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Income Smoothing and the Cost of Debt and Credit Ratings

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Abstract *The goal of this research is to examine the effect of income smoothing on the cost of debt and the credit rating. The statistic community is the accepted firms in Tehran's stock exchange during 1385-1389, that the statistic sample has chosen from them. Also in this research we used Jones' modified model for measuring the discretionary accruals (measure of income smoothing). And we used regression analysis for testing the research hypothesis. The results of this research show that there is significant and negative relation between income smoothing and cost of debt. And also there is significant and direct relation between income smoothing and firm's credit rating.*

Key words Income smoothing, cost of debt, credit rating, discretionary accruals

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1. Introduction

In recent years, earning management has increased many serious questions for market financial regulators, investors and academic researches of many advanced countries and also the prevalence of earning management between companies is momentous for legislators and professional persons. Investors, creditor and financial analysts are interested in having more information concerning income smoothing in invested firms especially if this action is effective on risk and return.

Always earning manipulation doesn't show more than real profit figure ,but sometimes managers prefer to report profit figure less than real for reduction of accountability against some body that want a response. And by this way don't allow sending out the addition of cash because of tax or dividend. Some believe that there is no difference between earning management and dishonesty but the truth is that earning management is done in framework of accepted accounting principles. And managers in addition to compliance of accounting standards manage the earning (Scott, 2003). In this research the effect of income smoothing has examined on cost of debt and credit rating by Tucker and Zarowin's model and also the research questions are:

1. What is the effect of income smoothing on cost of debt?
2. What is the effect of income smoothing on credit rating?

Although there are many researches about income smoothing but there is no research about the effect of income smoothing on cost of debt and credit rating. So this research is new.

1.1. Definition of income smoothing

There are various definitions of income smoothing and every researcher based on his/her method that used in income smoothing has offered one definition. Barna and his colleagues know income smoothing as intentional reduction of fluctuation within accounting principles to the extent it seems normal to companies. Byldman know income smoothing as efforts made by management to reduce abnormal changes in income smoothing and within accounting principles. Both definitions are emphasizing on earning manipulation based

on profit of past years. Such that the abnormal return is reduced and reported earning be the same with expected earning.

1.2. Credit rating

Credit rating is increased with both positive firm's image in society and indicator's improvement and firm's financial ratios. So numerator of brand value equation and at last firm's brand value is increased. High firm's market share means more awareness and loyalty of customers. By increasing market share, firm's financial capability in providing advertising budget be increased. And also financial ratios are consolidated. These two processes make attractiveness of firm's shares in market be increased and also increase value of company's shares in stock exchange. Also this process makes credit rating be consolidated and facilitate financial providing by short and long term debt with lower rate (Azizi et. al, 1390).

2. Literature review

Pourheydari and Aflatouni (1385) have examined the motivations of income smoothing in accepted firms in Tehran's stock exchange with using of discretionary accruals. The results of this research show that income smoothing is done with discretionary accruals by managers of Iranian firms. And income tax and deviation in operating activities with discretionary accruals are principal stimulus for income smooth and against western researcher's results, the firm's size, the ratio of debt to total assets (debt deals) and earning fluctuating have little importance.

Molanazari and Karimi (1386) are examined the relation of income smoothing with firm's size and the kind of industry in accepted firms in Tehran's stock exchange. The results of this research show that there is strong correlation between firm's size (sale) and income smoothing. And this correlation is reverse correlation. Also there is no significant difference between earning smoother firms from an industrial point of view (axial or circumferential), but there is just a weak relation between industry and income smoothing in gross profit level.

Hashemi and Samadi (1388) have examined the effect of income smoothing on information content in accepted firms in Tehran's stock exchange the results of examining hypothesis show that income smoothing increase profit ability in predicting it and future operating cash flows while profit ability isn't increased in predicting accruals by income smoothing.

Shorozi and Pahlavan (1389) have examined the effect of firm's size on income smoothing. In this research the effect of firm's size on income smoothing is examined in accepted firms in Tehran's stock exchange and also 352 accepted firms in Tehran's stock exchange are examined during 1381-1385. The results of this research show that there is positive relation between firm's size and income smoothing.

Demory et. al. (1390) have examined the relation between income smoothing ,quality of earnings and value of firm in accepted firms in Tehran's stock exchange the results of multiple regression show that investors are price most value for qualified earnings smoother firms and least value for no qualified and no earnings smoother firms.

Moses (1987) and Ndubize, G.A. and Tsetsekos (1991) argue that firms begin to smooth for reduction of risk. In other words the lack of considerable fluctuation in earnings make sure the creditors that business unit can pay their demands in future.

Tucker and Zarowin(2006) have examined income smoothing on its information content . Based on the results of their research, income smoothing increase income's information content and smoothed earnings present information about earnings, cash flow and future accruals.

Tseng,L,J. and Chien, W.L. (2007) resulted that there is strong negative relation between profitability and income smoothing. Also in their research four factors such as profitability, debt quantity, quantity of paid earnings and firm's size are introduced as motivations for income smoothing.

Huang et al. (2009) have examined the effect of artificial smoothing and real smoothing on value of firm. The results of their research show that the value of firm is decreased because of using unusual deferred. And as a result using of real smoothing becomes increase.

3. Research conceptual model

The research conceptual model is Tucker and Zarowin's model (2006).

Income smoothing is estimated based on negative correlation between changes in firm's discretionary accruals (ΔDAP) and changes in optional benefit (ΔPDI). The Jon's model (1991) is used for estimating the discretionary accruals. That in it:

$$\mathbf{ACCRUALS}_t = \beta_0 (1/\mathbf{ASSETS}_{t-1}) + \beta_1 \Delta\mathbf{SALES}_t + \beta_2 \mathbf{PPE}_t + \beta_3 \mathbf{ROA}_t + \varepsilon_t \quad (1)$$

ASSETS is total assets
ACCRUALS is total accruals
ΔSALES is changes in sales

PPE is property, plant and equipment and ROA is return on assets using net income over lagged total assets. ACCRUALS, ΔSALES and ΔPPE are each deflated by the beginning-of-year total assets (ASSETS). Non-discretionary accruals (NDAP) are represented by the fitted values of regression 1:

$$\mathbf{NDAP}_{j,t} = \hat{\beta}_0 (1/\mathbf{ASSETS}_{j,t-1}) + \hat{\beta}_1 \Delta\mathbf{SALE}_{j,t} + \hat{\beta}_2 \mathbf{PPE}_{j,t} + \hat{\beta}_3 \mathbf{ROA}_{j,t} \quad (2)$$

And discretionary accruals (DAP) are represented by the deviations of actual accruals from NDAP:

DAP = ACCRUALS- NDAP (3)

The managed income series (PDI) is calculated as net income minus discretionary accruals, or

PDI = NI – DAP (4)

The TZ statistic is the correlation between the change in discretionary accruals and the change in un-managed income, i.e., Corr (ΔDAP,ΔPDI), using the current year's and past four years' observations. Firms with more negative correlations are higher smoothing firms.

3.1. Research hypothesis

This research is based on following hypothesis that after doing research and analyzing its results we experiment them and know their truth and untruth with statistics testing in significant level.

1. Income smoothing decreases cost of debt.
2 .Income smoothing increases credit rating.

3.2. Community and statistical sample

The goal of this research is examine the relation of income smoothing with cost of debt and credit rating. Based on necessary condition, I proceed to review and extract data from financial statements of sample firms. The restricted area of this research is accepted firms in Tehran's stock exchange. The statistical sample has chosen based on the following condition that with systematic elimination, the number of samples for testing of first stage includes 399 firms and for testing of second stage includes 314 firms.

1. Between years 1385-1389 have participated in exchange.
2. Their data bank be complete from 1385 -1389 and don't have data limitation.
3. Their financial year terminate to March.

3.3. Data and descriptive statistics of research:

A. Testing of first stage

The first equation descriptive statistics of estimating discretionary accruals are in table 1. That includes number of observation, mean, median, standard deviation, minimum and maximum. Mentioned quantities show research data.

Table 1. Research variables descriptive statistics is related to first estimating of discretionary accruals

ROA	PPE	SALES	ASSET	ACCRUAL	
6/393189	5/420920	89628/32	0.00000588	−37221/44	mean
7/416477	50/60173	161779/9	0.00000273	5/6325-	Median
6115/103	25165557	97/11338	000129/0	9457277	Maximum
207/138-	000000./0	0504/390-	0.0000000052	−23435289	Minimum
06695/20	1705797	4948/336	0.0000105	5/877151	Standard deviation
1938	1938	1938	1938	1938	Number of observation

Above information has extract from research sample that include 399 firms. Number of observation consists of five years existing data of sample firms. Manner of choosing sample is explained in previous chapter.

B. Testing of second stage

Table 2 and 3 show summary descriptive statistics of second stage's test i.e. examining cost of debt that include 314 firms. Because of information's defect, the number of observation is 310 companies.

Table 2. Descriptive statistic

Standard deviation	mean	Maximum	Minimum	Number of observation	
556000	−35781/514	2969117	−6272734	399	ACCRUAL
469000	5837/4889	51/5831363	−1305385/2	335	DAP
1642867/0	−0/9154193	09719/0-	−1	335	TZ
				335	Valid N (listwise)

Table 3.

TANGIB	ROA	COVER	MKBK	DEBT	SIZE	IS	AVEYIELD	
7/432967	052288/3	058065/0	602012/1	849522/0	48461/12	522079/0	3/646294	mean
76089	632043/5	0	287334/1	688426/0	51436/12	531746/0	648694/3	Median
25165557	76097/51	1	499477/8	485414/6	24168/18	1	9/733149	Maximum
0	0611/112-	0	62975/0	085628/0	652071/7	0	29046/4-	Minimum
2096137	98869/19	234244/0	997731/0	743152/0	509456/1	297154/0	742265/1	Standard deviation
890988/9	987602/1-	7794/3	507474/3	520246/4	230558/0	08296/0-	42185/0-	skewness
1312/107	64546/10	28387/15	52939/19	53549/27	021007/4	782406/1	270949/5	elongation
310	310	310	310	310	310	310	310	Number of observation

3.4. Relative statistics

A. Estimate of discretionary accruals (first stage of testing)

The regression results of estimating discretionary accruals are in following table. Firstly I summarize and classify the raw data of database's file then I do necessary calculations in Excel then I enter screened data as data panel in Eviews, data processing software, and the following regression output has obtained with 399firms and 1938 observations as table 4.

$$ACCRUALS_t = \beta_0 (1/ASSETS_{t-1}) + \beta_1 \Delta SALES_t + \beta_2 PPE_t + \beta_3 ROA_t + \varepsilon_t \qquad (5)$$

Table 4.

DEPENDENT VARIABLE ACCRUAL				Variable
Coefficient	Std. Error	t-Statistic	Prob.	
0/143219-	09/65699	-2.179924	0.0294	C
1120000000-	2300000000	-0.484567	0.6281	ASSET
123/6788	64/28743	1.923842	0.0546	SALES
0/141627	150295/0	0.942332	0.3462	PPE
7644/858	1567/257	4.877859	0.0000	ROA

R-squared	0.427610	Mean dependent var	-37221.44
Adjusted R-squared	275820/0	S.D. dependent var	877151.5
S.E. of regression	746445.2	Akaike info criterion	30.06832
Sum squared resid	853000000000000	Schwarz criterion	31.23795
Log likelihood	-28729.20	Hannan-Quinn criter.	30.49847
F-statistic	2.817115	Durbin-Watson stat	2.412730
Prob (F-statistic)	0.000000		

According to above table the considered regression is significant at 5% level, completely .because Prob's statistics (F – statistic) is under 5%.also Durbin-Watson stat is near 2 and this show that regression variables don't have internal correlation and one of classical regression assumptions has regarded.

By comparing the mean of obtained coefficients with Tucker and Zarowin (2006) and Sabramanim (1996) results we understand that the mean of $\Delta SALES$ coefficient is 123% and have positive significant relation with accruals and it is agreeable with TK results. Like TK study we found positive significant relation with accruals for ROA variable that had 76.44 coefficients, with this difference that obtained coefficient by TK is 4.16 for ROA, We can know the reason of this difference because of difference in elected sample and time and place interval of mentioned subject.

Obtained data from regression (1) consist of estimated accruals and wastes. Estimated accruals are the same with non-discretionary accruals (NDAP) that their equation is in the following.

$$NDAP_{j,t} = \hat{\beta}_0 (1/ASSETS_{j,t-1}) + \hat{\beta}_1 \Delta SALES_{j,t} + \hat{\beta}_2 PPE_{j,t} + \hat{\beta}_3 ROA_{j,t} \quad (6)$$

And discretionary accruals (DAP) obtain from difference of first and second equation i.e. difference of real and non-discretionary accruals that are wastes in regression 1's results.

$$DAP = Accruals_t - NDAP \quad (7)$$

Unmanaged income (PDI) is net income after reduction of discretionary accruals.

$$PDI = NI - DAP \quad (8)$$

After calculation of DAP and PDI based on five years firms, The correlation changes of these two variables for each firm calculated in 1385-1389. Negative correlation (TZ statistic) Show income smoothing, so whatever the negative correlation be more, the income smoothing be more too. So we choose firms with negative correlation and rank them based on smoothing. Then we allocate number 1 to firms with maximum of income smoothing(the most negative correlation) and number 0 to firms with minimum of income smoothing(the least negative correlation) and we called it as IS.

B. The costs of debt (second stage of testing)

In foreign countries there are validation institutions like Andpurz standard, Fich, Modiz, etc. these institutions rank firms based on credit and firms with better credit can take a debt with lower interest rate so their cost of debt is lesser. And vice versa firms with lower rate can't fund by debt Because of greater credit risk, comfortably. So they have to pay more interest to encourage creditors to debt them. But in Iran there is

no such this institution. So we use from another measurement for cost of debt and credit rating. Thus we use annual mean's natural logarithm of cost of financial as indicator of firm's cost of debt and credit rating.

For estimating the relation of firm's cost of debt and credit rating with income smoothing, we use from a sectional regression that its independent variable is annual mean's natural logarithm of cost of financial (AVEYIELD), this research key independent and considered variable is income smoothing rank (IS) and control variables consist of: the variables of firm's size(SIZE), debt ratio (DEBT), the value of stock market plus book value of the debt to book value of the assets (MKBK), dummy variable (COVER) (if operating cash flows are greater than current liabilities takes a value of 1, otherwise it takes a value of 0), output of assets (ROA) and the variable of property plant and equipment (TANGIB).

$$AVEYIELD_J = \alpha_0 + \alpha_1 IS_i + \alpha_2 SIZE_i + \alpha_3 DEBT_i + \alpha_4 MKBK_i + \alpha_5 COVER_i + \alpha_6 ROA_i + \alpha_7 TANGIB_i + \varepsilon \quad (9)$$

Hypothesis confirmation

First hypothesis: income smoothing reduces cost of debt.

Second hypothesis: income smoothing Increase firm's credit rating.

According to table5, there is significant negative relation between income smoothing (IS) and cost of debt(Prob<.05) and the coefficient of income smoothing is -1.48. so we conclude that whatever the income smoothing be greater ,the firm's cost of debt be lesser because these two variables have reverse(negative) relation. Thus the first hypothesis will confirm.

Table 5.

AVEYIELD Dependent variable				
Coefficient	Std. Error	t-Statistic	Prob.	Variable
-1.487870	0.242004	-6.148119	0.000	IS
0.397418	0.017228	23.06790	0.000	SIZE
0.272171	0.215326	1.263996	0.2072	DEBT
-0.404237	0.098689	-4.096080	0.0001	MKBK
-0.958183	0.335424	-2.856628	0.0046	COVER
-0.028213	0.007297	-3.866230	0.0001	ROA
0/000000117	0/0000000363	3/234655	0/0014	TANGIB

R-squared 0.463536	Mean dependent var 3. 646294
Adjusted R-squared 0.452913	S.D. dependent var 1. 742265
S.E. of regression 1.288672	Akaike info criterion 3.367423
Sum squared resid 503.1843	Schwarz criterion 3.451797
Log likelihood -514.9505	Hannan-Quinn criter. 3.401152
Durbin-Watson stat 1. 8147795	

Whatever the firm's credit rating be greater, firm can fund by debt and with lower cost of interest easily because of lower credit risk. Thus there is reverse relation between credit rating and firm's cost of debt. Since we confirm income smoothing and firm's cost of debt have reverse relation before, we conclude that income smoothing and firm's credit rating have direct relation. So the second hypothesis will be confirmed too.

Control variables

Coefficient of firm's size is 39 and coefficient of property, plant and equipment is 1.17. They have significant and positive relation with firm's cost of debt. This shows that if the company be greater or have more property, plant and equipment and its cost of debt is greater too.

Coefficient of MKBK, COVER and ROA is -.41,-.96 and -.28. They have significant and negative relation with firm's cost of debt. This shows that firms with more MKBK, COVER and ROA have lower cost of debt and vice versa.

But these results may not be true because of correlation between variables. So, for reduction of correlation between variables, estimate the model as following too.

$$AVEYIELD = \alpha_0 + \alpha_1 IS_i + \alpha_2 IS * SIZE + \alpha_3 IS * DEBT + \alpha_4 SIZE_i + \alpha_5 DEBT_i + \alpha_6 MKBK_i + \alpha_7 COVER_i + \alpha_8 ROA_i + \alpha_9 TANGIB_i + \varepsilon \quad (10)$$

The achieved results of above model presented at table 6.

Generalities

By adding variables like IS*SIZE and IS*DEBT to above model, the explanatory power of independent variable increase from .46 to .54. And all of independent variables have significant relation with dependent (cost of debt) variable (prob<.05). Also Durbin-Watson stat is 1.97. Compared to previous mode, it is near to 2 and this shows the lack of internal correlation between independent variables.

Table 6.

	AVEYIELD Dependent Variable			Variable
Coefficient	Std. Error	t-Statistic	Prob.	
-8.382510	1.148767	-7.296965	0.0000	IS
0.665194	0.100030	6.649960	0.0000	IS*SIZE
-0.715702	0.352520	-2.030246	0.0432	IS*DEBT
0.319107	0.024559	12.99325	0.0000	SIZE
0.839052	0.353282	2.375021	0.0182	DEBT
-0.234054	0.095333	-2.455118	0.0146	MKBK
-0.828776	0.315442	-2.627349	0.0090	COVER
-0.031832	0.006924	-4.597182	0.0000	ROA
0000000984/0	0000000344/0	862539/2	0045/0	TANGIB
R-squared 0.536275		Mean dependent var 3.646294		
Adjusted R-squared .523950		S.D. dependent var 1.742265		
S.E. of regression 1.202100		Akaike info criterion 3.234619		
Sum squared resid 434.9583		Schwarz criterion 3.343101		
Log likelihood -492.3660		Hannan-Quinn criter. 3.277986		
Durbin-Watson stat 1.973266				

According to output 6 , we understand that IS*SIZE 's coefficient is .67. and IS*SIZE is also positive and significant, indicating that large firms experience more costs of debt, that this is less likely to be the case for higher smoothing firms. Also we see in table 6 that IS*DEBT's coefficient is -72. And IS*DEBT have negative and significant relation with cost of debt and we can conclude that higher debt ratio and lower credit rating have more relation with cost of debt. So the effect of income smoothing is more than debt's ratio effect .also we understand that debt's ratio DEBT that its coefficient is .84 have positive and meaningful relation with firm's cost of debt. It means that firms with higher debt's ratio That have higher credit risk should pay more interest for absorption of financial resources by debt that this make to increase the costs of debt.

In addition achieved results of renewed regression (table 6) are more similar to previous results (table 5) that higher income smoothing has significant relation with lower cost of debt.

4. Conclusion

The results of this research show that there is negative relation between income smoothing and firm's costs of debt, so if income smoothing be high, cost of financial fund will reduce by debt. In other words creditors at the time of granting financial facilities to firms consider its financial stability to be sure of basis receipt and their claims' interest. If firms have lower financial stability, they can fund just with paying more interest by debt. Thus firm's managers use income smoothing as one of financial stability ways to reduce its cost of debt by increasing financial stability.

Since one of the firm's important financial sources is financing by debt and financial costs are the major parts of firm's costs, so firms want to reduce their financial costs and increase their performance by condition improvement and attract firm's condition with the help of income smoothing. Also financial markets have positive reaction by shares price increasing of such firms.

Also the results of this research show that income smoothing make to increase firm's credit rating. Because income smoothing reduces the firm's credit risk by increasing the forecasts accuracy and creditors want to grant borrowing with lower cost.

In summary research hypothesis and their results are as follow:

Results	Research Hypothesis
Confirmation	Income smoothing decreases cost of debt
Confirmation	Income smoothing increases credit rating

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