

Relationship between Real Earnings Management with Cost of Debt in South Africa Listed Enterprises: the Perspective of Manipulate R&D Expenditures

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Abstract:

R&D investment had an effect on companies operating, but the level of this investments effect on firm's earnings, thus managers may manipulate this item to reflect their expected earnings. In additional, managers can borrow funds from external creditors and should meet the rate of return to lenders (i.e., cost of debt). Managers manipulate earnings may affect firm's cash flow, caused external lender's not evaluate firm performance correctly, thus these results showed conflicting results. Moreover, this study examines data from the S&P Capital IQ database for the period 20011–2018 and includes data from 67 listed South Africa enterprises. The results show that managers appear to manipulate firm earnings through adjust research & development investments has a non-negatively relationship with debt costs and the signs and magnitudes of coefficients were not difference among high research & development expenditures; medium-high research & development expenditures medium research & development expenditures; medium low research & development expenditures; and low R&D expenditures firms.

Keywords: *South Africa, Real activities earnings management, Manipulate R&D expenditure, Cost of debt.*

I. INTRODUCTION

R&D investment improves firms' core competitiveness and their ability to innovate, however this investment may be low because of financial constraints [1]. Furthermore, R&D expenses are a line item originated form income statements, thus the effects of research & development investments on earnings in current year. Current studies have considered the effects of research & development activities or incentives on a firm's earnings manipulation [2-7]. It is important to understand managers' manipulate earnings incentives through R&D investments.

In addition, managers focus on raise capital because it is necessary for operating. Businesses can borrow or issue stocks and bonds to seek funds directly from any number of investors. The major determining factor is to focus on identifying what lenders or investors expected the rate of return. Cost of

capital is an optimal index to measure expected the rate of return form funds providers and show that the providers of capital such as lenders or owners require as compensation for their contribution of capital. In other words, the rate reflect that must be earned on the firm's investment in order to satisfy all the investor's required rates of return. In addition, the financial reporting is to provide financial information such earnings or cash flows in certain period about the reported entity, which is useful for existing and potential lenders, and other creditors while making decisions about providing funds to the entity. Prior studies have also examined that managers manipulate earnings affect cost of debt because they would like to through management earnings to satisfy all the external lender's required rates of return, but these results showed differences [8-10]. These opposing findings indicate that researchers need to be analyze whether creditors can detect and reflect appropriately price (i.e., required rates of return) with the negative effect of REM internationally.

South Africa has been classified by the World Bank as a newly industrialised country, Therefore, technology development plays an important role in South Africa enterprises and the related R&D expenditure accounting policy affect firms' R&D decisions and performance, especially in current earnings based on accounting standard. Since in international literature the inference about earnings management of results, and that in earnings management studies to assess the consequences of real earnings management have indicated this practice in listed firms. This article tries to answer the following research question: 1. Do South Africa listed enterprises also use earnings management to satisfy all the lender's required rates of return in their earnings results (i.e., cost of debt) ? 2. Do these enterprises assessed the earnings of meet this target with manipulate R&D expenditure? The data sample comprises observations from 67 listed enterprises, with data from the 2011 up to 2018. The results show that firms managed earnings through research & development investments in the current year and negatively influenced the costs of debt in the next year (non-significant). This paper contributes an earnings management and fills the gap in the management of results for in South Africa listed enterprises, since studies with this group were not detected with manipulate R&D expenditures.

II. LITERATURE REVIEW

2.1 Research & Development Expenditure and Earnings Management

Several articles have examined the effect of R&D expenditures on earnings management practices. [2] (2015) showed that R&D cut is managerial strategic decision to increase performance for earnings management purposes and manipulated R&D expenditures to achieve smooth income in French and earning targets affect R&D cut after IFRS adoption. [3] found that R&D capitalization is possibly used for pushing their earnings above analysts' forecasted earnings, prior year's earnings in highly R&D intensive German after IFRS adoption, however earnings management through R&D capitalization will decrease the market value and the market values R&D capitalization positively for well-performing firms, for which capitalizing does not matter to beat an earnings benchmark. [4] found that R&D capitalization and the R&D cut were made by managers in order to meet target earnings and these two approaches are substitutes for each other in French. [5] showed that showed that R&D disclosures after the IFRS adoption are

negatively associated with earnings management and the negative effect is more prevalent during the global financial crisis. [6] revealed that earnings pressure is positively related to R&D cut, and this relationship can be softened when having the presence of family control and debt in Taiwanese-listed firms. [7] showed that the stock market penalizes (i.e., a discount to the market reward) if beating the forecast requires cutting R&D and the reductions in R&D are likely temporary, as firms tend to increase R&D spending in the subsequent periods.

2.2 Earnings Management and Cost of Debt

Several articles have examined the effect of R&D expenditures on earnings management practices. [8] showed that there is no significant statistical association between accrual-based earnings management and cost of debt in energy companies on Vietnam. [9] indicated that earnings management is negatively related to cost of debt in Kazakhstan from listed companies, however the effect of earnings management on cost of debt is not different for the companies audited by the Big Four and for the companies audited by other audit firms. [10] found out the higher the levels of earnings management (i.e., the lower earnings quality), the higher the cost of debt, even when controlling by other variables that can influence this relationship in Brazilian privately held companies.

2.3 R&D Expenditures, Earnings Management and Cost of Debt

[11] 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, [12] demonstrated that conflicts of interest between parties arise when a company demands a certain profit level.

Cost of capital reflects the combined costs of all sources of financing. The cost of debt is the rate of return that the suppliers of capital such as lenders require as compensation funds risks for their contribution of capital. [13] considered that earnings management activities have an impact on the expected level of future cash flows, and therefore the market demands a higher risk premium for these activities, therefore the cost of capital is positively associated with the extent of real earnings management.

In addition, [14, 15] showed that debt holders bear only the downside risk related to default risk, and hold fixed claims on the principal and interest based on a contracted schedule, thus debt investors appropriately price (i.e., increase cost of debt) reflect manipulate earnings by controlling real operation decisions.

According to above references and agency theory, if a firm wants to obtain private benefits through manipulating earnings, then a certain profit result must be set, however this action may reflect a conflict of interest (i.e., information asymmetry) and this manipulation is not perceived favorably by external creditors because they may consider that a lower financial reporting quality thorough earnings management cause impose more risks premiums to compensation funds risks for their contribution of capital. Moreover, firms

manipulate earnings by altering the timing and scale of operation decisions, such as those involving R&D expenditure ([16, 17]). Accordingly, we proposed the following hypothesis:

H1: Earnings management through adjust R&D expenditures for firms has a significantly positive relationship with debt costs.

On the other hands, R&D investment improves firms' core competitiveness and their ability to innovate, but R&D caused external creditors impose different risks premiums to compensation funds risks for their contribution of capital. These differences may concerning the earnings management through R&D expenditures has the signs and magnitudes of the cost of debt variable coefficients were difference. Firms whose annual reports R&D expenditures may be also classified into the following five groups based on ISIC Revision 4. Accordingly, we also proposed the following hypothesis:

H2: Earnings management through adjust R&D expenditures for High R&D; medium-high R&D ; Medium R&D; medium low and low R&D expenditures firms has a significantly positive relationship with debt costs, but they has the signs and magnitudes of the cost of debt variable coefficients were difference

III. METHODOLOGY

We collected data from 2011 to 2018 from S&P Capital IQ database. All 67 listed enterprises are included, for a total of 339 samples. These listed enterprises in South Africa are classified into the following primary sectors: Industrials (26.86%); Materials (20.89%); Consumer Staples (17.91%); Information Technology (16.41%); Health Care (5.97%); Consumer Discretionary (5.97%); Communication Service (4.47%); Energy (1.49%). These sample only include R&D expenditures are expensed in financial reports or databases and R&D expenditures which report only non- zero value observation so as to better reflect validation procedures. Firms whose annual reports R&D expenditures may be also classified into the following five groups (high, medium-high, medium, medium low, and low). The industry division respectively is defined using International Standard Industrial Classification of All Economic Activities (ISIC) Revision 4.

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). [18] measured debt cost as follows:

$$COD_{it+1} = \frac{IE_{it+1}}{DEBT_{it+1}} \dots\dots\dots(1)$$

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

3.2 Independent Variables: REM (Real Earnings Management)

R&D expenses are calculated from financial statements; if these numbers are not present in financial reports, we estimate a version of the R&D expenses manipulation model as follow as [19]:

$$RD_{it} / TA_{it-1} = \alpha_0 + \alpha_1(1/TA_{it-1}) + \alpha_2(S_{it-1}/TA_{it-1}) + RDLIU_{it} \dots\dots\dots(2)$$

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 ε_{it} 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). However, we adopted the absolute value of ε_{it} to measure R&D expenses manipulation to avoid extreme values.

3.3 Control Variables:

[20] showed that firm size in terms of total assets is negatively correlated with cost of debt, in which bigger firms can borrow at a lower interest cost (i.e., less financial risk and firm leverage is negatively correlated with cost of debt. A possible explanation is that firms that can borrow at lower rates tend to borrow larger amounts. In addition, [21] suggested that more profitable firms are expected to have a lower cost of debt and [22] also supported that firm has high return of assets, the cost of debt is less. [14] showed that firms with higher interest coverage, receive better credit ratings, because higher ratios indicate a lower default risk for debts.

We followed the [20] and [22] revised [14] to measure the control variables as follow as: $SIZE_{it}$ is the natural logarithm of total assets at the t year; LEV_{it} is the ratio of debts to assets at the t year; ROA_{it} is the ratio of net income to assets at the t year. IC_{it} is the ratio of interest expenses add net income to net income at the t year;

3.4 Model

$$COD_{it+1} = a_0 + a_1REM_{it} + a_2SIZE_{it} + a_3LEV_{it} + a_4ROA_{it} + a_5IC_{it} + \varepsilon_{it} \dots\dots(3)$$

COD_{it+1} is the cost of debt that is obtained by using the [18] model at t+1 year. REM_{it} is the real activities earnings management through R&D expenditures at t year. $SIZE_{it}$ is the natural logarithm of total assets at the t year; LEV_{it} is the ratio of debts to assets at the t year; ROA_{it} is the ratio of net income to assets at the t year. IC_{it} is the ratio of interest expenses add net income to net income at the t year

IV. EMPIRICAL RESULTS

4.1. Descriptive Statistics

TABLE I present the regressions results of the R&D expenses model. TABLE II shows the estimated cross-section of the discretionary of R&D expenditure (all of residual value is measured by equations 2 have passed the t-test). The mean of total discretionary R&D expenditures is positive, thus indicating that listed enterprises in South Africa have adopted discretionary R&D expenditures to decrease their adjusted income (i.e., they recognized more R&D expenditures to earnings management). Table II also shows that the mean of the total discretionary R&D expenditures for High research and development investments ; medium-high research and development investments; Medium research and development investments; medium low and low research & development investments firms, which shows that listed enterprises in South Africa prefer to manipulate earnings with different levels of R&D levels. For example, high; medium-high; Medium; medium low firms have adopted discretionary R&D expenditures to decrease their adjusted income (i.e., they recognized more R&D investments to earnings management) and low R&D investments firms have adopted discretionary R&D expenditures to increase their adjusted income (i.e., they recognized less R&D expenditures to earnings management). Overall, we show that manipulate earnings with different levels of R&D intensity in South Africa listed firms and the average for discretionary R&D expenditures is 2.889 US millions.

TABLE III shows that the mean of the cost of debt is 3.167%, which shows that listed enterprises in South Africa may prefer to finance through debt because they may have cheaper cost obtain funds from debts. Furthermore, the mean of the ratio of debts to assets is 48.4%, and the ratio of interest expenses add net income to net income (i.e, interest coverage) is 1.323; this shows that listed enterprises in South Africa face financially structurally or conservative (i.e, they have better coverage of outstanding debt and higher liquidity make interest payments on outstanding debts easily). More importantly, the debt ratio also shows they may prefer to obtain funds from stockholders than obtain funds from debts. In addition, ROA only 5.63%; this shows that listed enterprises in South Africa face may operate on very narrow margins.

4.2. Empirical Test

TABLE IV shows that earnings management through R&D expenses has a non-significantly negative relationship with cost of debt in South Africa listed enterprises. H1 is not supported. Agency theory explains that principals and agents have different purposes; consequently, they have a conflict of interest. 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 benefits such as obtain funds. It is likely that creditors in South Africa should tolerate this opportunistic manager behavior for obtaining funds through earnings manipulation because discretionary expenditures manipulation can be not detected, thereby causing the firm's expected level of future cash flows distortion (i.e., performance is estimated unreasonably), but they only consider that a higher reporting results thorough earnings management cause impose less risks premiums to compensation funds risks for their contribution of capital. This manipulation is perceived favorably by external creditors. This results in firms obtaining cheaper debt funds (i.e., lower cost of debt). This is not also consistence with [13,23-24] ; [14], [15]. Besides it, discretionary R&D expenditure manipulation is difficult to detect for external creditors in South Africa to evaluate firm performance accurately. It is also likely that creditors do not focus on this opportunistic behavior through manipulating R&D expenditures based earnings management causes increased noise or errors in earnings, and therefore, non-negatively evaluating the firm and necessitating an additional yield premium or these creditors may focus on other indices because cash flows may not be directly distorted by other indices.

Size has a significantly negative relationship with cost of debt in South Africa listed enterprises, which indicates that larger firms tend to indulge in less risky behavior (i.e., less financial risk) , thereby lowering the cost of debt. This is consistence with [20]. In additional, firm leverage has a significantly positive relationship with cost of debt in in South Africa listed enterprises, which indicates that higher leverage firms tend to indulge in more risky behavior (i.e., firms may borrow larger amounts), thereby higher the cost of debt. This is not consistence with [20]. Furthermore, ROA has a non-significantly relationship with cost of debt in South Africa listed enterprises, which indicates that listed enterprises in South Africa face may operate on very narrow margins. This is not consistence with [21-22]. Finally, interest coverage ratio has a significantly negative relationship with cost of debt in South Africa listed enterprises, which indicates that higher interest coverage ratio firms receive better credit ratings because higher ratios indicate a lower default risk for debts. This is consistence with [14].

Compared to above results, TABLE IV also shows that earnings management through adjust Research and development expenditures for high; medium-high; medium; medium low and low Research and development expenditures firms has a non-significantly negative relationship with debt costs and the signs and magnitudes of the cost of debt coefficients were not difference, thus H2 is not supported. Furthermore, our results also show that creditors in South Africa can not detected discretionary expenditures manipulation, thus they only consider that a higher reporting results thorough earnings management. This manipulation is still perceived favorably by external creditors cause impose less risks premiums to compensation funds risks for their contribution of capital (i.e, firms obtain cheaper funds from creditors)

among five types of firm's R&D intensity. According to the signs and magnitudes of the cost of debt coefficients. For example, high R&D firms has the highest coefficients; medium low and low firms has the lowest coefficients. It is likely that high R&D firms manipulate (a majority of samples are pharmaceuticals or health care) earnings through discretionary R&D expenditures caused their external creditors consider that these firms may send a negative signal about expected level of uncertain due to pharmaceuticals or health care firms invest R&D expenditures has more probability of failure than other types of firms, thus this manipulation is still perceived favorably by external creditors but the magnitudes of firms obtain cheaper funds from creditors is lower than other four types of firm. Besides it, medium low and low R&D firms manipulate (a majority of samples are consumer discretionary; telecommunications; leisure, entertainment, other services: energy) earnings through discretionary R&D expenditures caused their external creditors consider that these firms may send a positive signal about expected level of future cash flows distortion (i.e., performance is estimated still unreasonably but higher rationality) because these firms should not or less tend to invest R&D expenditures than other types of firms, thus this manipulation is still perceived favorably by external creditors but the magnitudes of firms obtain cheaper funds from creditors is higher than other four types of firm.

Overall, we noted that managers in South Africa may 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 funds), causing these companies demand a certain profit level and firms' cost of debt to down and this relationships were not difference among high; medium-high; medium; medium low and low Research and development expenditures firms.

TABLE I. Regressions of [30] model (n=389)

	Dependent variable: RD_{it}/TA_{it-1}
intercept	-0.00133
$1/TA_{it-1}$	0.530647***
S_{it-1}/TA_{it-1}	0.001606
R ²	0.520252
F value	210.8366***

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 II. Descriptive statistics of the abnormal levels of R&D expenses (US millions)

	Max	Min	Avg
Full samples	142.769	-27.369	2.889
High R&D	34.447	-7.193	8.003
medium-high R&D	20.559	-0.533	6.445

Medium R&D	142.769	-4.347	3.342
Medium low R&D	39.483	-1.796	2.987
Low R&D	11.315	-27.369	-1.927

where abnormal levels of R&D expenses (ε_{it}) reflects discretionary R&D expenses are calculated as the difference between reported and expected R&D expenses, wherein the latter are estimated to use the coefficients from model (2)

TABLE III. Descriptive statistics of variables (n=339)

	Max	Min	Avg
COD_{it+1}	0.14831	0.0000	0.03167
$SIZE_{it}$	4.41910	0.51851	2.66937
LEV_{it}	1.02307	0.14226	0.48400
ROA_{it}	1.80867	-0.52457	0.05628
IC_{it}	20.63303	-3.22414	1.32354

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 the natural logarithm of total assets at the t year; LEV_{it} is the ratio of debts to assets at the t year; ROA_{it} is the ratio of net income to assets at the t year. IC_{it} is the ratio of interest expenses add net income to net income at the t year

TABLE IV Regression of real activities earnings management with cost of capital

	Dependent variable: COD_{it+1}					
	Overall	High	Medium High	Medium	Medium low	low
intercept	0.029373***	0.032877***	0.02522***	0.035153***	0.029247***	0.030139***
REM_{it}	-9.2E-05	-0.00018	-0.00026	-6.2E-05	-8.7E-05	-8.7E-05
$SIZE_{it}$	-0.00229*	-0.00269	-0.00154	-0.00389**	-0.0025*	-0.00305**
LEV_{it}	0.014667**	0.017145*	0.018039***	0.017656*	0.015951**	0.015886*
ROA_{it}	0.00724	-0.01009	0.009249	-0.00465	0.007726	-0.010854*
IC_{it}	-0.001193*	0.000467	-0.001149*	-0.000546	-0.001175*	-0.001202*
F- value	2.548527**	1.775496	2.609758**	2.31398**	2.725337**	2.559721**
R^2	0.022330	0.022046	0.026299	0.038974	0.025551	0.026544
samples	0.032947***	0.032877***	0.02522***	0.035153***	0.029247***	0.030139***

COD_{it+1} is the cost of debt that is obtained by using the Bauwhede et al. (2015) model at t+1 year; REM_{it} is the real activities earnings management through R&D expenditures (the absolute value of ε_{it}) at t year. $SIZE_{it}$ is the natural logarithm of total assets at the t year; LEV_{it} is the ratio of debts to assets at the t year; ROA_{it} is the ratio of net income to assets at the t year. IC_{it} is the ratio of interest expenses add net income to net income at the t year. *:p<0.1, **: p<0.05, ***: P<0.01

V. CONCLUSIONS

This study focused on whether conducting earnings management by manipulating R&D expenses in South Africa has a significant effect on debt cost. This study collected data from 2011 to 2018 from S&P Capital IQ database. All 67 listed enterprises are included, for a total of 339 samples. The empirical results suggest that the listed firms in South Africa that manipulate through R&D expenses has a negative effect on the cost of debt (non-significant). The results show that the cost of debt are lower when firms manipulating R&D expenses and funds suppliers (creditors) have adjusted their required minimum return of funds with firms that indulge in this earnings management behavior. The results also show that earnings management through adjust Research and development expenditures for South Africa listed firms has a non-negatively relationship with debt costs and the signs and magnitudes of the cost of debt variable coefficients were not difference among high; medium-high; medium; medium low and low Research and development expenditures firms.

The results provide critical implications for managers, creditors, researchers, and regulators. Managers of listed firms in South Africa that manipulate R&D expenses to obtain funds cost benefits (i.e., decreased cost of debt) because creditors may not identify this earnings manipulating behavior is a price risk factor, thereby causing creditors to calculate an decreased risk premium. In other words, creditors may have not understood the negative effects of real earnings management by firms seeking to obtain fund cost and misled by REM, thus they trust real earnings through real activities management. For researchers, researchers should analyzed discretionary R&D serve as opportunistic earnings management and exploit creditors' wealth for the short-term benefits or not.

For regulators, especially in taxation authorities. Some listed enterprises may adjusted their R&D expenses for tax deductions. Therefore, to decrease the lower limits of manipulated their R&D expenses, they may tracked the R&D activity of listed enterprises, inspected budget reports for source documents and expenses related to R&D activity, verified R&D activity based on intellectual property rights certificates, 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.

This study has three limitations. First, the findings cannot be generalized to non-listed firms. Second, the applicability of the proposed R&D expenditure model used to measure earnings manipulation may not apply to listed enterprises among different nations because different nations have different environment such as intention of innovation, innovation ability, government subsidy, laws, tax system etc. Third, firm's manipulated earnings models through R&D expenditures, hence the other researchers may not be considered equivalent Future studies can also explore different conditions. First, our proxies for cost of debt were interest expense of next year divided into the average debts for next year and an alternative approach to measure the cost of debt or explore the long and short- term debt or different creditors such as banks, bond holders Second, whether listed firms face incentives to manage earnings by reducing or increasing R&D expenses and the potential effect of real earnings management on debt cost or not. Third, firms can be divided into high; medium-high; medium; medium low and low research and development

expenditures firms based on their R&D intensity, thus whether business environments and strategies, management styles, governance systems, shareholding structures, and risk preferences by for these firms moderate the relationship with manipulating R&D expenditure to obtain debt capital is a potential topic for future research.

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