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Original Paper

Relationship between Real Earnings Management with Cost of Debt in Chinese Listed High-Tech Enterprises: The Perspective of Corporate Income Tax Incentives

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Abstract

To encourage corporate investment in innovation or R&D and foster innovative firms, the government of China established standards for the certification of high-tech enterprises in 2008. The business entities that fulfill these standards are entitled to tax deductions. One of the criteria is the ratio of R&D expenses to sales exceeding a specific percentage (which depends on the annual revenue) in the preceding 3 years. Moreover, this study examines data from the CSMAR database for the period 2008-2019 and includes data from 8,233 listed high-tech enterprises. The results show that if the proportion of pre-managed R&D expenses to pre-managed sales that are less than 6% (or 5%), 4%, or 3% in the past three years of firms with different sales range in the current year and managed earnings through sales or R&D expenses to fulfill the standards required for the certification positively influenced the costs of debt (non-significant).

Keywords

high-tech enterprises, income tax incentives, real activities earnings management, cost of debt

1. Introduction

In the knowledge economy era, R&D investment improves firms' core competitiveness and their ability to innovate. However, R&D projects provide only long-term and uncertain payoffs and are therefore subject to increase the lemons premium (Myers & Majluf, 1984). These projects also lack tangible assets that can be used as collateral (Bester, 1985). Therefore, outside investors are usually reluctant to provide financing to firms for R&D (Bhattacharya & Ritter, 1985). R&D investment may also be low because of financial constraints (Kasahara et al., 2014). Governments support private R&D investments

through R&D policies, which either directly allocate public R&D resources through grants or procurement (i.e., government R&D grants) or provide indirect support through tax incentives (i.e., tax deductions or credits).

China has transformed from the "world's factory"—a hub of low-cost manufacturing—into an innovation-oriented society through the government's support for firm investment in R&D activities. China has familiarized itself with the R&D support policies of more advanced countries. The government of China established standards for the certification of high-tech enterprises in 2008. Per corporate income tax law in China, high-tech enterprises have a tax rate of 15%, in contrast to the statutory tax rate of 25%. In China, firms must fulfill certain standards, established in 2008 by the Ministry of Science and Technology, the Ministry of Finance, and the State Administration of Taxation, to receive certification as a high-tech enterprise; the standards are as follows: (1) The enterprise must have obtained intellectual property (i.e., technology) for a product through transfer, purchase, independent R&D, or contribution in the past 3 years or must have obtained a franchise more than 5 years ago. (2) The technology or services of the enterprise's prominent products must be related to electronics and telecommunications, aircraft and spacecraft, materials, medicine and pharmaceuticals, energy, technology services, and advanced technology, or environmental protection. (3) The proportion of employees engaged in R&D activities or technology innovation must not be less than 10% in any year. (4) The proportion of R&D expenses to sales must not be less than 6% (or 5% (Note 1)), 4%, and 3% in the past 3 years if sales are below 50 million yuan, 50 and 200 million yuan, and more than 200 million yuan in the current year, respectively (each high-tech enterprise certification is valid for up to 3 years). Re-examination is conducted during each year of the certification period; if the proportion of R&D expenses to sales does not reach the specified level, no tax deduction is offered for that year. (5) The proportion of sales of advanced technology products or services should not be less than 60% in the current year. (6) The enterprise must have high innovation ability and must fulfill the related innovation criteria. Items 3, 5, and 6 are not marked for disclosure, making it difficult for outsiders to obtain these data.

Empirical studies have examined the effects of tax incentives on a firm's earnings management (Mulyadi & Anwar, 2015; Mulyadi et al., 2013; Kapoutsou et al., 2015; Maydew, 1997); therefore, tax expenses are also used to ensure that the earnings fulfill the earnings target (Hyun, 2016). Listed firms in China may attempt to fulfill the standards required to become certified as a high-tech enterprise in order to obtain tax benefits. One of the criteria is the ratio of R&D expenses to sales exceeding a specific percentage (which depends on the annual revenue) in the past 3 years. This ratio is likely a desired reference point for manipulating sales or R&D expenses to qualify as a high-tech enterprise and obtain tax incentives.

The objective of financial reporting is to provide financial information about the reported entity, which is useful for existing and potential lenders, and other creditors while making decisions about providing resources to the entity. These decisions include buying, selling, or holding debt instruments and

providing or settling loans and other forms of credit. Studies have noted that a firm's manipulated earnings can significantly affect their debt cost (Graham et al., 2005; Bharath et al., 2008; Crabtree et al., 2014; Ge & Kim, 2014; Lin & Shen, 2015; Demirtas & Cornaggia, 2013) because debt holders have set contractual claims, such as periodic interest payments. They tend to concentrate on future cash flows to guarantee the company's ability to pay debt interest and principal. This occurs because earnings management can have direct negative effects on the future level of net cash flows (Graham et al., 2005).

Firms in China can obtain tax benefits when they are recognized as high-tech enterprises. For example, one of the standards for the certification of a high-tech enterprise stipulate the proportion of R&D expenses to sales in the past 3 years. This paper examines whether managing earning by manipulating sales or R&D expenses in order to qualify for the aforementioned certification and thus receive the associated tax benefits has an effect on debt cost. Our study provides evidence that have conducted earnings management through increased R&D expense, both decreased sales and increased R&D expense, or both increased sales and R&D expenses to fulfill the standards required for certification in order to obtain tax benefits have increased debt costs.; however, this relationship is weak (non-significant).

The results show that manipulating sales or R&D expenses for the aforementioned purpose (i.e., the criteria established in 2008 that influence corporate income tax law in China as well as the standards for certification as a high-tech enterprise) has a positive influence on the cost of debt. These findings provide also evidence regarding how firms behave after manipulating the financial data to obtain tax credits and highlights the difference between genuinely innovating and manipulating firms. The remainder of the paper is organized as follows. Section 2 discusses the literature review. Section 3 describes the methodology. Section 3 explains the empirical results, and Section 5 offers a conclusion

2. Literature Review

2.1 Real Earnings Management

Real Earnings Management (REM) is a type of earnings management techniques. REM is viewed more negatively than is accruals-based earnings management (Roychowdhury, 2006; Cohen & Zarowin, 2010) because distorting cash flow through the manipulation of real operation manipulation (Kim & Sohn, 2013) causes increased noise or errors in earnings and reduces investor expectations for future cash flow levels (Graham et al., 2005; Roychowdhury, 2006; Cohen & Zarowin, 2010). Moreover, this approach deviates from optimal business operations, hides the firm's unmanaged earnings, and can be detrimental to its long-term profitability and competitive advantages (Cohen & Zarowin, 2010; Zang, 2012). REM is opaque to outside stakeholders (Graham et al., 2005; Zang, 2012) and internal monitors, such as the board and audit committee; therefore, REM is difficult to detect because it may not be reduced through good governance mechanisms and may make it difficult for external investors to evaluate firm performance (Kim & Sohn, 2013). These methods and estimations deviate from normal

cash flow from operations, production costs, discretionary expenditure (Roychowdhury, 2006; Gunny, 2010), R&D expenditure (Seybert, 2010), and sales manipulation (Ge & Kim, 2014; Stubben, 2010).

2.2 Tax, Real Earnings Management and Cost of Debt

The standards for the certification of a high-tech enterprise stipulate that the proportion of R&D expenses to sales is not below 6% (or 5%), 4%, or 3% in the prior 3 years for firms with sales below 50 million yuan, of 50–200 million yuan, or more than 200 million yuan in the current year, respectively. Listed firms in China may attempt to fulfill the standards required to become certified as a high-tech enterprise in order to obtain tax benefits. Hu et al. (2015) confirmed that tax is closely related to firms' earnings management activities.

Moreover, firms manipulate earnings by altering the timing and scale of operation decisions, such as those involving R&D expenditure (Seybert, 2010; Gunny, 2010) and sales manipulation (Ge & Kim, 2014; Stubben, 2010; Gunny, 2010). Tax-induced earnings management examines REM for tax purposes (Maydew, 1997); therefore, managers in listed firms in China may manipulate earnings to fulfill one of the aforementioned requirements to be recognized as a high-tech enterprise and obtain tax benefits; examples of manipulations include R&D expenses, sales, or both

Agency theory explains that principals and agents have different purposes; consequently, they have a conflict of interest. Meini and Siregar (2014) noted that managers have more information than external parties, such as creditors, and their information is faster and more detailed; thus, information asymmetry provides incentives to management to manipulate earnings to maximize their own welfare. Additionally, Ifada and Wulandari (2015) demonstrated that conflicts of interest between parties arise when a company demands a certain profit level.

If a firm in China wants to obtain private benefits (i.e., tax benefits) by being recognized as a high-tech enterprise through meeting one of the aforementioned ratios (i.e., manipulated earnings), then a certain profit target must be set; according to agency theory, this action may reflect a conflict of interest between the principal (i.e., creditors) and the agent (i.e., managers) because of information asymmetry. Manipulating earnings has also a significantly positive relationship with cost of debt because creditors negatively evaluate the use of earning management techniques and thus require an additional yield premium (Crabtree et al., 2014). Creditors should, therefore, evaluate the net benefits, and manipulation is not perceived favorably by the investors. Accordingly, we proposed the following hypothesis:

H1: Earnings management only through decreased sales to the proportion of pre-managed R&D expenses to managed sales above 6% (or 5%), 4%, and 3% in the previous three years for firms with different sales amounts that than in the current year has a positive relationship with debt costs.

H2: Earnings management only through increased R&D expense to the proportion of managed R&D expense to pre-managed sales above 6% (or 5%), 4%, 3% in the prior three years for firms with different sales amounts that than in the current year has a positive relationship with debt costs.

H3: Earnings management through both through decreased sales and increased R&D expenses; through

both of increase R&D expenses and sales; both of decrease sales and increase R&D expenses; both of decrease sales and decrease R&D expenses to the proportion of managed R&D expenses to manage sales above 6% (or 5%), 4%, or 3% in the prior 3 years for firms with different sales amounts that than in the current year has a positive relationship with debt costs.

3. Methodology

This study collected data from 2008 to 2019 from CSMAR database. All 2,107 listed high-tech enterprises are included, for a total of 8,233 samples. Firms whose annual reports include such statements as "certification (along with a specific certification number)" and "subject to 15% income tax" are recognized as high-tech enterprises. These listed high-tech enterprises in China are classified into the following sectors: electronics and telecommunications (22.35%), biotechnology and pharmaceuticals (16.02%), aircraft and spacecraft (1.55%), materials (20.05%), technology services (6.05%), energy (2.32%), resources and environmental protection (3.61%), and advanced technology (28.05%).

3.1 Dependent Variables: Cost of Debt (COD_{it+1})

Companies use various bonds, loans, and other forms of debt; so, the cost of debt is the return (often expressed as the rate of return) a firm theoretically pays creditors to compensate for the risk they undertake by investing their capital. This measure can allow investors to understand the risk level associated with investing in a company relative to investing in other companies because riskier companies generally have an increased cost of debt (i.e., when a creditor provide funds to a firm and this firm has worse financial situations, creditors may would like receive higher interest expense to return to compensate for the their invest risk, thus caused firm faced higher cost of debt). Bauwhede et al. (2015) measured debt cost as follows:

$$COD_{it+1} = \frac{IE_{it+1}}{DEBT_{it+1}} \quad \text{.....(1)}$$

$IE_{i,t+1}$ is interest expense of year t+1; $DEBT_{i,t+1}$ is the average debts for year t+1/

3.2 Independent Variables: Real Earnings Management

3.2.1 Sales Manipulation

To investigate firms engaging in sales manipulation, it is sufficient to measure abnormal levels of operating cash flows (Tabassum et al., 2015). To measure abnormal CFO level, the following model proposed by Dechow et al. (1998) is used. We estimate a version of the sales manipulation model as follow as

$$\frac{CFO_{i.t}}{TA_{i,t-1}} = \alpha_0 + \alpha_1 \frac{SALES_{i.t}}{TA_{i.t-1}} + \alpha_2 \frac{\Delta SALES_{i.t}}{TA_{i,t-1}} + \varepsilon_{i.t} \quad \text{.....(2)}$$

Where $CFO_{i.t}$ is the cash flow from operations for year *t*; $TA_{i,t-1}$ is the assets for year t-1; $SALES_{i.t}$ is

the sales for year *t*; $\Delta SALES_{i.t}$ is the change in sales for year *t*; Abnormal levels of operating cash flows (ε_{it}) are calculated as the difference between reported and expected operating cash flows, wherein the latter are estimated to use the coefficients from model (1). However, this model only reflects the proportion of ε_{it} to assets in year t-1; therefore, we use ε_{it} times assets in year t-1 to measure discretionary items correctly.In addition, if $\varepsilon_{i.t}$ form model (1) is positive indicating that enterprises have adopted abnormal levels of operating cash flows to earnings management to increase their adjusted income (i.e., increased sales) ; negative indicating that enterprises have adopted abnormal levels of operating cash flows to earnings management to decrease their adjusted income (i.e., decreased sales);

3.2.2 R&D Expenses Manipulation (Liu et al., 2014)

R&D expenses are calculated from financial statements; if these numbers are not present in financial reports, R&D expenditure is capitalized and R&D expenditure belonging to general and administrative expenses, such as R&D expenses or technological development expense minus development expenditure, are expensed. We estimate a version of the R&D expenses manipulation model as follow as

$$RD_{it} / TA_{it-1} = \alpha_0 + \alpha_1(1/TA_{it-1}) + \alpha_2(S_{it-1}/TA_{it-1}) + RDLIU_{it} \quad \text{.....(3)}$$

where RD_{it} is the R&D expenditure of year t; TA_{it-1} are the assets for year t-1; S_{it-1} is the sales for year t-1; and $RDLIU_{it}$ is ε_{it} , thus denoting discretionary R&D for year t. We use ε_{it} to the measure earnings management. However, this model only reflects the proportion of ε_{it} to assets in year t-1; therefore, we use ε_{it} times assets in year t-1 to measure discretionary items correctly. In addition, if $\varepsilon_{i.t}$ form model (2) is positive indicating that enterprises have adopted discretionary R&D expenses to earnings management to decrease their adjusted income(i.e., increase R&D expenses); is negative indicating that enterprises have adopted discretionary R&D expenses to earnings management to increase their adjusted income (i.e., decrease R&D expenses)

3.3 Control Variables

Liu et al. (2010) shows that the larger the firm size is, the greater the lower risky about the firm will be and their stock will have a lower cost of debt. $SIZE_{it}$ is measured as the natural log of total assets at t year. MB_{it} is measured as the market value of equity that is divided by the book value of equity at t year, PRO_{it} is measured as an operating income minus depreciation divided by total assets at t year, $LLEV_{it}$ is measured as long-term debt divided by total assets at t year. Ge and Kim (2014) find that firms with increased market-to-book and profitability ratios receive increasingly favorable credit ratings, thus leading to lower debt costs, whereas highly leveraged firms receive less favorable ratings, thus leading to higher debt cost. We followed the previously listed references to measure the control variables.

3.4 Model

$$COD_{it+1} = \alpha_0 + \alpha_1 REM1_{it} + \alpha_2 SIZE_{it} + \alpha_3 MB_{it} + \alpha_4 PRO_{it} + \alpha_5 LLEV_{it} + \varepsilon_{it} \quad \text{..... (4)}$$

$$COD_{it+1} = \alpha_0 + \alpha_1 REM2_{it} + \alpha_2 SIZE_{it} + \alpha_3 MB_{it} + \alpha_4 PRO_{it} + \alpha_5 LLEV_{it} + \varepsilon_{it} \quad \text{.....(5)}$$

$$COD_{it+1} = \alpha_0 + \alpha_1 REM3_{it} + \alpha_2 SIZE_{it} + \alpha_3 MB_{it} + \alpha_4 PRO_{it} + \alpha_5 LLEV_{it} + \varepsilon_{it} \quad \text{.....(6)}$$

COD_{it+1} is the cost of debt that is obtained by using the Bauwhede et al. (2015) model at t+1 year. Firms in China seeking high-tech enterprise certification must fulfill the related requirement (Note 2). Therefore, we define "real activities earnings management as follows: $REM1_{it}$ is if the proportion of pre-managed R&D expenses (Note 3) to pre-managed sales (Note 4) are less than 6% (or 5%) in the past three years of firms with sales less than 50 million yuan; less than 4% in the past three years of firms with sales between 50 to 200 million yuan; less than 3% in the past three years of firms with sales above than 200 million in the current year, respectively, and through decreased sales (i.e., pre-managed sales plus negative abnormal levels of operating cash flows for year t) casued the proportion of pre-managed R&D expenses for managed sales exceeds 6% (or 5%), 4%, or 3% in the past 3 years among different sales range in current year, the value is 1. On the other hands, if the proportion of pre-managed R&D expenses to pre- managed sales exceed 6% (or 5%), 4%, or 3% in the past 3 years among different sales range in current year, the value is 0. $REM2_{it}$ is if the proportion of pre-managed R&D expenses to pre- managed sales are less than 6% (or 5%) in the past three years of firms with sales less than 50 million yuan; less than 4% in the past three years of firms with sales between 50 to 200 million yuan; less than 3% in the past three years of firms with sales above than 200 million in the current year, respectively, and through increased R&D expenses (i.e., pre-managed R&D expenses add positive discretionary R&D for year t) casued the proportion of managed R&D expenses for pre-managed sales exceeds 6% (or 5%), 4%, or 3% n the past 3 years among different sales range in current year , the value is 1. On the other hands, if the proportion of pre-managed R&D expenses to pre- managed sales exceed these 6% (or 5%), 4%, or 3% in the past 3 years among different sales range in current year, the value is 0. $REM3_{it}$ is if the proportion of pre-managed R&D expenses to pre-managed sales are less than 6% (or 5%) in the past three years of firms with sales less than 50 million yuan; less than 4% in the past three years of firms with sales between 50 to 200 million yuan; less than 3% in the past three years of firms with sales above than 200 million in the current year, respectively, and through both of increase R&D expenses and sales (i.e., pre-managed R&D expenses add positive discretionary R&D for year t; pre-managed sales plus positive abnormal levels of operating cash flows for year t); both of decrease sales and increase R&D expenses (i.e., pre-managed R&D expenses add positive discretionary R&D for year t; pre-managed sales plus negative abnormal levels of operating cash flows for year t); both of decrease sales and decrease R&D expenses (i.e., pre-managed R&D expenses add negative discretionary R&D for year t; pre-managed sales plus negative abnormal levels of operating cash flows for year t) casued the proportion of managed R&D expenses to manage sales exceeds 6% (or 5%), 4%, or 3% in the past 3 years among different sales range the value is 1. On the other hands, if the proportion of pre-managed R&D expenses to pre-managed sales exceed these 6% (or 5%), 4%, or 3% in the past 3 years among different sales range in current year, the value is 0.

4. Empirical Results

4.1 Descriptive Statistics

Tables 1-2 present the regressions results of the sales and R&D expenses model. Table 3 shows the estimated cross-section of the discretionary of sales and R&D expenses (all of ε_{it} is measured by equations 1 and 2 have passed the t-test). The mean of abnormal levels of operating cash flows are positive, whereas and the mean of discretionary R&D expenses are negative, thus indicating that high-tech enterprises in China have adopted discretionary sales to earnings management to increase their adjusted income. However, they adopted discretionary R&D expenses to earnings management to increase their adjusted income. Table 4 shows that the mean of the cost of debt is 2.59%, which shows that listed high-tech enterprises in China may prefer to finance through debt. The mean of financial leverage is 44.88%, and market-to-book ratio is 103.6%; this shows that listed high-tech enterprises in China face increased security risk, are financially and structurally conservative, and that the market value of firms has been overestimated.

4.2 Empirical Test

According to security law, a firm would like to be listed in china stock market should accumulate above 300 million sales prior 3 years in listed. We can't search out sales below 50 million in the current year of the listed firms in china high-tech enterprises, it is likely that these firms have been listed in stock market, therefore they have bigger size. Additionally, we search out sales from 50 million to 200 million in the current year for 48 samples, however these firms' pre-managed R&D expenses to pre-managed sales above 4% in the prior 3 years. Furthermore, all of the listed high-tech enterprises in china are 2,107 firms and included with 8,233 samples, pre-managed R&D expenses to pre-managed sales above 3% in the prior 3 years among different sales in the current year are 6,634 samples. It is showed that 81.11% of the listed high-tech enterprise in china have been focused on R&D activities whether the qualification of "high-tech enterprises" are established by the China government or not , may because that China government has been support firm invest R&D activities and innovations since 2006.

Table 5 shows that earnings management through REM (including through decrease sales, increased R&D expenses; both increased sales and R&D expenses; both decreased sales and increased R&D expense; and both of decrease sales and R&D expenses) to fulfill the standards for certification as a high-tech enterprise in order to obtain tax benefits has a non-significantly positive relationship with cost of debt. H1,H2, H3 are not supported. It is likely that creditors do not tolerate this opportunistic behavior for obtaining tax benefits, thereby causing the firm's economic resource distortion (i.e., performance is estimated unreasonably), and therefore, negatively evaluating the firm and necessitating an additional yield premium. This results in firms obtaining expensive debt funds (i.e., higher cost of debt); however, creditors may focus on cash flows more than stock investors do, although cash flow may not be directly distorted by REM. Overall, we also noted that managers have more information than external parties, such as creditors; thus, information asymmetry provides incentives to

management to manipulate earnings to maximize their own welfare (i.e., manipulating earnings to obtain tax benefits), causing these companies demand a certain profit level and firms' cost of debt to rise.

In additional, size, market-to-book ratio, and operating income, minus depreciation, are divided based on total assets, and have a significantly negative relationship with cost of debt, which indicates that larger firms tend to indulge in less risky behavior and that increased market-to-book and profitability ratios lead to increasingly favorable credit ratings, thereby lowering the cost of debt. However, long-term debt has a significantly positive relationship with cost of debt, which indicates that highly long-term-leveraged firms receive less favorable ratings, thus leading to increased cost of debt.

The results from the variance inflation factors explains the variables for correlation. The result lies between 1.082 and 1.398 (Variance Inflation Factors<10); therefore, there is no correlation problem. Moreover, to avoid potential bias from extreme values, this study only adopted samples that included sample data from the 5th percentile to the 95th percentile as measures for the robustness test (Note 5). The results show that most of them were consistent (Note 6).

Table 1. Regressions of Dechow et al. (1998)) Model

	Dependent variable: $\frac{CFO_{i.t}}{TA_{i,t-1}}$
intercept	0.021***
$\frac{SALES_{i.t}}{TA_{i.t-1}}$	0.025***
$\frac{\Delta SALES_{i.t}}{TA_{i,t-1}}$	0.016**
R^2	0.042
F value	47.015***

Where $CFO_{i.t}$ is the cash flow from operations for year *t*; $TA_{i,t-1}$ is the assets for year t-1; $SALES_{i.t}$ is the sales for year *t*; $\Delta SALES_{i.t}$ is the change in sales for year *t*; *:p<0.1, **: p<0.05, ***: P<0.01

Table 2. Regressions of Liu et al. (2014) Model

	Dependent variable: RD_{it}/TA_{it-1}
intercept	0.021***
$1/TA_{it-1}$	6323289.027 ***
S_{it-1}/TA_{it-1}	0.026***
R^2	0.035

F value	34.682***

where RD_{it} is the R&D expenditure of year t; TA_{it-1} are the assets for year t-1; S_{it-1} is the sales for year t-1; *:p<0.1、**: p<0.05、***: P<0.01.

Table 3. Descriptive Statistics of the Abnormal Levels of Operating Cash Flows and R&D Expenses (%)

	Max	Min	Avg
Abnormal levels of operating cash flows (ε_{it})	16138259392.00	-30343001561.00	2530140.7879
$RDLIU_{it}$	3007743588.00	-6660143428.00	-15411858.0307

where abnormal levels of operating cash flows (ε_{it}) are calculated as the difference between reported and expected operating cash flows, wherein the latter are estimated to use the coefficients from model (1); $RDLIU_{it}$ reflects discretionary R&D expenses

Table 4. Descriptive Statistics of Variables

	Max	Min	Avg
COD_{it+1}	0.302	0.00	0.0259
$SIZE_{it}$	11.67	8.35	9.3927
MB_{it}	33.552	0.0312	1.036
PRO_{it}	0.69	-0.192	0.0348
$LLEV_{it}$	1.10	0.000	0.0573

COD_{it+1} is the cost of debt that is obtained by using the Bauwhede et al. (2015) model at t+1 year; $SIZE_{it}$ is measured as the natural log of total assets at t year. MB_{it} is measured as the market value of equity that is divided by the book value of equity at t year; PRO_{it} is measured as an operating income minus depreciation divided by total assets at t year; $LLEV_{it}$ is measured as long-term debt divided by total assets at t year.

Table 5. Regression of Real Activities Earnings Management with Cost of Capital

	Dependent variable		
	COD_{it+1}		
intercept	0.070***	0.069***	0.068***
$REM1_{it}$	0.004		
$REM2_{it}$		0.002	

$REM3_{it}$			0.001
$SIZE_{it}$	-0.005***	-0.005***	-0.004***
MB_{it}	-0.319***	-0.317***	-0.310***
PRO_{it}	-0.020***	-0.022***	-0.022***
$LLEV_{it}$	0.032***	0.029***	0.029***
F- value	12.696***	14.022***	13.866**
R^2	0.029	0.030	0.029

COD_{it+1} is the cost of debt that is obtained by using the Bauwhede et al. (2015) model at t+1 year. $REM1_{it}$ is if the proportion of pre-managed R&D expenses to pre-managed sales are less than 6% (or 5%) in the past three years of firms with sales less than 50 million yuan; less than 4% in the past three years of firms with sales between 50 to 200 million yuan; less than 3% in the past three years of firms with sales above than 200 million in the current year, respectively, and through decreased sales (i.e., pre-managed sales plus negative abnormal levels of operating cash flows for year t) casued the proportion of pre-managed R&D expenses for managed sales exceeds 6%, 4%, or 3% in the past 3 years among different sales range in current year, the value is 1. On the other hands, if the proportion of pre-managed R&D expenses to pre- managed sales exceed 6% (or 5%), 4%, or 3% in the past 3 years among different sales range in current year, the value is 0. $REM2_{it}$ is if the proportion of pre-managed R&D expenses to pre- managed sales are less than 6% (or 5%) in the past three years of firms with sales less than 50 million yuan; less than 4% in the past three years of firms with sales between 50 to 200 million yuan; less than 3% in the past three years of firms with sales above than 200 million in the current year, respectively, and through increased R&D expenses (i.e., pre-managed R&D expenses add positive discretionary R&D for year t) casued the proportion of managed R&D expenses for pre-managed sales exceeds 6% (or 5%), 4%, or 3% n the past 3 years among different sales range in current year , the value is 1. On the other hands, if the proportion of pre-managed R&D expenses to pre- managed sales exceed these 6% (or 5%), 4%, or 3% in the past 3 years among different sales range in current year, the value is 0. $REM3_{it}$ is if the proportion of pre-managed R&D expenses to pre-managed sales are less than 6% (or 5%) in the past three years of firms with sales less than 50 million yuan; less than 4% in the past three years of firms with sales between 50 to 200 million yuan; less than 3% in the past three years of firms with sales above than 200 million in the current year, respectively, and through both of increase R&D expenses and sales (i.e., pre-managed R&D expenses add positive discretionary R&D for year t; pre-managed sales plus positive abnormal levels of operating cash flows for year t); both of decrease sales and increase R&D expenses (i.e., pre-managed R&D expenses add positive discretionary R&D for year t; pre-managed sales plus negative abnormal levels of operating cash flows for year t); both of decrease sales and decrease R&D expenses (i.e., pre-managed R&D expenses add negative discretionary R&D for year t; pre-managed sales plus negative abnormal levels of operating cash flows for year t) casued the proportion of managed R&D expenses to manage sales exceeds 6% (or 5%), 4%, or 3% in the past 3 years among different sales

range the value is 1. On the other hands, if the proportion of pre-managed R&D expenses to pre-managed sales exceed these 6% (or 5%), 4%, or 3% in the past 3 years among different sales range in current year, the value is 0. $SIZE_{it}$ is measured as the natural log of total assets at t year. MB_{it} is measured as the market value of equity that is divided by the book value of equity at t year; PRO_{it} is measured as an operating income minus depreciation divided by total assets at t year; $LLEV_{it}$ is measured as long-term debt divided by total assets at t year.

*:p<0.1, **: p<0.05, ***: P<0.01.

5. Conclusions

This study focused on whether conducting earnings management by manipulating sales or R&D expenses to qualify as high-tech enterprises in China and receive the associated tax benefits has a significant effect on debt cost. This study collected data from 2008 to 2019 from CSMAR database. All 2,107 listed high-tech enterprises are included, for a total of 8,233 samples. The empirical results suggest that the listed firms in China that manipulate only through decreased sales or increased R&D expenses; both of increase R&D expenses and sales; increase R&D expenses and decrease sales; decrease R&D expenses and sales to fulfill the standards for certification of high-tech enterprises in order to obtain tax benefits have a positive effect on the cost of debt (non-significant). The results show that the cost of debt are higher when firms fulfill the standards for certification as high-tech enterprises after manipulating R&D expenses or sales and funds suppliers have adjusted their required minimum return of funds with firms that indulge in this earnings management behavior.

The results provide critical implications for managers, creditors, researchers, and regulators. Managers of listed firms in China that manipulate sales or R&D expenses to fulfill the standards for certification of high-tech enterprises to obtain tax benefits also obtain increased cost of debt because creditors may consider that this earnings manipulating behavior is a price risk factor, thereby causing creditors to calculate an increased risk premium. In other words, creditors may have understood the negative effects of REM by firms seeking to obtain tax benefits and not misled by REM, thus they distrust real earnings through real activities management. For researchers, accounting information is a crucial part of the capital allocation process because it contributes to the improved understanding of the role of earnings "signals" sent to stock or credit markets based on REM for listed firms seeking to fulfill the requirements that high-tech listed firms require to obtain tax benefits. Some listed high-tech enterprises adjusted their R&D expenses and sales revenue to become certified high-tech businesses, and thus, be legible for tax deductions. Therefore, the taxation authorities adjusted the proportion of R&D expenses to sales necessary to obtain high-tech enterprise certification, revised the definitions of the R&D expenses-to-sales ratio (whereas a flat ratio is generally adopted in Western countries) to decrease the lower limits of each class required to obtain high-tech enterprise certification, tracked the R&D activity of high-tech enterprises, inspected budget reports for source documents and expenses related to R&D activity, verified R&D activity based on intellectual property rights certificates, restricted the

manipulation of R&D expense-to-sales ratio, and established a comprehensive taxation management system for R&D expenditure, wherein R&D spending represents the true level of investment in R&D or innovation.

Future studies can explore the effects of business environments and strategies, management styles, governance systems, shareholding structures, and risk preferences on the manipulation of sales or R&D expenses by the management team for obtaining tax deductions. Whether manipulating sales or R&D expenses to fulfill the standards for the certification of high-tech enterprises to obtain tax benefits is related to the cost of private debt is a potential topic for future research. More importantly, because 81.11 % of the listed high-tech enterprises in China from 2008 to 2019 fulfilled the standards for certification as a high-tech enterprise before manipulating earnings, these enterprises clearly focused on R&D activities, regardless of whether the qualification of "high-tech enterprises" had been established by the government in China. Therefore, whether this rule (i.e., related requirements of the recognition with high-tech enterprises) was crucial for encouraging enterprises to invest in R&D or innovation activities is also a potential topic for future research.

This study has three limitations. First, because of the limited data available, the findings cannot be generalized to non-listed high-tech firms. Second, the applicability of the proposed R&D expenditure and sales models used to measure earnings manipulation may not apply to high-tech enterprises among different nations because different nations have different environment such as intention of innovation, innovation ability, government subsidy, laws, tax system etc.

References

Bauwhede, H. V., Meyere, M. D., & Cauwenberge, P. V. (2015). Financial reporting quality and the cost of debt of SMEs. *Small Business Economics*, *45*, 149-164. https://doi.org/10.1007/s11187-015-9645-1

Bester, H. (1985). Screening vs. Rationing in Credit Markets with Imperfect Information. *American Economic Review*, *75*, 850-855.

Bharath, S., Sunder, J., & Sunder, S. (2008). Accounting quality and debt contracting. *The Accounting Review*, *83*, 1-28. https://doi.org/10.2308/accr.2008.83.1.1

Bhattacharya, S., & Ritter, J. (1985). Innovation and Communication: Signalling with Partial Disclosure. *Review of Economic Studies*, *52*, 331-346.

Cohen, D. A., & Zarowin, P. (2010). Accrual-based and real earnings management activities around seasoned equity offerings. *Journal of Accounting and Economics*, *50*, 2-19. https://doi.org/10.1016/j.jacceco.2010.01.002

Crabtree, A., Maher, J. J., & Wan, H. (2014). New debt issues and earnings management. Advances in Accounting, incorporating. *Advances in International Accounting*, *30*, 116-127. https://doi.org/10.1016/j.adiac.2014.04.005

Dechow, P. M., Kothari, S. P., & Watts, R. L. (1998). The relation between earnings and cash flows.

Journal of Accounting and Economics, *25*(2), 133-168. https://doi.org/10.1016/S0165-4101(98)00020-2

Demirtas, K. O., & Cornaggia, K. R. (2013). Initial credit ratings and earnings management. *Review of Financial Economics*, *22*, 135-145. https://doi.org/10.1016/j.rfe.2013.05.003

Ge, W. X., & Kim, J. B. (2014). Real earnings management and the cost of new corporate bonds. *Journal of Business Research*, *67*, 641-647. https://doi.org/10.1016/j.jbusres.2013.01.021

Gunny, K. (2010). The relation between earnings management using real activities manipulation and future performance: Evidence from meeting earnings benchmarks. *Contemporary Accounting Research*, *27*(3), 855-888. https://doi.org/10.1111/j.1911-3846.2010.01029.x

Guo, Y. Y., & Wang, B. (2013). Study on the Economic Growth of Patent Output in the High-tech Industry. *Journal of Management and Sustainability*, *3*(1), 103-107. https://doi.org/10.5539/jms.v3n1p103

Hu, N. W., Cao, Q., & Zheng, L. (2015). Listed Companies' Income Tax Planning and Earnings Management: Based on China's Capital Market. *Journal of Industrial Engineering and Management*, *8*(2), 417-434. https://doi.org/10.3926/jiem.1310

Huang, D. T., & Liu, Z. C. (2011). The relationships among governance and earnings management: An empirical study on non-profit hospitals in Taiwan. *African Journal of Business Management*, *5*(14), 5468-5476.

Hyun, M. J. (2016). Earnings Management in South Korea: Using Tax Expenses. *Global Business and Finance Review*, *21*(1), 24-32. https://doi.org/10.17549/gbfr.2016.21.1.24

Ifada, L. M., & Wulandari, N. (2015). The Effect of Deferred Tax and Tax Planning Toward Earnings Management Practice: An Empirical Study on Non Manufactring Companies Listed In Indonesia Stock Exchange In The Period of 2008-2012. *The International Journal of Organizational Innovation*, *8*(1), 155-170.

Kapoutsou, E., Tzovas, C., & Chalevas, C. (2015). Earnings Management and Income Tax Evidence from Greece. *Corporate Ownership & Control*, *12*(2), 511-529. https://doi.org/10.22495/cocv12i2c5p1

Kasahara, H., Shimotsu, K., & Suzuki, M. (2014). Does an R&D tax credit affect R&D expenditure? The Japanese R&D tax credit reform in 2003. *Journal of the Japanese and International Economies*, *31*, 72-97. https://doi.org/10.1016/j.jjie.2013.10.005

Lin, Y. M., & Shen, C. A. (2015). Family firms' credit rating, idiosyncratic risk, and earnings management. *Journal of Business Research*, *68*, 872-877. https://doi.org/10.1016/j.jbusres.2014.11.044

Liu, C. H., Yuen, C. Y., Yao, L. J., & Chan, S. H. (2014). Differences in earnings management between firms using US GAAP and IAS/IFRS. *Review of sAccounting and Finance*, *13*(2), 134-155. https://doi.org/10.1108/RAF-10-2012-0098

Liu, Y., Ning, Y., & Davidson III, W. N. (2010). Earnings Management Surrounding New Debt Issues.

The Financial Review, *45*, 659-681. https://doi.org/10.1111/j.1540-6288.2010.00265.x

Maydew, E. L. (1997). Tax-Induced Earnings Management by Firms with Net Operating Losses. *Journal of Accounting Research*, *35*(1), 83-96. https://doi.org/10.2307/2491468

Meini, Z., & Siregar, S. V. (2014). The effect of accrual earnings management and real earnings management on earnings persistence and cost of equity. *Journal of Economics, Business, and Accountancy Ventura*, *17*(2), 269-280. https://doi.org/10.14414/jebav.v17i2.309

Mulyadi, M. S., Anwar, Y., & Yanny, L. (2013). Analysis of Corporate Income Tax Rate Changes and Earnings Management. *Beykent University Journal of Social Sciences*, *6*(2), 138-143.

Mulyadi, M. S., & Anwar, Y. (2015). Corporate Governance, Earnings Management and Tax Management. *Procedia Social and Behavioral Sciences*, *177*, 363-366. https://doi.org/10.1016/j.sbspro.2015.02.361

Myers, S., & Majluf, N. (1984).Corporate Financing and Investment Decisions when Firms Have Information that Investors Do Not. *Journal of Financial Economics*, *13*, 187-221. https://doi.org/10.1016/0304-405X(84)90023-0

Roychowdhury, S. (2006). Earnings management through real activities manipulation. *Journal of Accounting and Economics*, *42*(3), 335-370. https://doi.org/10.1016/j.jacceco.2006.01.002

Seybert, N. (2010). R&D capitalization and reputation-driven real earnings management. *The Accounting Review*, *85*(2), 671-693. https://doi.org/10.2308/accr.2010.85.2.671

Stubben, S. R. (2010). Discretionary Revenues as a Measure of Earnings Management. *The Accounting Review*, *85*(2), 695-717. https://doi.org/10.2308/accr.2010.85.2.695

Tabassum, N., Kaleem, A., & Nazir, M. S. (2015). Real Earnings Management and Future Performance. *Global Business Review*, *16*(1), 21-34. https://doi.org/10.1177/0972150914553505

Zang, A. Y. (2012). Evidence on the trade-off between real activities manipulation and accrual-based earnings management. *The Accounting Review*, *87*, 675-703. https://doi.org/10.2308/accr-10196

Notes

Note 1. The new rules issued by the Ministry of Science and Technology, the Ministry of Finance, and the State Administration of Taxation will take effect in January 1st, 2016).s

Note 2. Because the proportion of R&D expenses to sales should not be less than 6% (5%), 4%, and 3% in the past 3 years among different sales range in current year.

Note 3. pre-managed R&D expenses can be expressed as the R&D expenses for year t minus discretionary R&D for year t.

Note 4. pre-managed sales can be expressed as the sales for year t minus abnormal levels of operating cash flows for year t.

Note 5. Huang & Liu, 2011.

Note 6. In order to shorten the tables, we omit the solution.