is empirical and experimental data. It is helpful to deepen the understanding of the concepts of earnings quality, earnings management and capital cost, and lay the foundation for further exploring the impact of earnings quality on capital cost. In addition, this paper expect to provide a reference for investors and enterprises, so that investors have a better understanding of corporate earnings quality, which is conducive to their investment decisions and supervision of the invested companies. At the same time, it also helps to improve the attention of enterprises to earnings quality, we should clearly recognize the impact of earnings quality on the cost of capital and the advantages and disadvantages of earnings management, restrain its improper earnings management behaviors such as earnings manipulation, and improve the quality of earnings and accounting information.

1.1 Literature Review

According to numerous literature studies, there are two more accurate definitions of earnings management: (1) earnings management is an accounting policy to improve the company's own business interests and value, and to appropriately adjust the internal earnings level of the enterprise without violating the accounting standards, so as to achieve the ideal enterprise value and business objectives. (2) earnings management is a process that the management of a company, for its own interests, beautifies the financial information announced to the outside world subjectively through its own power, and artificially adjusts the disclosure of financial statements [4,5]. In a word, earnings management refers to the behavior of company managers subjectively operating the company's operating conditions or external earnings information in order to improve their own interests or maximize the enterprise value [6].

There are many ways to measure earnings management. The most often used two measurements are accrual earnings management and real earnings management.

For the measurement of accrual earnings management, Jones model is more mature [7]. At present, the modified Jones model [8] is widely used. The model is as follows：

$$\frac{TA_{i,t}}{A_{i,t-1}} = \alpha_1 \frac{1}{A_{i,t-1}} + \alpha_2 \frac{\Delta REV_{i,t} - \Delta REC_{i,t}}{A_{i,t-1}} + \alpha_3 \frac{PPE_{i,t}}{A_{i,t-1}} + \varepsilon_{i,t}$$

$$\frac{NDA_{i,t}}{A_{i,t-1}} = \alpha_1 \frac{1}{A_{i,t-1}} + \alpha_2 \frac{\Delta REV_{i,t} - \Delta REC_{i,t}}{A_{i,t-1}} + \alpha_3 \frac{PPE_{i,t}}{A_{i,t-1}} + \varepsilon_{i,t}$$

$$DA_{i,t} = \frac{TA_{i,t}}{A_{i,t-1}} - \frac{NDA_{i,t}}{A_{i,t-1}}$$

Where TA is the total accrued profit and A is the total assets, ΔREV is the increment of sales revenue, ΔREC is the increment of accounts receivable, PPE is the total amount of fixed assets, and NDA is the non-manipulation accrual, ε is the residual, DA is the operational accruals.

According to the related research of Roychowdhur [9], there are three measurements of real earnings management as following:

Calculation of cash flow from controlling operations (RCFO)

$$\frac{CFO_{i,t}}{A_{i,t-1}} = \alpha_1 \frac{1}{A_{i,t-1}} + \alpha_2 \frac{REV_{i,t}}{A_{i,t-1}} + \alpha_3 \frac{\Delta REV_{i,t}}{A_{i,t-1}} + \varepsilon_{i,t}$$

b. Calculation of production cost from controlling operations (RPROD)

$$\frac{PROD_{i,t}}{A_{i,t-1}} = \alpha_1 \frac{1}{A_{i,t-1}} + \alpha_2 \frac{REV_{i,t}}{A_{i,t-1}} + \alpha_3 \frac{\Delta REV_{i,t}}{A_{i,t-1}} + \alpha_4 \frac{\Delta REV_{i,t-1}}{A_{i,t-1}} + \varepsilon_{i,t}$$

c. Calculation of discretionary fee (RDISEXP)

$$\frac{DISEXP_{i,t}}{A_{i,t-1}} = \alpha_1 \frac{1}{A_{i,t-1}} + \alpha_2 \frac{REV_{i,t-1}}{A_{i,t-1}} + \varepsilon_{i,t}$$

Based on the above three formulas, the real earnings management (REM) is:

REM = RPROD-RCFO-RDISEXP

Where, CFO is net operating cash flow, REV is sales revenue, PROD is the sum of sales cost and changes in inventory book value, DISEXP is discretionary expense.

Capital cost is the cost for an enterprise to obtain and occupy funds, which is an important basis for an enterprise to choose financing methods and schemes. The common calculation methods are as follows:

1. Long-term borrowing cost

The loan interest can be treated as an expense to offset the income tax, so the enterprise's actual interest expense is reduced; However, the fund raising fee of long-term loan is mainly a negligible loan handling fee, so the calculation formula of the capital cost of long-term loan based on income statement is as follows:

$$K_i = I_i(1 - T)$$

Where K is the capital cost rate of long-term loan, I is the interest rate of long-term loan, and t is the income tax rate.

2. Cost of bond capital

When an enterprise issues bonds, it not only needs to pay the registration fee, guarantee fee and other raising expenses, but also needs to pay the interest, that is, the occupation fee, and it can offset the income tax. The calculation of cost of bond capital is also according to the income statement figure shows as follow：

$$K_i = \frac{I_i(1 - T)}{Q(1 - f)}$$

Where K is the bond capital cost rate, I is the annual interest rate, T is the income tax rate, Q is the amount of bond financing, and f is the bond financing expense rate.

However, when using the above formula, according to the different ways of issuing bonds and the use of bond funds, should make specific analysis. For example, if the funds raised by bonds and its purpose is for the purchase and construction of fixed assets, the interest expenditure cannot offset the income tax.

3. Capital cost of preferred stock

Unlike bond interest, the payment of preferred stock dividends will not reduce the income tax payable by enterprises. Also, need to pay a certain fund-raising fees, such as registration fees. Therefore, the figures of the preferred stock capital cost calculation are also obtained from financial statement.

$$K_p = \frac{d_c}{P(1 - f)}$$

Among them, K is the capital cost rate of preferred shares, D is the annual interest payment of preferred shares, P is the total amount of preferred shares issued at par value, and F is the financing cost rate of preferred shares.

4. Capital cost of common stock

Different from preferred stock, common stock dividend is unfixed, usually increasing year by year, and the payment of financing fees such as underwriting fees and occupancy fees such as dividend are necessary. However, the fund-raising expenses can be directly deducted from the total amount of fund-raising, which does not constitute the cost of capital. Therefore, the capital cost calculation of common stock is different from that of preferred stock in that it needs to consider the growth rate of the company.

$$K_c = \frac{d_c}{P_c(1-f)} + G$$

Where K is the capital cost rate of common stock, D is the total amount of the first year's dividend of common stock, P is the total amount of common stock, f is the financing rate, and G is the expected annual growth rate of common stock dividend.

5. Cost of retained earnings

Retained earnings are equivalent to shareholders' additional investment in the enterprise. On the surface, retained earnings do not cost. However, shareholders are willing to keep earnings in the company with a view to the common stock compensation they can obtain in the future. Therefore, retained earnings is a typical opportunity cost. The Capital Asset Pricing Model (CAPM) can be used to calculate the cost of retained earnings [10,11,12]. The mode of CAPM shows：

$$E(R_i) = R_f + \beta * (R_m - R_f)$$

Where E (Ri) is the expected return on investment of stock i, Ri is the risk free rate of return; Rm is the expected return rate on market portfolio which refers to the portfolio composed of all risk assets; as for the β coefficient, which represents the systematic risk, is also the covariance between the stock i and the market portfolio return.

In addition, there are many channels and ways of raising funds for an investment project of an enterprise, and different sources of funds have different capital costs. According to the famous MM theorem [13], under the condition of MM, the weighted average cost of capital of an enterprise has nothing to do with its capital structure. From the perspective of no arbitrage equilibrium, the weighted average cost of capital (WACC) of an enterprise can be expressed as follows:

$$K_w = \sum(W_i K_i)$$

Among them is the weighted average capital cost, the i-th source of capital accounts for the proportion of all funds, and the i-th source of capital cost rate.

When investors make investment decisions, the information of financial statement is the most important factor to be considered, such as debt service level, profitability, operation status, cash flow level, development potential and innovation ability. Good financial ratio can attract more investors and increase the liquidity of stocks (Tong and Wei, 2021). In order to increase the feasibility of fund-raising or the private interests of senior management, enterprises are likely to carry out earnings management, but virtually, enterprises have to pay more costs. According to the related studies of Chinese and foreign scholars, Tao [14] found that the higher the level of accrual earnings management, the higher the capital cost. Huang et al. [15] theoretically analyzed and empirically probed the role of institutional investors in corporate governance and capital market from the perspective of the impact of institutional ownership on earnings quality and debt capital cost. The results show that institutional ownership has a significant impact on the debt capital cost. However, different types of institutional ownership have significant differences on the debt capital cost. In the impact of institutional ownership on the debt cost capital, earnings quality plays a mediator; Institutional investors such as investment funds, insurance companies and social security funds can improve earnings quality, reduce the cost of debt capital and enhance company value, while institutional investors such as securities companies and trusts have adverse effects on the cost of debt capital. The study of Houqe et al. [16] indicated that companies employing a high-quality auditor have a lower degree of earnings management and lower cost of equity capital. Knipp and Zimmermann [17] studied the relationship between earnings quality and capital

cost of German listed companies since 1995, and found that the capital cost of companies with high earnings quality, i.e. low earnings management level, is significantly lower than that of companies with low earnings quality, i.e. high earnings management level. Mao and Deng [18] analyzed the relevant industry data from 2009 to 2010. Because of the asymmetric information acquisition of enterprise management and investors, they brought incorrect information to investors, resulting in investors' investment judgment errors, indicating that there is a positive correlation between capital cost and earnings management. Wang and Lan [19] explored and developed the data. Under the background of China's mixed ownership reform, with the increase of the shareholding ratio of private shareholders, the enterprise's own equity capital will rise, and the cost of debt capital will fall. Finally, the weighted average cost of capital of the enterprise itself will also have an upward trend. Moreover, because the degree of earnings management affects the change of the cost of equity capital; the cost of equity capital affects the change of the weighted average cost of capital.

Based on the conclusion of the above literature, this paper sets the hypothesis as follows: with the increase of earnings management, the cost of capital will also rise.

2. METHODS

This study explores the impact of earnings quality on the capital cost through empirical method. The following is a detailed description of the research design.

1. Sample selection and period: A-share listed companies in Shanghai and Shenzhen stock exchanges from 2015 to 2019.
2. Sample source: all the resources of capital cost and financial figures are from WIND database and CSMAR database.
3. Sample processing: after downloaded all the samples, deleted the samples with incomplete data first, then eliminated the outliers. Finally, obtained totally of 10,697 samples.
4. Research methods：This study uses regression analysis to carry out empirical research. Considering different capital costs degree under different operation conditions, therefore, besides ordinary least squares method, we use quantile

regression to assist to analyze more deeply. The regression model is as follows：

$$CAPM_{it} = \alpha_0 + \alpha_1 EM_{it} + \alpha_2 IND_{it} + \alpha_3 SCALE_{it} + \alpha_4 AGE_{it} + \alpha_5 ROA\alpha_7 + \alpha_6 LIAB_{it} + \alpha_7 GROWTH_{it} + \alpha_8 STATE_{it} + \varepsilon_{it} \dots (1)$$

2.1 Variable Description

1. The explained variable is capital cost rate (CAPM)：Since the research samples of this study is the public companies, so the CAPM model (Sharpe,1964; Ross,1976; Fama and French,1996) is the most suitable method to calculate capital cost.
2. Explanatory variable: since the earnings management leads to the earnings quality, hence, this study takes the real earnings management index (EM) as the proxy variable of the explanatory variable. The data source is the CSMR database, and its calculation method is by the modified Jones model [8].

2.2 Control Variables

(1) Industry (IND): referring to the research of Zhuang et al. (2006), because the industrial characteristics of electronic industry and non-electronic industry are quite different, this study sets this variable as a dummy variable, if the sample company is electronic industry, it is set as "1", if it is not electronic industry, it sets as "0".
(2) Company Scale (SCALE): the larger the size of the company, the higher the expected return rate of investors. In this study, the total assets as a substitute variable for the size of the company. In order to minimize the absolute value of the sample data and not affect the relative relationship between the samples, this study uses the natural logarithm of the total assets at the end of the period to measure. [20]
(3) The age of the samples company (AGE): Coad, Segarra and Teruel [21] indicate that the age of a company implies the life cycle of the company, the performance of the company and the expected rate of return for investors to the company. This study takes the number of years from the year of establishment of the company to each research period.
(4) Return on total assets (ROA): the higher the return on total assets of the company,

the better the efficiency of asset utilization, which will also lead to the increase of the expected return of investors.

(5) The ratio of debt on total assets (LIAB): based on Margaritis and Psillaki [20], companies with higher debt ratio are more likely to face default risk in the future, resulting in failure to repay debts. If the debt ratio is too high, it will affect the use of enterprise funds, and then affect the profitability of enterprises.

(6) Growth rate of operating revenue (GROWTH): according to the study of Maury and Pajuste [22], the higher the growth rate of the company's operating revenue, the better the performance may be, and the expected return rate of investors to the company will increase along with the trend.

(7) The nature of the company's equity (STATE)：Zhou and Hu [23] and Xu [24] both point out the uniqueness of China's stock market. Because the largest shareholder of most listed companies is the government, the companies controlled by the government or not will have different effects on the company's operating performance. We set this as a dummy variable. When the ownership of the enterprise is a state-owned enterprise, its value is "1", otherwise, it is "0".

3. RESULTS AND DISCUSSION

In the descriptive statistics of each variables in Table 1, many variables are widely distributed, such as the number of AGE, ROA and LIAB etc., indicating that the operating environment exit a big gap among all the sample companies. Moreover, we can see many variables are not in a normal distribution, such as EM coefficient, IND, GROWTH and STATE etc., therefore, for keep the samples as complete as possible, we take the Winsorize method to delete the extreme value should be proper. Moreover, this study uses quantile regression to conduct the empirical research, the results should have more practical application value.

Next, we have to make a preliminary judgment on the rationality of the regression model design by reviewing some necessary index in ordinary least square method, the Table 2 shows the empirical results of the least square method.

Table 1. Descriptive statistics of variables (n = 10 697)

Var.	Min.	Max.	Ave.	Std.
CAPM	-0.38	0.44	0.05	0.24
EM	0.00	0.78	0.14	0.14
IND	0.00	1.00	0.12	0.33
SCALE	19.92	26.43	22.59	1.31
AGE	8.26	33.33	19.84	5.32
ROA	-26.05	20.62	3.36	6.40
LIAB	0.07	0.93	0.46	0.20
GROWTH	-0.60	2.04	0.13	0.35
STATE	0.00	1.00	0.19	0.39

Note：Please refer to the Variable description in 3. Method

Table 2. Empirical results of ordinary least square method (n = 10 697)

Var.	Coef.	t value	p value	Collinearity
Con_	0.15	3.35	0.00 ***	
EM	0.03	1.98	0.05 **	1.06
IND	0.01	1.13	0.26	1.02
SCALE	0.00	-2.18	0.03 **	1.48
AGE	0.00	-0.26	0.79	1.03
ROA	0.00	-0.05	0.96	1.37
LIAB	0.03	1.70	0.09 *	1.66
GROWTH	-0.05	-7.86	0.00 ***	1.09
STATE	-0.01	-2.01	0.04 **	1.05
F value	10.226	p value	0.000***	

*Note 1: the definition of variables please see table 1, Note 2: P < = 0.01 is * *, 0.01 < p < = 0.05 is * *, 0.05 < p < = 0.1 is **

Table 2 shows the empirical results of the regression model with the ordinary least square method. First, we judge whether the variables in the model have obvious homogeneity. Collinearity is the standard to judge whether the variables have homogeneity. In most literature, if collinearity is higher than 10, it means that a variable has obvious homogeneity with other variables. Some literature also set the upper limit as 5,However, table 2 shows that the collinearity of all variables in the regression equation is less than 2, so it can be determined that the variables selected in the regression model have no significant homogeneity.

Then we see the F value. The value represents the significance of testing the variance difference among the groups of variables. The F value significantly represents the obvious difference among the variables, that is, this regression model has enough predictive ability. The F value in Table 2 is 10.226, and the result is significant. In conclusion, the design of regression model is reasonable.

Finally, we compared and analyzed the empirical results of the ordinary least square method and quantile regression. in quantile regression, we divides the explanatory variable capital cost (CAPM) into 5%, 25%, 50%, 75% and 95% as the degree on extremely low, low, medium, high and extremely high. The empirical results show as Table 3.

Table 3 is the empirical results of the ordinary least square and quantile regression, we implement the cross comparison and analysis for these results. The empirical results show that, from the perspective of the whole sample, the higher the degree of earnings management, the higher the cost of capital. The capital cost is the expected return rate for investors. The earnings

management behavior of public companies usually through making the fraud financial statements and manipulating the stock price. It is reasonable that there is a positive correlation between the degree of earnings management and the capital cost.

However, if we further look at the results of quantile regression, the two levels of extremely low and low capital cost have a positive and significant impact, but there is no significant impact at the middle and high level, and then it becomes a negative and significant impact at 95% of the extremely high level. This change shows that the companies with lower capital cost are usually those with less expected return on stock investment, There are usually two types of such companies, one is more conservative and the profit is more stable, the other is the expected profit is poor, it is difficult to raise the stock price. At this time, if the company carries out earnings management, it is more effective to increase the expected return of the stock, but if the company wants to raise the capital cost, it will have more responsibility for the investors' expected return on investment in the future. The empirical results show that the capital cost is in the middle and high-level companies, earnings management has no significant impact on the cost of capital, and such companies usually have higher expected return on investment due to better business prospects, so the impact of earnings management on the capital cost is not so important. Finally, we can see that the relationship between the degree of earnings management and the capital cost is opposite when the cost of capital is at a very high level. This shows that companies may expect to reduce the cost of capital through earnings management in order to take into account the expectations of investors and their own operating conditions when the capital cost is very high.

Table 3. The empirical results of quantile regression and ordinary least squares (n = 10 697)

Var.	5%	25%	50%	75%	95%	OLS
Con_	-0.38***	-0.22***	0.30***	0.38***	0.40***	0.15***
EM	0.03**	0.03**	0.01	-0.01	-0.03**	0.03**
IND	-0.04***	-0.02***	0.01	0.04***	0.06***	0.01
SCALE	0.00*	0.00*	-0.01***	-0.01***	0.00*	0.00**
AGE	0.00***	0.00***	0.00	0.00***	0.00***	0.00
ROA	0.00	0.00**	0.00	0.00***	0.00***	0.00
LIAB	0.00	0.01	0.04**	0.02**	-0.01	0.03*
GROWTH	0.01	-0.01	-0.04***	-0.07***	-0.02***	-0.05***
STATE	0.01	0.00	-0.01	-0.01***	-0.02***	-0.01**

*Notes1: the definition of variables please see table 1; Note 2: P < = 0.01 is * *, 0.01 < p < = 0.05 is * *, 0.05 < p < = 0.1 is *.*

4. CONCLUSION

Based on the samples of listed companies in China from 2015 to 2019, this study adopted an empirical approach to probe the relationship between earnings quality and capital cost. Considering the large number of sample companies, there are great differences in operating conditions, profitability, development stages and so on. In order to increase the practical value of the research findings, we takes the quantile regression method, It is expected that the research findings can be more in line with the actual situation of different types of companies, and provide regulators with more in-depth reference information on the actual situation. We expect that the research findings of this study can provide a valuable reference basis for enterprises, regulators of listed companies and investors. The empirical results indicate that the higher the degree of earnings management, the higher the cost of capital, especially for the companies with low capital cost; however, for the company with extremely high capital cost, the relationship between the degree of earnings management and capital cost is negative.

Since there are few literatures on earnings, quality and capital cost in China, and most are based on the least square method. Based on this, the paper makes up for this shortcoming by taking quantile regression to increase the practical value, and finds out the impact of earnings quality on companies of different cost of capital levels after in-depth discussion. Therefore, the suggestions put forward will be more practical. Based on the above results, we put forward some suggestions. First, for enterprises, the earnings management behavior exists for a long time in practice. However, the higher the capital cost of the company, the higher the expected return of investors to the company, and the greater the responsibility of the company. Yet, sometimes beyond the real ability of the company, it will affect the normal operation, focus on short-term interests and hurt long-term development; therefore, focusing on our own business and pragmatic management is the way to long-term development of enterprises. Second, for the regulators of listed companies, according to the empirical results, the companies with very high capital cost prefer manipulate earnings to reduce the capital cost, however, invest such companies is the most risky. Therefore, the regulators should pay more attention to such companies; moreover, relevant accounting standards should also be revised more strictly.

Finally, for investors, the company's information may not disclose the full information to the public. Therefore, investors must collect information from various sources after choosing the investment target, besides the financial statements, we should also know the company's major news immediately to prevent the company from manipulating the financial statements by means of earnings management and misleading investors' investment decisions.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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