



Research on the Impact of R&D Expenditure Reduction on Corporate Performance Under the Real Earnings Management Motivation

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Abstract. In order to maximize the benefits, listed companies will carry out enterprise management through more hidden real earnings management methods, and reducing R&D expenditure is an important method of real earnings management. In this paper, the listed companies on China's Gem Market from 2016 to 2020 are selected as a research sample, and the regression analysis of the measurement model is carried out by using Stata. It examined the impact of reduced R&D investment on the company's future operating performance under the background of real earnings management motivation, and further analysed the relationship between real earnings management behaviour and company performance in different enterprise life cycles. The study found that the reduction of R&D expenditure by listed companies for the real earnings management motive will have a negative impact on the company's future operating performance as a whole. And it has a significant negative impact on companies in the growth and recession periods, while for mature companies, there is a non-significant positive impact. This provides a reference for corporate management of companies at different stages.

Keywords: Real Earnings Management · R&D Expenditures · Company Performance · Enterprise Life Cycle

1 Introduction

In order to maximize their own interests or utility, listed companies often use some accounting methods to manipulate the company's earnings, which is called earnings management. Earnings management includes accrued earnings management and real earnings management. Accrued earnings management is a means of earnings manipulation to cover up the real operation of enterprises by purposeful selection of accounting standards policies. This manipulation mode only involves the adjustment of accounting accounts and does not affect cash flow. Real earnings management was first proposed by Schipper, which refers to the behavior of using the real activities of the enterprise to manipulate the reported earnings to change. Different from accrued earnings management, this mode is mainly adjusted from the level of business activities such as sales, production and discretionary expenses, among which the manipulation of discretionary

expenses is mainly manifested in the reduction of R&D expenditures, sales expenses and administrative expenses.

In recent years, with the improvement of external audit quality, accrued earnings management of listed companies is significantly inhibited. Due to the implementation of real earnings management behavior is based on the real economic business activities, so that it has more concealment. Therefore, companies are more inclined to use Real activities manipulate profits, and real earnings management is gaining more and more attention.

At present, domestic researches on real earnings management mainly focus on the relationship between accrued earnings management and real earnings management, the relationship between corporate governance and real earnings management, and the economic consequences of real earnings management. In the research on its economic consequences, most scholars give the comprehensive impact of real earnings management on corporate performance, without separately examining the economic consequences caused by certain manipulative behaviors. Although The study of Zhu Hongjun et al. (2016) [33] separately investigated the consequences of earnings management by companies manipulating R&D investment decisions, it did not take into account the differences in earnings management levels and consequences at different stages of enterprise development.

Based on this, this paper uses the data of listed companies on Growth Enterprise Market (GEM) in China from 2016 to 2020 to investigate the impact of cutting R&D expenditure for the purpose of real earnings management on the company's future performance under different life cycles. First, through empirical tests, it provides evidence of the economic consequences of abnormal reduction of R&D expenditure by GEM listed companies, which further confirms that the research conclusions of Zhu Hongjun et al. are also applicable to GEM; Second, we combine the R&D expenditure decision under real earnings management with the enterprise life cycle, and examine the different economic results of manipulating R&D investment in different stages of earnings management from a dynamic perspective.

2 Literature Review

2.1 Real Earnings Management and Company Performance

Existing studies show that real earnings management exists in the normal operation of a company. Due to the higher regulatory requirements on profitability of listed companies in China, listed companies have a strong motivation to conduct earnings management to avoid losses or profit decline. He Ku (2012) [7] found that Chinese listed companies were motivated to avoid high-quality external audit by using real earnings management. When the company passes equity incentive plan, its executives have stronger motivation to conduct earnings management in pursuit of profit maximization [31]. And equity incentive intensity is positively correlated with real earnings management [17, 27]. Wang Tingting and Li Hemei (2018) believe that management incentive can inhibit the real earnings management of a company to a certain extent, and the inhibition degree varies in different life cycles. Xu Lili and Wang Xuan (2019) [28] found that China's GEM listed companies implemented real earnings management before and after IPO, and

such behavior had a serious negative impact on the performance after IPO. Li Xiaodong, Zhang Keyu and Wang Jinchao (2020) [13] draw the conclusion through empirical research that the major shareholder's equity pledge promoted real earnings management under the partial intermediary role of internal control.

In terms of the economic consequences of real earnings management, Du Yingjie and Shi Tianyu (2017) [4] believe that “dying” enterprises avoid delisting through real earnings management behavior, but such behavior will lead to “wearing caps and stars” again in the next three years and damage the long-term performance of enterprises. Ma Guangqi and Han Yang (2017) [18] found that real earnings management would significantly reduce the future financial performance and market performance of enterprises. Yang Caihong (2018) [29] believes that earnings management has different impacts on financial performance of enterprises in different life cycles. Du Jianju, Sun Jing and Qiao Lei (2019) [3] believe that real earnings management affects the long-term development of enterprises and is also not conducive to the healthy development of the securities market. Chen Li and Wang Hongwei (2021) [1] found that the larger the scale of the enterprise, the less damaging effect of real earnings management on enterprise value.

2.2 R&D Expenditure and Company Performance

He Yanan, Yuan Chunsheng and Feng Xiaoyun (2020) [8] found that R&D reduction under the motivation of real earnings management would lead to lower innovation output, innovation quality and innovation efficiency. R&D investment determines the level of enterprise innovation, and the level of innovation has an impact on enterprise economic performance [15]. Tian Yuexin and Feng Qinghua (2016) [22] studied the data of biomedical industry and found that R&D expenditure has a significant positive impact on the improvement of enterprise value. By studying high-tech enterprises, Li Sihai and Zou Ping (2016) [12] found that when R&D expenditure increases, enterprise performance will significantly increase, but when R&D expenditure decreases, enterprise performance will not significantly decline, that is, there is a stickiness characteristic. MAO Jianfeng and Li Zhixiong (2016) [19] concluded through empirical test that management equity incentive would strengthen the positive correlation between R&D expenditure and corporate performance. In addition, Liang Laixin et al. (2010) [14] found that R&D investment has different effects on enterprise performance in different life cycle stages.

2.3 Enterprise Life Cycle and Real Earnings Management

Hou Xiaohong and Ma Ke (2017) [9] research enterprise in different life cycle phase to meet the threshold “surplus” the difference between earnings management way. They found that in order to meet the “earnings threshold”, enterprises in the recession will only choose accrued earnings management way, and at the same time in the mature period will choose two methods of accrued earnings management and real earnings management. According to Wang Tingting and Li Hemei (2018) [25], enterprises have the highest degree of real earnings management in the growth stage. Yang Yifei (2019) [30] believes that the degree of real earnings management of enterprises in the declining stage is significantly higher than that of enterprises in the mature stage and enterprises in the growing stage. And that there is a complementary relationship between the two

earnings management modes in different life cycles, but the degree of complementary relationship is greater in enterprises in the growing stage and enterprises in the declining stage. Wang Yun et al. (2016) [26] believe that the debt level in the growth stage and recession stage is higher than that in the mature stage, and the debt level can significantly positively affect earnings management.

3 Theoretical Analysis and Research Hypothesis

This paper mainly studies the impact of cutting R&D expenditure on the company's future performance under the motivation of real earnings management. In theory, it can be considered from the following two aspects:

On the one hand, based on the principal-agent theory, the conflict of interests between the principal and the trustee makes the management have the motivation to manipulate earnings to maximize their own interests, while the information asymmetry makes the real earnings management behavior lack the internal control of the enterprise. Ni Min and Huang Shizhong (2014) [20] proposed that real earnings management beyond the scope permitted by the contract has an opportunism tendency and distorts accounting information. In this way, the management's manipulation of R&D expenses for earnings management may be motivated by opportunism, that is, to maximize their own interests. This behavior will mislead the decision-making of stakeholders, thereby causing damage to the company's performance.

On the other hand, innovation is the source of enterprise competitiveness. Technological innovation comes from the stable R&D investment support of enterprises. Sufficient funds ensure that enterprises continuously develop new technologies and new products, and gradually acquire core competitiveness, so as not to be eliminated in the competition [11]. Lu Juli (2006) [16] showed through research that R&D expenditure of listed companies can improve enterprise value. Dai Xia (2016) [2] and He Yanan (2020) [8] believe that R&D expenditure is the cost voluntarily paid at present by a company committed to long-term future development in order to truly improve the company value and market value. Cutting spending on R&D reduces the company's innovation edge to some extent, which will hurt the company's future profitability and competitiveness. The greater the intensity of upward real earnings management by managers artificially cutting R&D expenditure, the worse the earnings persistence [5].

Based on the above analysis, the first hypothesis of this paper is proposed:

H1: The reduction of R&D expenditure for real earnings management motivation of listed companies will have a negative impact on the company's future business performance.

Based on the life cycle theory, the real earnings management behavior, R&D investment decision and its consequences will be different with the different life cycle. In the growth stage of the enterprise, its main goal is to obtain the core competitiveness, for the largest market share. Enterprises in the growth stage do not have scale effect and stable profit level, and can only gain market share from competitors by improving research and development ability. Li Bin and Zhang Junrui (2010) [10] believe that the reduction of R&D expenses may make the company unable to cope with the market expansion of competitors. In the recession period, enterprises are faced with a crisis of survival.

If they want to find new profit growth points, they need to invest a lot in R&D [32]. However, managers at this stage are often unwilling to accept risky R&D projects, and their decisions are strongly motivated by self-interest.

Based on the above analysis, the second hypothesis of this paper is proposed:

H2: The reduction of R&D expenditure by listed companies due to the motivation of real earnings management has a significant negative effect on the company’s operating performance in both growth and recession periods.

After the mature period, the enterprise enters the stage of steady development. After growth of research and development experience, the product market has become increasingly familiar [23], In the mature period the company’s technology is relatively mature, the demand for technological innovation is reduced, and the resource investment has been maximized and maintained relatively stable. At this time to reduce costs to improve the level of corporate profits [21].

In this regard, the third hypothesis of this paper is proposed:

H3: The reduction of R&D expenditure by listed companies motivated by real earnings management may have a positive effect on the business performance of mature companies.

4 Research Design

4.1 Samples and Data

This paper takes all listed companies on the GEM in Shanghai and Shenzhen as research samples, selects relevant data from 2016 to 2020, and 4320 initial samples are obtained. The sample data were screened according to the following criteria:(1) Eliminate all newly listed companies during the 2019–2020 annual period; (2) Eliminate financial companies with special qualities; (3) Eliminate all ST, *ST companies; (4) Eliminate the companies with missing necessary sample data. After processing, 1896 research samples were finally obtained.

The data in this paper are all from CSMAR database, and some variable data are calculated manually by Excel. Stata software is the main measurement tool used for data analysis.

4.2 Variable Selection

4.2.1 Abnormal R&D Expenditure

This paper uses Gunny’s (2010) [6] measurement method for reference and uses the following measurement model to estimate abnormal R&D expenditure of listed companies:

$$\frac{RD_{i,t}}{TA_{i,t-1}} = \beta_0 + \beta_1 \frac{1}{TA_{i,t-1}} + \beta_2 MV_{i,t} + \beta_3 Q_{i,t} + \beta_4 \frac{INT_{i,t}}{TA_{i,t-1}} + \beta_5 \frac{RD_{i,t-1}}{TA_{i,t-1}} + \varepsilon_{i,t}$$

$$Normal_RD_{i,t} = \hat{\beta}_0 + \hat{\beta}_1 \frac{1}{TA_{i,t-1}} + \hat{\beta}_2 MV_{i,t} + \hat{\beta}_3 Q_{i,t} + \hat{\beta}_4 \frac{INT_{i,t}}{TA_{i,t-1}} + \hat{\beta}_5 \frac{RD_{i,t-1}}{TA_{i,t-1}}$$

$$Abnormal_RD_{i,t} = \frac{RD_{i,t}}{TA_{i,t-1}} - Normal_RD_{i,t}$$

Among them, $RD_{i,t}$ is the actual R&D investment amount of the company in that year; $MV_{i,t}$ is the total market value of the company at the end of the current year; $Q_{i,t}$ is tobin's Q value at the end of the period; $INT_{i,t}$ is the operating profit of the company in the current year before deducting depreciation and amortization expense; TA represents the company's total assets at the end of the period; $Normal_RD_{i,t}$ is the estimated normal R&D expenditure; $Abnormal_RD_{i,t}$ reflects the abnormal R&D expenditure of the company.

Based on the above model, the abnormal reduction in R&D expenditure is assumed to be that which the company reduces for earnings management, and defines a virtual variable $Reduce_RD_{i,t}$. $Abnormal_RD_{i,t}$ value is less than 0, that is, when the company is in the real management motivation to reduce R&D expenditure in the current year, the $Reduce_RD_{i,t}$ value is 1, otherwise, the $Reduce_RD_{i,t}$ value is 0.

4.2.2 Company Performance

Referring to the practice of Gunny (2010) [6] and Zhu Hongjun (2016) [33] et al., ROA of the future period of total return on assets is selected to measure the company's future business performance. The original ROA and the industry-adjusted ROA (AdjROA) are used as explained variables in regression. AdjROA is the difference between a company-specific ROA and the median ROA of the company's industry in the same year. The adjusted value reflects the excess return earned by the company in its industry.

4.2.3 Enterprise Life Cycle

In this paper, the enterprise life cycle is divided into start-up period, growth period, maturity period and recession period. Since listed companies have all gone through the start-up period, this paper only considers the growth period, maturity period and recession period. Based on the measurement method of Victoria Dickinson [24], this paper uses the cash flow portfolio division method to divide enterprise life cycle, that is, according to the different combinations of the three indicators of net cash flow of operating activities (CFO), net cash flow of investment activities (CFI) and net cash flow of financing activities (CFF). This classification is based on the fact that these three indicators can reflect the business activities, investment activities and financing activities of enterprises, which are the source of enterprise value creation and related to the future development trend of enterprises. In this paper, the maturity period is taken as the base period, and two virtual variables are established, respectively:

Growth: indicates the Growth period. The value is 1 when the company is in the Growth period and 0 for the rest.

Recession: indicates recession period, which is 1 when the company is in Recession and 0 for the rest.

If the values of Growth and Recession are 0, it indicates the maturity period (Table 1).

Table 1. Basis for the division of cash flow portfolio method

| Enterprise life cycle | Operating cash flow | Investment cash flow | Funding cash flow |
|-----------------------|---------------------|----------------------|-------------------|
| Growth period | - | - | + |
| | + | - | + |
| Maturity period | + | - | - |
| Recession period | - | - | - |
| | + | + | + |
| | + | + | - |
| | - | + | + |
| | - | + | - |

Note: “+” indicates that the end-of-period cash flow value is greater than 0; “-” indicates that the end-of-period cash flow value is less than or equal to 0.

4.2.4 Control Variables

Referring to existing studies, this paper selects two types of control variables, corporate characteristic factors and corporate governance structure, when conducting multiple regression. Among them, the corporate governance structure chooses ownership concentration (OWC), represented by the shareholding ratio of the largest shareholder. The company characteristic factor selects. The company size (Size), represented by the total assets at the end of the period. Financial leverage (LEV) is expressed by asset-liability ratio, that is, the ratio of total liabilities to total assets at the end of the period; Company growth (MTB) is the ratio of the company’s total market value to total assets at the end of the period; Operating cash flow (CFO) is net cash flow from operating activities.

4.3 Model Setting

This paper establishes the following model to test the hypothesis proposed above:

$$\begin{aligned}
 ROA_{i,t+1} (AdjROA_{i,t+1}) = & \alpha_0 + \alpha_1 Reduce_{RD,i,t} \\
 & + \alpha_2 Normal_{RD,i,t} + \alpha_3 CFO_{i,t} + \alpha_4 LEV_{i,t} + \alpha_5 Size_{i,t} \\
 & + \alpha_4 LEV_{i,t} + \alpha_5 Size_{i,t} + \alpha_6 OWC_{i,t} + \alpha_7 MTB_{i,t} \\
 & + \gamma + \varepsilon_{i,t}
 \end{aligned} \tag{1}$$

5 Empirical Results

5.1 Descriptive Statistics

Table 2 shows the descriptive statistical analysis results of the main variables in this paper. It can be seen from the data in the table that the maximum value of abnormal R&D expenditure (*Abnormal_RD*) was 0.814, the minimum value was -0.194, and the average value was 0. The maximum value of R&D expenditure reduction (*Reduce_RD*)

Table 2. Descriptive statistics of main variables

| variable | average value | standard deviation | minimum | maximum | Number of samples |
|-------------|---------------|--------------------|---------|---------|-------------------|
| Abnormal_RD | 0 | 0.052 | -0.194 | 0.814 | 1573 |
| Reduce_RD | 0.532 | 0.499 | 0 | 1 | 1896 |
| Normal_RD | 0.044 | 0.041 | -0.070 | 0.584 | 1575 |
| ROA | 0.031 | 0.101 | -0.690 | 0.466 | 1896 |
| OWC | 73.70 | 27.29 | 12.50 | 100 | 1894 |
| Growth | 0.511 | 0.500 | 0 | 1 | 1896 |
| Recession | 0.206 | 0.404 | 0 | 1 | 1896 |

motivated by earnings management was 1, the minimum value was 0, and the average value was 0.532. It indicates that a small number of GEM listed companies actually reduce R&D expenses for earnings management.

The maximum value of return on total assets (ROA) was 0.466, the minimum value was -0.690, the mean value was 0.0310, and the standard deviation was 0.101. It shows that the overall profitability of listed companies is good, but there are great differences among companies. The average shareholding ratio of the largest shareholder is 73.70%, indicating that the shareholding ratio of listed companies is relatively concentrated.

The average values of Growth and Recession companies are 0.511 and 0.206 respectively, indicating that most of the sample companies are in the Growth or Maturity period. And there are more companies in the Growth stage than the Maturity period, while a few companies are in the Recession period. This is consistent with the actual situation in China, most of the listed companies are young.

5.2 Correlation Test of Variables

According to the correlation analysis results of main variables (as shown in Table 3), the correlation coefficient between *Reduce_RD* and ROA is -0.108, which can preliminarily determine that the reduction of abnormal R&D expenditure will lead to the decline of enterprise business performance. As for the influence of control variables on explained variables, it can be seen from the results that there is a certain correlation between control variables and explained variables, indicating that control variables can affect the business performance of enterprises to a certain extent. The absolute value of the correlation coefficient between the control variable and the main explanatory variable is 0.410, which is relatively large. The absolute value of the correlation coefficient between the other variables is less than 0.4. In general, the correlation coefficients of all variables in the model are below 0.5, and there is no multicollinearity problem in the model.

Table 3. Variable correlation test

| | ROA | Reduce_RD | Size | MTB | LEV | CFO | OWC |
|-----------|---------|-----------|---------|---------|---------|---------|-----|
| ROA | 1 | | | | | | |
| Reduce_RD | -0.108 | 1 | | | | | |
| Size | -0.0269 | -0.0634 | 1 | | | | |
| MTB | 0.190 | -0.154 | -0.374 | 1 | | | |
| LEV | -0.300 | 0.0054 | 0.410 | -0.269 | 1 | | |
| CFO | 0.109 | 0.0256 | 0.151 | 0.0802 | -0.0347 | 1 | |
| OWC | -0.0169 | 0.0308 | -0.0399 | -0.0139 | 0.0142 | -0.0266 | 1 |

Table 4. Real earnings management and company performance

| | (1) | (2) | (3) | (4) |
|-------------------|------------------------|-------------------------|------------------------|-------------------------|
| | ROA _{t+1} | ROA _{t+1} | adjROA _{t+1} | adjROA _{t+1} |
| Reduce_RD | -0.0112 * (0.0062) | -0.0123 ** (0.0059) | -0.0139 ** (0.0057) | -0.0150 *** (0.0056) |
| Normal_RD | | 0.4162 *** (0.0831) | | 0.4325 *** (0.0851) |
| CFO | | 0.0000* (0.0000) | | 0.0000 (0.0000) |
| LEV | | -0.1712 *** (0.0269) | | -0.1368 *** (0.0219) |
| Size | | 0.0013 (0.0065) | | -0.0023 (0.0063) |
| MTB | | 0.0044 *** (0.0012) | | 0.0040 *** (0.0012) |
| OWC | | -0.0001 (0.0001) | | -0.0001 (0.0001) |
| Constant | 0.0410 *** (0.0081) | 0.0365 (0.1372) | -0.0000 (0.0077) | 0.0667 (0.1334) |
| Observations | 1,896 | 1,573 | 1,896 | 1,573 |
| R-squared | 0.0030 | 0.1507 | 0.0048 | 0.1339 |
| Number of symbols | 316 | 316 | 316 | 316 |

Note: The brackets are robust standard error, *** means significant at 0.01 level, ** means significant at 0.05 level, * means significant at 0.1 level.

5.3 Regression Analysis

This paper first empirically examines the impact of reducing R&D investment based on real earnings management motivation on the company's future business performance. Multiple regression results of model (1) are listed in Table 4.

As can be seen from columns (1) and (2) in Table 4, for ROA, the regression coefficient of Reduce_RD was significantly negative, which was consistent with the expectation of hypothesis 1. This reflects that the future operating performance of companies that reduce R&D expenditure for earnings management purposes is worse than that of companies that do not reduce R&D expenditure. Thus, confirming that real earnings management by reducing R&D expenditure does have a negative impact on the future performance of companies.

Furthermore, ROA was re-regressed after industry median adjustment, and the results were shown in column (3) and (4) of Table 4. As can be seen from the regression results, the regression coefficient of Reduce_RD was -0.0150 , which was significant at the level of 0.01. It was generally consistent with the results before adjustment, indicating that the regression results were robust, and further verifying the negative impact of reducing R&D investment for the real earnings management motivation on the company's performance.

Table 5. Multiple regression results under different life cycles

| | Growth period | | Recession period | | Maturity period | |
|-------------------|------------------------|------------------------|------------------------|------------------------|-----------------------|-----------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| | ROA _{t+1} | adjROA _{t+1} | ROA _{t+1} | adjROA _{t+1} | ROA _{t+1} | adjROA _{t+1} |
| Reduce_RD | -0.0131* (0.0079) | -0.0201*** (0.0068) | -0.0299* (0.0155) | -0.0259* (0.0153) | 0.0076 (0.0156) | 0.0148 (0.0161) |
| Normal_RD | 0.3361*** (0.1296) | 0.3237*** (0.1208) | 0.9692*** (0.3257) | 0.9448*** (0.3208) | 0.5138*** (0.1178) | 0.5821*** (0.1537) |
| CFO | -0.0000 (0.0000) | 0.0000 (0.0000) | 0.0000 (0.0000) | 0.0000 (0.0000) | 0.0000* (0.0000) | 0.0000* (0.0000) |
| LEV | -0.1691*** (0.0445) | -0.1158*** (0.0272) | -0.2185*** (0.0599) | -0.2090*** (0.0610) | -0.1163** (0.0550) | -0.0928 (0.0586) |
| Size | 0.0057 (0.0085) | 0.0010 (0.0068) | -0.0452* (0.0251) | -0.0447* (0.0252) | -0.0008 (0.0136) | -0.0022 (0.0136) |
| MTB | 0.0037** (0.0016) | 0.0038** (0.0015) | 0.0004 (0.0066) | 0.0001 (0.0066) | 0.0069** (0.0031) | 0.0062** (0.0030) |
| OWC | -0.0002 (0.0002) | -0.0001 (0.0002) | -0.0008 (0.0007) | -0.0007 (0.0007) | 0.0003 (0.0006) | 0.0002 (0.0006) |
| Constant | -0.0372 (0.1775) | 0.0080 (0.1462) | 1.1102** (0.5412) | 1.0446* (0.5453) | -0.0024 (0.2751) | -0.0160 (0.2746) |
| Observations | 812 | 812 | 320 | 320 | 441 | 441 |
| R-squared | 0.1324 | 0.1105 | 0.3060 | 0.2850 | 0.2229 | 0.2102 |
| Number of symbols | 301 | 301 | 199 | 199 | 246 | 246 |

Note: The brackets are robust standard error, *** means significant at 0.01 level, ** means significant at 0.05 level, * means significant at 0.1 level.

In addition, the time fixed effect and individual fixed effect were added into the model, which made the test of the model stricter. It may be the reason for the low goodness of fit R^2 .

Next, the samples were grouped according to the enterprise life cycle, and the samples in the growth period, maturity period and recession period were regressed according to model (1). The regression results are shown in Table 5.

It can be seen from the results in the table that the regression coefficients of Reduce_RD are significantly negative in both the growth and recession sample groups. It indicates that when the company is in the growth and recession period, real earnings management by reducing R&D expenditures will have a negative impact on the company. This verifies the rationality of the hypothesis 2. It can also be seen that the regression coefficient of Reduce_RD and ROA in the sample group at the maturity period is 0.0076, which is not significant. It indicates that when the company is in the maturity period, real earnings management can promote the development of the company to a certain extent. But the promotion effect is not significant, which verifies hypothesis 3.

Table 6. Robust test results

| | (1) | (2) | (3) | (4) |
|-------------------|-------------------------|------------------------|-------------------------|-------------------------|
| | EPS _{t+1} | EPS _{t+1} | adjEPS _{t+1} | adjEPS _{t+1} |
| Reduce_RD | -0.1217 *** (0.0343) | -0.0738 ** (0.0331) | -0.1056 *** (0.0311) | -0.0688 ** (0.0302) |
| Normal_RD | | 2.5557 *** (0.6505) | | 2.1565 *** (0.5575) |
| CFO | | 0.0000* (0.0000) | | 0.0000 (0.0000) |
| LEV | | -0.3736 ** (0.1512) | | -0.4604 *** (0.1311) |
| size | | 0.0279 (0.0443) | | 0.0362 (0.0371) |
| MTB | | 0.0224 *** (0.0073) | | 0.0197 *** (0.0071) |
| OWC | | -0.0014 (0.0013) | | -0.0017 (0.0013) |
| Constant | 0.3455 *** (0.0472) | -0.3348 (0.9536) | 0.0862 ** (0.0430) | -0.6489 (0.8095) |
| Observations | 1,896 | 1,573 | 1,896 | 1,573 |
| R-squared | 0.0097 | 0.0852 | 0.0089 | 0.0906 |
| Number of symbols | 316 | 316 | 316 | 316 |

Note: The brackets are robust standard error, *** means significant at 0.01 level, ** means significant at 0.05 level, * means significant at 0.1 level.

5.4 Robustness Test

In order to test the validity of the study and avoid the influence of different measurement methods of indicators, robust test was carried out in this paper. Use earnings per share (EPS) instead of return on Total assets (ROA) to measure a company's operating performance. After redefining variables in this way, regression is performed again, and the regression results are shown in Table 6. The results show that the regression coefficient of Reduce_RD on EPS under the new definition method is still negative and significant, that is, the real earnings management behavior of reducing R&D expenditure will have a negative impact on the company's future performance. It indicates that the main conclusion of this paper does not affect the variable definition standard and has good robustness.

6 Research Conclusions

This paper examines the important economic consequences of real earnings management by reducing R&D expenditure of listed companies. It is found that the real earnings management by cutting R&D expenditure has a negative impact on the company's future operating performance. In addition, starting from the life cycle of the enterprise, this paper studies the impact of real earnings management by cutting R&D expenditure on the future business performance of the company at different life cycles, and gives the corresponding empirical evidence. It is found that the reduction of R&D expenditure for real earnings management motivation of listed companies in growth and recession period will significantly reduce their future business performance, while the reduction of R&D expenditure in maturity period will promote the business performance of the company, but the promotion effect is not obvious.

The biggest revelation of this paper is that, unlike accrual earnings management, real earnings management is not simply change the surplus distribution companies, but through intervention company normal business decisions to achieve surplus control. This short-term behavior will change the company's future cash flow and affect the company's performance. At the same time, the impact will vary with the enterprise life cycle. There are also some limitations in this study. First of all, in the enterprise life cycle division method, this paper chooses the most commonly used cash flow symbol group method, but the enterprise life cycle is very complicated, adding other factors to improve the cash flow symbol method may be more realistic.

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