Relationship between Real Earnings Management with Cost of Debt: An Advanced Study of Chinese Listed Banks

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Abstract: Previous literature shows mixed evidence on the effect of earnings management on the cost of debt. This study investigates the impact of real earnings management on the cost of debt and develop regression model, evaluated it for accuracy. Using a sample of Chinese listed banks during the period 2011–2018, we show that real earnings management has a negative relation with the cost of debt (only total loan loss provisions and increase loan loss provisions have a significantly relationship with cost of debt). Particularly, the banks have adopted discretionary loan loss provisions to earnings management to increase their adjusted income (i.e., decrease loan loss provisions) enjoy a lower interest costs than the banks have adopted discretionary loan loss provisions to earnings management to decrease their adjusted income (i.e., increase loan loss provisions). In addition, we have also developed regression model, evaluated it for accuracy used criteria based on the mean squared error (MSE), Root MSE (RMSE), mean absolute error (MAE), median AE, Mean absolute percentage error (MAPE), Median APE, root mean squared percentage error (RMSPE), and the root median squared percentage error (RMSPE) and showed that earnings management through decrease loan loss provisions have a highest ability to explain the model (these values performed the lowest) in Chinese listed banks.

1. Introduction

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.

Earnings is a major financial information about the reported entity, thus   managers may adjust financial reports and structure transactions to mislead stakeholders about the economic performance of a company or influence contractual outcomes that depend on reported accounting numbers[1].Therefore, earnings management may adversely influences earnings quality, and in turn increases information asymmetry for external investors such as potential lenders, and other creditors while making decisions about providing resources to the entity.

A firm's capital costs are determined on the basis of the minimum rate of return that is expected from its investors (i.e., creditors) as compensation for the risk incurred while investing in the company

[2]. Existing research regarding the effects of earnings management on the cost of debt is mixed [3-11]. However, these results presented only investigate whether earnings management influences a firm's debt cost from the perspective of accounting or information quality.

Since in international literature the inference about earnings management of results, and that in earnings management studies to assess the earnings management results have indicated this practice for listed firms. Banks have relatively enterprises operate in unique systems and environments; therefore, these empirical results may not be considered equivalent. [12] first investigated how earnings management influences credit ratings, and thus the cost of debt, using bank data from 85 countries. Their results indicate that raters downgrade ratings when they perceive earnings management, after controlling for other potential determinants of bank credit ratings, implying that earnings management increases borrowing costs.

International investors paid closer attention to China after the 2008 financial tsunami because they were growing. China's banking sector had CN¥319.7 trillion (US$49.5 trillion) in assets at the end of 2020. The "big four/five" state-owned commercial banks are the Bank of China, the China Construction Bank, the Industrial and Commercial Bank of China, and the Agricultural Bank of China, all of which are among the largest banks in the world as of 2018. The Bank of Communications is sometimes included. The China Banking Regulatory Commission (CBRC) announced its approval for nine foreign-funded banks to start their preparatory work for setting up local corporations in China on 24 December 2006. Therefore, China banks not only play an important role in China or world economy and the related accounting policy also affect funds obtaining and performance, especially in earnings. Besides it, managers may manage earnings by altering the timing and scale of operating decisions (referred to as real activities based earnings management, REM).

The main contribution of this study to the literature is that, based on our research, it is the study to predict the association between earnings management and the cost of debt with China listed banks. This study adds to the limited research on earnings management in China. This article tries to answer the following research question: 1.Do China banks use real earnings management in their earnings results to meet expected from its existing and potential lenders, and other creditors as compensation for the risk while making invest decisions (i.e, cost of debt). 2. We have also developed regression model, evaluated it for accuracy, and analyzsed these results based on these models. For analysis of the data, the classic linear regression model with cross section data was used. The data sample comprises observations from 44 listed banks, with data from the 2011 up to 2018. We established the real earnings management by loan loss provisions and examined whether managers make decisions with a certain reference point (i.e., the prospect theory). The results show that manipulating LLP in China listed banks has a negative influence on the cost of debt. Our study provides evidence that have conducted earnings management through total loan loss provisions , increased loan loss provisions and decreased loan loss provisions have decreased debt costs; however, this relationship is significant (only earnings management through decreased loan loss provisions non-significant). These findings provide also evidence regarding how Chinas listed banks behave after manipulating the financial data to undertake debt cost and highlights the difference between these 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 [13] because distorting cash flow through the manipulation of real operation manipulation [14] causes increased noise or errors in

earnings and reduces investor expectations for future cash flow levels [15]. 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 [16].

REM is opaque to outside stakeholders [15] 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 [14]. Banks firms manipulate earnings by altering the timing and scale of provisions or other operations tools such as available for sale securities [17], unrealized gains realize more gains [17], gains and losses on available for sale [17- 18], Loan Loss Provisions (LLP) [18].

2.2 Earnings Management and Cost of Debt

Agency theory explains that principals and agents have different purposes; consequently, they have a conflict of interest. [19] 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, [20] demonstrated that conflicts of interest between parties arise when a company demands a certain profit level.

Existing literature highlights the important role of high financial reporting quality in obtaining better debt contracting terms [3-4]. [3] show that high financial reporting quality contributes to reducing the cost of debt. [6] conclude that firms manipulate earnings increases information asymmetries (i.e, reduces the quality of financial reporting). In this regard, lenders assess a firm's default risk and set higher interest rates to compensate its future earnings and cash flows. Thus, firms that are heavily dependent on debt financing bear higher borrowing costs from lower earnings quality because the benefits from avoiding debt covenant violations exceed the higher costs of borrowing.[4] find that firms with poorer accounting quality face significantly higher yield spreads of new bond issues. [7] showed that earnings management through accruals (i.e., lower financial information) is likely to increase cost of debt because when defining the contractual terms of a loan, lower accounting information is used to adverse selection by assessing liquidity, solvency and default risks of borrowers. [9] study the impact of earnings quality on cost of capital (measured by cost of cost of debt) in publicly listed firms in Euro zone and Asian countries and use 199.516 firm year observations from 11 Euro zone and 8 Asian countries over the period 2000–20140. They show that the earnings management is positively correlated with cost of debt only in Euro zone countries.

Creditors also tend to focus on a firm's ability to generate future cash flows to ensure the payment of periodic interest and the principal. Since financial statements are an important source of information for lenders, the quality of accounting information impacts the lenders' estimates of future cash flows from which the debt will be repaid [4]. Therefore, stringent contract terms for low accounting quality borrowers reflect lenders' compensation for information risk [3-4]. Studies have noted that a firm's manipulated earnings can significantly affect their debt cost because debt holders have set contractual claims, such as periodic interest payments. [15] showed that creditors tend to concentrate on future cash flows to guarantee the company's ability to pay debt interest and principal because earnings management can have direct negative effects on the future level of net cash flows . [21], corporate credit risk is higher when real earnings management uncertainty is greater. They consider that real earnings management will influence firm's future cash flow uncertainty and asset value distributions, and therefore will increase credit risk. Furthermore, existing studies showed that the relationship between earnings management and cost of debt. [3] find that earnings management is associated with higher cost of debt. Similarly, [4] document that firms manipulate earnings leads to a higher cost of debt in American. [22] suggested that manipulate earnings has 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. [11] examine the association between the extent of real earnings management and the cost of debt capital in an international setting and find that on average, the extent of real earnings management is positively associated with the cost of debt capital. Besides it, real earnings management can have direct negative consequences on the level of future net cash flows [15]; [13], creditors are likely to be concerned about and respond to REM activities. [8] suggested that firms' real earnings management increase the cost of capital for newly issued corporate bonds in bonds market and find that real earnings management impairs credit ratings and is associated with higher bond yield spreads, their results imply that credit rating agencies and creditors perceive real earnings management as a credit risk-increasing factor and thus require high risk premiums for firms engaging in real earnings management.

Overall, if a bank in China wants to obtain private benefits (i.e., funds cost) through 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. In addition, creditors may tend to concentrate on future cash flows to guarantee the company's ability to pay debt interest and principal , however earnings management have direct negative effects on the future level of net cash flows and information asymmetries (i.e, reduces the quality of financial reporting). Creditors should, therefore, reduce adverse selection and moral hazard problems by improving contracting and monitoring and evaluate the net benefits, and manipulation is not perceived favorably by the investors. Banks with poorer accounting quality may face significantly higher cost of debts. Banks firms manipulate earnings through loan loss provisions [18]. Accordingly, we proposed the following hypothesis:

H1: Earnings management through total loan loss provisions for banks has a positive relationship with debt costs.

H2: Earnings management through increased loan loss provisions for banks has a positive relationship with debt costs.

H3: Earnings management through decreased loan loss provisions for banks has a positive relationship with debt costs.

3. Methodology

This study collected data from 2011 to 2018 from S&P Capital IQ database. All 44 listed banks are included, for a total of 268 samples.

3.1 Dependent Variables: Cost of Debt (COD)

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). [10] measured debt cost as follows:

$$\frac{INTEREST_{it}}{AVGDEBT_{it}} \tag{1}$$

$INTEREST_{it}$ = interest expense for t; $AVGDEBT_{it}$ = the average debt for year t

3.2 Independent Variables: Real Earnings Management

Discretionary Loan Loss Provisions (DLLP)

Variation in bank earnings is driven predominately by the performance of the loan portfolio. Loans over 90 days past due and still accruing interest as well as loans no longer accruing interest are observable measures of the current loans at risk of default. In principle, each bank manager's basis for judgment with respect to these provisions is subject to periodic review by regulators. Banks therefore may manage earnings through allowable discretion in the recording of loan loss provisions. [18]. We measure discretionary loan loss provisions and revised [23] to as follow as:

$$LOSS_{it} = a_1 + a_2 SIZE_{it} + a_3 NPL_{it} + a_4 LLR_{it} + a_5 LRE_{it} + a_6 LC_{it} + a_7 LD_{it} + a_8 LCD_{it} + a_9 LF_{it} \varepsilon_{it} \tag{2}$$

where $LOSS_{it}$ = loan loss provisions as a fraction of total loans for t ; $SIZE_{it}$= the natural log of total assets for t; NPL_{it}= nonperforming loans (includes loans past due 90 days or more and still accruing interest and loans in nonaccrual status) as a percentage of total loans for t; LLR_{it} = loan loss allowance as a fraction of total loans for t; LRE_{it}= real estate loans as a fraction of total loans for t; LC_{it}=commercial loans as a fraction of total loans for t; LD_{it} = loans to depository institutions as a fraction of total loans for t; LCD= consumer loans as a fraction of total loans for t; LF_{it}= loans to foreign areas as a fraction of total loans for t. Discretionary loan loss provisions represent the component of loan loss provisions that is more susceptible to manipulation by bank managers, where the absolute value of ε_{it} to measure it were adopted and the residual of the regression is taken as the "abnormal" or discretionary component of loan loss provisions. Based on equation (2) models loan loss provisions as a fraction of total loans, we adopted the residual from equation time total loans for discretionary loan loss provisions. In addition, if ε_{it} form model (2) is positive indicating that banks have adopted discretionary loan loss provisions to earnings management to decrease their adjusted income (i.e., increase loan loss provisions); is negative indicating that banks have adopted discretionary loan loss provisions to earnings management to increase their adjusted income (i.e., decrease loan loss provisions).

3.3 Control Variables

[24] shows that the higher liquidity and interest coverage the lower cost of debt because companies make interest payments on outstanding debts easily. [25] find that firms with increased leveraged ratio receive favorable cost of debt because of economies of scale (i.e., most indebted companies, holding larger amounts of funding). [26] suggests that firms with good performance and low risk have a lower cost of debt capital. We followed the previously listed references to measure the control variables. LIQ_{it-1} is liquidity ratio and measured as the current assets divided by the current liabilities at t-1 year. IC_{it-1} is interest coverage ratio and measured as the earnings before interest, taxes, depreciation and amortization (EBITDA) divided by the interest expense at t-1 year. LEV_{it-1} is leverage ratio and measured as the total debt divided by the total assets at t-1 year. $PERF_{it-1}$ is measured as the firm i's cash flow from operations divided by total assets at year t-1. All above control variables are lagged one year, because loan interest rates based on accounting information obtained from financial reports of the previous year [26]; [10]

3.4 Model

$$COD_{it} = a_0 + a_1 DLLP_{it-1} + a_2 LIQ_{it-1} + a_3 IC_{it-1} + a_4 LEV_{it-1} + a_5 PERF_{it-1} \tag{3}$$

$$COD_{it} = a_0 + a_1 ALLP_{it-1} + a_2 LIQ_{it-1} + a_3 IC_{it-1} + a_4 LEV_{it-1} + a_5 PERF_{it-1} \quad (4)$$
$$COD_{it} = a_0 + a_1 BLLP_{it-1} + a_2 LIQ_{it-1} + a_3 IC_{it-1} + a_4 LEV_{it-1} + a_5 PERF_{it-1} \quad (5)$$

where COD_{it+1} is the cost of debt that is obtained by using the [10] model at t year. $DLLP_{it-1}$ is absolute value of the value of ε_{it} form model (2), indicating that banks have adopted discretionary loan loss provisions to earnings management at t -1year. $ALLP_{it-1}$ is actual value of the value of ε_{it} form model (2), indicating that banks have adopted discretionary loan loss provisions to earnings management to decrease their adjusted income (i.e., increase loan loss provisions and above zero the value of ε_{it}) at t -1year. $BLLP_{it-1}$ is actual value of the value of ε_{it} form model (2), indicating that banks have adopted discretionary loan loss provisions to earnings management to increase their adjusted income (i.e., decrease loan loss provisions and below zero the value of ε_{it}) at t -1year. LIQ_{it-1} is the liquidity ratio and measured as the current assets divided by the current liabilities at t-1 year. IC_{it-1} is the interest coverage ratio and measured as the earnings before interest, taxes, depreciation and amortization (EBITDA) divided by the interest expense at t-1 year. LEV_{it-1} is leverage ratio and measured as the total debt divided by the total assets at t-1 year. $PERF_{it-1}$ is measured as the firm i's cash flow from operations divided by total assets at year t-1.

3.5 Forecasts Model

The paper investigate the effect of misspecification of a statistical models simulation. A correct model which is the same as the true underlying process that generates the observations should be known and fitted the observations. Then statistics from this correct model serve as the base for determining the effects of mis-specified models with respect to those statistics, and is a major measure of accuracy or loss. To examine which of the two sets of forecasts provides the best accuracy, the analyst can use criteria based on some average or median of loss functions of the forecast errors. Well-known examples include the mean squared error (MSE), Root MSE (RMSE), mean absolute error (MAE), median AE, Mean absolute percentage error (MAPE)   Median APE, root mean squared percentage error (RMSPE), and the root median squared percentage error(RMSPE).The references are provided by [27]. We use regression models to estimate the error value of ε_{it}. The related models as follow as:

Definitions	Variables	Statistics
Squares	ε_{it}^2	Mean squared error (MSE) Root MSE (RMSE)
Absolute	$\|\varepsilon_{it}^2\|$	Mean absolute error (MAE) Median AE
Absolute percentage	$\left\lceil \dfrac{100\widehat{\varepsilon_{it}}}{y_t} \right\rceil$	Mean absolute percentage error (MAPE) Median APE Root mean squared percentage error Root median squared percentage error.

3.6 Robustness Test

In order to avoid possible bias from extreme values, the study also adopt those samples only include the sample data of from the 5th percentile to the 95th percentile as measures for the robustness test [28]

4. Empirical Results

4.1. Descriptive Statistics

Tables 1 present the regressions results of the loan loss provisions model and shows that size, real estate loans and commercial loans have a non-significantly negative relationship with loan loss provisions; loans to depository institutions and consumer loans have a non-significantly positive relationship with loan loss provisions; nonperforming loans and loan loss allowance have a significantly positive relationship with loan loss provisions; loans to foreign areas has a significantly negative relationship with loan loss provisions. Table 1 also shows the estimated cross-section of the discretionary of loan loss provisions (all of residual value is measured by equations 2 has passed the t-test). The mean of total loan loss provisions is negative, thus indicating that listed banks in China have adopted total discretionary loan loss provisions to earnings management to increase their adjusted income (i.e., they recognized less total loan loss provisions).

Table 2 shows the descriptive statistics of [23] model and the mean of the loan loss provisions as a fraction of total loans for t is 1.056%, and the nonperforming loans as a percentage of total loans for t is only 1.171%, which show that which shows that listed banks in China may not prefer to loan loss provisions as a fraction of total loans for t because they may have conservative lending strategy. Furthermore, the mean of commercial loans as a fraction of total loans for t is 61.95%; this shows that listed banks in China may prefer to loans through commercial loans. Table 3 shows that the mean of the cost of debt is 2.497%, which shows that listed banks in China may prefer to finance through debt because they may have cheaper cost obtain funds from debts. Furthermore, the mean of interest coverage ratio is 1.645 and the debt ratio of leverage ratio 93.94%; this shows that listed banks in China face financially structurally or conservative (i.e, they have better coverage of outstanding debt and higher liquidity make interest payments on outstanding debts easily). However, the cash flow from operations for t-1 year is negative value shows they may face to obtain funds.

Table 1: Regressions of beatty et al. (2002) model (sample=268).

	Dependent variable: $LOSS_{it}$
intercept	0.00646
$SIZE_{it}$	-8.3E-05
NPL_{it}	0.38571***
LLR_{it}	0.258699***
LRE_{it}	-0.00684
LC_{it}	-0.00917
LD_{it}	0.000149
LCD_{it}	8.1E-05
LF_{it}	-187.288**
R²	0.337787
F value	18.02416***

where $LOSS_{it}$ = loan loss provisions as a fraction of total loans for t ; $SIZE_{it}$= the natural log of total assets for t; NPL_{it}= nonperforming loans (includes loans past due 90 days or more and still accruing interest and loans in nonaccrual status) as a percentage of total loans for t; LLR_{it} = loan loss allowance as a fraction of total loans for t; LRE_{it}= real estate loans as a fraction of total loans

for t;LC_{it}=commercial loans as a fraction of total loans for t; LD_{it} = loans to depository institutions as a fraction of total loans for t;LCD= consumer loans as a fraction of total loans for t;LF_{it}= loans to foreign areas as a fraction of total loans for t. *:p<0.1、**: p<0.05、***: P<0.01

Table 2: Descriptive statistics of beatty et al. (2002) model

	Max	Min	Avg
$LOSS_{it}$	0.041051	0.001289	0.010560
$SIZE_{it}$	6.603064	3.565942	5.153176
NPL_{it}	0.033174	0.002165	0.011713
LLR_{it}	0.053970	0.013710	0.028005
LRE_{it}	0.380000	0.034000	0.180446
LC_{it}	0.888916	0.377689	0.619505
LD_{it}	0.730048	0.000000	0.067106
LCD_{it}	0.483198	0.000000	0.184042
LF_{it}	0.000022	0.00000	0.000002
ε_{it}	0.025279	0.000000	-0.011375

where $LOSS_{it}$ = loan loss provisions as a fraction of total loans for t ; $SIZE_{it}$= the natural log of total assets for t; NPL_{it}= nonperforming loans (includes loans past due 90 days or more and still accruing interest and loans in nonaccrual status) as a percentage of total loans for t; LLR_{it} = loan loss allowance as a fraction of total loans for t; LRE_{it}= real estate loans as a fraction of total loans for t;LC_{it}=commercial loans as a fraction of total loans for t; LD_{it} = loans to depository institutions as a fraction of total loans for t;LCD= consumer loans as a fraction of total loans for t;LF_{it}= loans to foreign areas as a fraction of total loans for t. ε_{it} are calculated as the difference between reported and expected loan loss provisions, wherein the latter are estimated to use the coefficients from model (2)

Table 3: Descriptive statistics of variables

	Max	Min	Avg
COD_{it}	0.039491	0.014157	0.024977
LIQ_{it-1}	0.578440	0.042095	0.315863
IC_{it-1}	2.524968	1.256517	1.645199
LEV_{it-1}	1.446268	0.890751	0.939440
$PERF_{it-1}$	148177.4	-181836.4	-10211.691045

COD_{it} is the cost of debt at t year. LIQ_{it-1} is the liquidity ratio and measured as the current assets divided by the current liabilities at t-1 year. IC_{it-1} is the interest coverage ratio and measured as the earnings before interest, taxes, depreciation and amortization divided by the interest expense at t-1 year. LEV_{it-1} is leverage ratio and measured as the total debt divided by the total assets at t-1 year. $PERF_{it-1}$ is measured as the firm i's cash flow from operations divided by total assets at year t-1.

4.2. Empirical Test

Table 4 shows that earnings management through discretionary loan loss provisions (including total loan loss provisions, increase or decrease loan loss provisions) at t-1year have a negative relationship with cost of debt at t year in Chinese listed banks (only total loan loss provisions and increase loan

loss provisions have a significantly   relationship with cost of debt). H1, 2. 3 are not supported. Creditors tend to focus on a firm's ability to generate future cash flows to ensure the payment of periodic interest and the principal. Earnings management through real operation manipulation is viewed more negatively than other earnings management tools because distorting cash flow through manipulation of real operation manipulation causes increased noise or errors in earnings and reduces investor expectations for future cash flow levels [15]; [13]

Signaling theory states that signals are informational cues sent out by one party to another to influence desired outcomes. Consequently, insiders focus on sending out positive signals to outsiders and avoid sending negative information to reduce information asymmetry, which helps firms reach their ultimate goal of positively influencing their desired outcome. Although creditors may consider earnings management have direct negative effects on the future level of net cash flows and increase information asymmetries (i.e, reduces the quality of financial reporting). It is likely that creditors do tolerate this opportunistic behavior, and therefore, positively evaluating the listed banks in China and not necessitating an additional yield premium. This results in firms obtaining cheaper funds (i.e., lower cost of debt) because managers in China listed banks tend manipulate loan loss provisions to sending out future loan quality signals to creditors; according to signaling theory, this action may reflect a conflict of interest between the principal (i.e., creditors) and the agent (i.e., managers) , therefore, reduce adverse selection and moral hazard problems and evaluate the net benefits, and manipulation is perceived favorably by the creditors. In addition, creditors may still consider that real earnings management through loan loss provisions will effluence bank's future cash flow, but will decrease bank's future cash flow uncertainty and asset value distributions, and therefore will decrease credit risk. Therefore, the lenders' estimates of future cash flows from which the debt will be repaid. In addition, the banks have adopted discretionary loan loss provisions to earnings management to increase their adjusted income (i.e., decrease loan loss provisions) enjoy a lower interest costs than the banks have adopted discretionary loan loss provisions to earnings management to decrease their adjusted income (i.e., increase loan loss provisions). Overall, the discretionary loan loss provisions play an importantly role in explaining the relationship between real earnings management with cost of debt in Chinese listed banks. Banks may face significantly lower cost of debts.

In additional, liquidity ratio, interest coverage ratio and cash flow from operations have a significantly relationship with cost of debt, which indicates that liquidity ratio, interest coverage ratio and cash flow from operations effluence China listed bank's cost of debt. The results from the variance inflation factors explains the variables for correlation. The result lies between 1.135 and 1.458 (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 [28]. The results show that most of them were consistent (in order to shorten the tables, we omit the solution).

To examine which of these models of forecasts provides the best accuracy, we use criteria based on the mean squared error (MSE), root MSE (RMSE), mean absolute error (MAE), median AE, mean absolute percentage error (MAPE), median APE, root mean squared percentage error (RMSPE), and the root median squared percentage error(RMSPE). According to the use criteria based such as the mean squared error (MSE), root MSE (RMSE), mean absolute error (MAE), median AE, mean absolute percentage error (MAPE), median APE, root mean squared percentage error (RMSPE), and the root median squared percentage error (RMSPE), table 5 shows that earnings management through decrease loan loss provisions at t-1year have a non- negative relationship with cost of debt at t year in Chinese listed banks , whereas banks earnings management through decrease discretionary loan loss provisions have a highest ability to explain the model (these values performed the lowest).

Table 4: Regression of real activities earnings management with cost of debt

	Dependent variable: COD_{it}		
intercept	0.049765***	0.051318***	0.050298***
$DLLP_{it-1}$	-3.3E-07**		
$ALLP_{it-1}$		-6.2E-07**	
$BLLP_{it-1}$			-7.5E-08
LIQ_{it-1}	0.008485***	0.009594***	0.009447***
IC_{it-1}	-0.01363***	-0.01474***	-0.01437***
LEV_{it-1}	-0.00501	-0.0052	-0.00483
$PERF_{it-1}$	7.75E-09	1.98E-08***	1.49E-08**
F- value	46.8288***	37.2519***	45.5023***
R^2	0.46185	0.425233	0.454558
samples	268	113	155

where COD_{it+1} is the cost of debt at t year. $DLLP_{it-1}$ is absolute value of the value of ε_{it} form model (2), indicating that banks have adopted discretionary loan loss provisions to earnings management at t -1year. $ALLP_{it-1}$ is actual value of the value of ε_{it} form model (2), indicating that banks have adopted discretionary loan loss provisions to earnings management to decrease their adjusted income (i.e., increase loan loss provisions and above zero the value of ε_{it}) at t -1year. $BLLP_{it-1}$ is actual value of the value of ε_{it} form model (2), indicating that banks have adopted discretionary loan loss provisions to earnings management to increase their adjusted income (i.e., decrease loan loss provisions and below zero the value of ε_{it}) at t -1year. LIQ_{it-1} is the liquidity ratio and measured as the current assets divided by the current liabilities at t-1 year. IC_{it-1} is the interest coverage ratio and measured as the earnings before interest, taxes, depreciation and amortization divided by the interest expense at t-1 year. LEV_{it-1} is leverage ratio and measured as the total debt divided by the total assets at t-1 year. $PERF_{it-1}$ is measured as the firm i's cash flow from operations divided by total assets at year t-1.

Table 5: Regression models for the accuracy: relationship between real earnings management with cost of debt

Statistics	Dependent variable: COD_{it}		
	Model(3)	Model (4)	Model (5)
Mean squared error(MSE)	1.49342E-05	0.000118566	1.11689E-05
Root MSE(RMSE)	0.003864478	0.01088879	0.003341996
Mean absolute error(MAE)	0.00294	0.010104	0.002623
Median AE	0.00234	0.009813	0.002275
Mean absolute percentage error (MAPE)	12.4367	43.50354	11.45657
Median APE	9.282184	39.87004	8.640107
Root mean squared percentage error(RMSPE)	3.526571	6.595722	3.384755
Root median squared percentage error.	3.046668	6.314273	2.939406
samples	268	113	155

5. Conclusions

This study focused on whether conducting earnings management by manipulating loan loss provisions in Chinese listed banks and has a significant effect on debt cost. This study collected data from 2011 to 2018 from S&P Capital IQ database. All 44 listed banks are included, for a total of 286

samples. The empirical results suggest that these listed banks in China that manipulate earnings through loan loss provisions have a negative effect on the cost of debt (only total loan loss provisions and increase loan loss provisions have a significantly relationship with cost of debt). The results show that the cost of debt are lower when these banks manipulating loan loss provisions and funds suppliers have adjusted their required minimum return of funds with banks that indulge in this earnings management behavior. The findings suggest that the bank's management tries to influence the upcoming cost of debt by actively engaging in real activities earnings management such as loan loss provisions. The study delivers an important message to firms regarding the economic benefits of providing high-quality accounting information. Overall, if a bank in China wants to obtain cheaper funds through manipulated earnings, then a certain profit target must be set; thus, they have incentives to management to manipulate earnings to obtain private benefits, causing these banks demand a certain profit level and banks' cost of debt to decline, therefore signaling theory is supported in this study.

The results provide critical implications for managers, creditors, researchers, and regulators. Managers of listed banks in China that manipulate loan loss provisions (including total loan loss provisions, increase loan loss provisions and decrease loan loss provisions) to obtain funds benefits obtain decrease cost of debt because creditors may consider that this earnings manipulating behavior is not a price risk factor, instead of providing creditors to calculate an truly operating risk. In other words, creditors may have understood the truly effects of REM by banks seeking to obtain funds benefits and not misled by REM, thus they trust real earnings through loan loss provisions. 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 credit markets based on loan loss provisions for listed banks seeking to fulfill the requirements that listed banks in China require to obtain funds benefits. Most listed banks adjusted their loan loss provisions in China. Therefore, the China Banking Regulatory Commission may tracked the loans activity of banks, inspected loans reports for source documents and items related to loan loss provisions and the taxation authorities may established a comprehensive taxation management system for loan loss provisions, wherein loan loss provisions represents the true level.

Future studies can explore the effects of business environments and strategies, management styles, governance systems, shareholding structures, and risk preferences on the manipulation of loan loss provisions by the management team for obtaining funds benefits. This study has three limitations. First, because of the limited data available, the findings cannot be generalized to non-listed banks. Second, the applicability of the proposed models used to measure earnings manipulation may not apply to banks among different nations because different nations have different environment such as banking regulations, capital markets, culture, government subsidy, laws, tax system etc. Third, several studies have also noted that a bank's manipulated earnings models through loan loss provisions, hence the other researchers may not be considered equivalent. Fourth, the study results only demonstrate that the negative influence of manipulating loan loss provisions on total cost of debt exists and is not robust after examining for other proxy such as credit ratings or cost of bond market

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