

**Research Article**

## **THE RELATIONSHIP BETWEEN PROFITSMOOTHING, CAPITAL COST AND THE EMPHASIS ON THE LIFE CYCLE OF LISTED COMPANIES IN TEHRAN STOCK**

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### **ABSTRACT**

The goal of present research is to observe profit smoothing effect on capital cost and also such contact related to different stages in the life cycle of companies. To gain research goals, 116 companies listed in Tehran stock have been chosen as the statistical sample from 2008 to 2013 and observed through panel data method and research hypothesis method. In first stage, descriptive statistics of research variables have been presented. Then, Panel unit root test was done for research variables and results showed the reliability of the parameters. The first hypothesis, according to the results, Lymr F test was conducted through panel data method and showed negative and meaningful effect of the capital cost. Also after categorizing the companies to different stages of life cycle, retest was done and showed that the effect of profit smoothing on capital cost was depend on different stages of company's life cycle.

**Keywords:** Profit Smoothing, Capital Cost, the Life Cycle of Companies, Panel Data, Wald Test

### **INTRODUCTION**

Separating ownership from management in Joint stock companies can makes potential possibility for the managers to transfer some part of the internal group's wealth to them. As the managers access the data which the others are deprived of somehow. Secondly, due to provision and intromission of data, such as financial data by the managers, there is the probability to change the mentioned data in their interest. Access of the managers to the data could lead them to profit smoothing. Profit smoothing phenomena wouldn't be considered optimum one when face the investors with the problems, but there would be no problem if the goal of management from profit smoothing is increasing the trust of the investors through profit fluctuation reduction, as by increasing the trust of the investors by reporting company benefit to them, the company financial risk would be decreased on behalf of the stockholders and expected return would be decreased and through this way, the cost of company capital would be decreased. Therefore as the first step, the effect of profit smoothing on company capital cost would be observed.

On the other hand, many researches showed: profit low and stable fluctuation is the indicative of quality. In this way, the investors could invest with more certainty in the stock of the companies with more stable profit process. Smoothed income caused the future prediction easier for analysts and investors and caused to increase stock cost and through this way conceptual risk of trade centers and business center valuation uncertainty would be reduced. Regarding negative aspects of profit smoothing, opportunistic use of profit smoothing could affect the transparency of reported accounting data reversely. The data non-transparent economic results would affect the tendency of investors to buy company stock. Therefore according to positive and negative effects of profit smoothing, observing the effects of profit smoothing on data level of confidence could be interesting.

As mentioned, the companies are seeking to decrease capital cost, as decreasing capital cost would lead to increase of stockholder's wealth and the cost of financial provision would decrease company's required fund. The decrease of capital cost could provide the possibility to choose investment projects in wider range for the managers and also increase company's profit. The managers try to attract the investor's satisfaction and trust by decreasing the risk of the company to attract more financial sources so they could increase the liquidity of their stock and company's stock return. The method to reach such goals was always focused by the managers and investors. According to the fact that profit smoothing is considered

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as one of the features of index profit for data uncertainty, so observing and determining the level of effect on capital cost would be prominent to decrease capital cost. In fact, the goal of present research is observing and explaining the level of profit smoothing effect on capital cost decrease to transparent the type of effect on this administrative actions. Among the other goals of the research, observing the relation between profit smoothing and capital cost and also emphasizing the company's life cycle listed in Tehran stock could be considered.

### **Research Theoretical Principles**

In this section, defining profit smoothing concept, capital cost, company's life cycle and former studies would be focused.

#### *Profit Smoothing*

Profit is considered as important financial data which is focused by the individuals at the time of making decision. The analysts generally consider profit as one of the most important factors in their judgment and observations. The investors depend on financial data mentioned in financial statements of economic units, especially reported profit for their investment decisions. The investors believe: fixed profit in contrast to fluctuated profit guarantees higher dividend. Also profit fluctuation is considered as an important criterion of company general risk and the companies with smoother profit are having inconsiderable risk. Therefore, the companies which are having smoother profit are more interested to invest and in their view, it would be better place to invest. According to above definition, one of the main problems of profit management is profit smoothing that is concentrated in accounting literature. Profit smoothing hypothesis recommends that: the profit to decrease fluctuations is changing consciously around the level which seems normal for the company and the managers use policies and methods in frame of accounting accepted principals to decrease reported profit variance (Miler & Sak, 2002) some of the researchers consider profit smoothing as profit fluctuation deliberatereduction in the framework of accounting framework to seem normal for the companies and the others consider profit smoothing as management implemented attempt to decrease abnormal changes in profit and in the frame of accounting principles. Generally, profit smoothing is defined as: conscious measures of management to gain specific goals in the frame of accounting process (Chen, 2009) in fact the investors believe: fixed profit in contrast to fluctuated profit could guarantee more dividend.

Furthermore, profit fluctuation, as company overall risk criterion and the companies with smoother profit are having less risk. Therefore, the companies which are having smoother profit are more suitable for investment and in their opinion better place for investment (Mehrani and ArafManesh, 2008).

#### *Capital Cost*

Capital cost is generally one of the basic due to wide usage in financial literature and is also focused now by the scholars in this field. Capital cost is considered as a criterion to assess performance in economic value added model and is having other usages like: acceptance criteria for new investment projects, the discount rate used to calculate the market value added and the criterion to assess capital return rates.

Financial provision is done in different ways such as: Borrowing, issuing shares and accumulating profit of the company.

Choosing the best option of funding, should be along with the consideration of financial costs which is called capital cost in accounting literature. Some people consider the ability of the companies to recognize potential financial sources to use in investments and provision of suitable financial plans as the main factor of the company progress. The expectations and the favors of different cash providers should be recognized by the company to manage capital cost in an appropriate manner. Therefore, company management should define the cost of the various sources of funding in line with determination of suitable financial sources and also determine the effects of financial sources on return and company risk. In fact, capital cost is the minimum return rate that economic units should gain to provide expected return of the investors.

In case of contacting capital cost and the issue of maximizing stockholder's property, capital cost could be defined as the minimum rate of return and the companies should gain, so the value wouldn't change. In this definition, the issue of head to head rate is considered. If the company couldn't achieve capital cost,

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the value of the company's security value would be decreased, but if company's return is more than capital cost, the value of the company would be increased.

The companies are seeking to decrease capital cost, as decreasing capital cost would increase the wealth of the stockholders and the cost of funding would decrease company's required funding cost. Decreasing the capital cost could provide the availability to choose investment projects in wider range for the managers and increase company's profiting. The managers try to attract the trust and satisfaction of investors by decreasing the risk of the company, such as data uncertainty to get more financial sources and increase stock Liquidity. Profit smoothing can decrease the company's profit fluctuation. Decreasing profit fluctuation and the its stability during long period can increase the certainty of the investors to company's financial data. On the other hand if profit smoothing is done to avoid the awareness of stockholders from bad news and publishing bad news in company and its effect on stock cost, would suddenly cause certainty decrease of investors.

#### ***The Company's Life Cycle***

Business units according to every steps of economic life, follow specific policy. Such policies would be reflected in accounting data of the companies. In accounting field, some of the researchers focused on company's life cycle effect. The researchers considered 4 steps to describe company's life cycle as following:

- Emergence step
- Development step
- Maturity step
- decline or stagnation step

In emergence step the level of properties (the company size) is in low level, cash flows obtained from operating activities and profitability is low and companies to finance and realize growth opportunities need high liquidity. The proportion of dividend in these companies was usually equal to zero or maximum 10% and investment return or balanced investment return compare to weighted rate of capital cost was inconsiderable. In other words, ( $IRR \leq K$        $MIRR \leq Ka$ ) equation is offered (Dehdar, 2007).

In development level, the company size was more than company size in emergent level and the rate of sale and income development is more than emergence level. Financial sources are more invested in properties and the company is having more flexibility than liquidity indicators. The proportion of dividend in such companies is between 10% to 50%. Investment return or balanced investment return is always increasing on capital cost balanced rate. In other words ( $IRR >K$        $MIRR >Ka$ ) equation is offered (The same source).

In decline step, as there is the opportunity of growth, probably that is so inconsiderable. Indicators of profitability, liquidity and performance of obligations is having decreasing trend, while funding cost from foreign sources is so high, in the way that in most of the cases investment return items or balanced investment return is less than capital cost balanced rate. In other words ( $IRR <K$        $MIRR <Ka$ ) equation is offered (The same source).

#### ***Reviewing Former Researches***

Bart *et al.*, (2013) observed the relation between profit transparency and the cost of normal stock investment. They measured and defined profit transparency balanced correlation coefficient derived from regression of stock returns on profit and changes in profitability. In their opinion, profit more transparency would lead to information asymmetry reduction, risk premium and expected return of the stockholders and finally would decrease the cost of company capital. They observed 51612 companies from 62371 and realized that: profit transparency is having negative and meaningful relation with the cost of company common stock capital. Cahng *et al.*, (2008) in a research titled, the effect of disclosure quality on data asymmetry and realized that disclosure quality as efficient plan could affect investor's relation method. it means, it could lead to disclosure position of the company, the attention of the analysts to the company, attract institutional investors, improve public understanding, reduce the capital, cost and finally reporting and increasing the standards. The results show: The price gap is negatively associated with disclosure of information. In other words, information asymmetry that is caused by the price gap

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between supply and demand (a measure of liquidity) would be decreased by Enhancement of transparency quality and disclosure. Therefore, it could be asserted that by increasing disclosure quality, the liquidity would increase. Khodami and Roostae (2014) in a research observed the relation between income smoothing including tax by avoiding from tax and data content. By choosing a sample including 92 companies listed in Tehran stock exchange and by choosing effective rate of cash tax as a criterion to assess the avoiding from the tax in the frame of multivariate regression panel, observed their hypothesis. The result of the research indicated that; there is meaningful negative relation between profit smoothing and cash effective tax rate.

This result is in line with the fact that profit smoothing decreased uncertainties related to future tax benefits and it could provide this possibility for the companies to use successful tax avoidance. Also the result of the research proves: there was negative meaningful relation between income smoothing including tax and data content and income smoothing including tax would decrease data content. Saeedi *et al.*, (2013) in a research observed the relation between real profit management activities and future performance of companies listed in Tehran Stock Exchange. By choosing 123 companies as statistical population for a period of 9 years utilized the real benefit management measures proposed by Kohen and Zarovin (2010). Also they used future operating cash flow and operating profit as the criterion for future performance. The results show: there is reverse and meaningful relation between management criteria of real profit and future performance. In other words, it could be deducted that: changing real activities in current period would reduce the future performance of the company.

## **MATERIALS AND METHODS**

### **Research Method**

In this research, in the case of considering proper statistical sample from statistical population, systematic deletion was used. In this regard, 5 following criteria are considered and in the case that a company could gain all criteria, would be chosen as research sample and the others would be deleted.

- The company is accepted before 2003 in stock exchange and was active to the end of 2013
- Due to specific nature of the activity in holding, insurance, leasing, banks, financial institutions and investment , especially from external finance and significant differences with manufacturing companies and commercial, the company wouldn't have any option than mentioned industries.
- The company stock should be traded during the research period.
- The company due to type of ownership, shouldn't be related to governmental or non-governmental public organizations. in other words, the company management should be non-governmental

After regarding all above criteria, 116 companies are remained as screened population and all of them are chosen as research sample. To observe the adequacy of statistical population, Cochran formula is used and the results showed the adequacy of the chosen sample size.

### **Research Hypotheses**

Research hypotheses are edited as following:

First hypothesis: profit smoothing reduces the capital cost of the companies listed in Tehran stock exchange.

Second hypothesis: the effect of profit smoothing on company's capital cost is different in different steps of company's life (development, maturity and decline)

### **The Method to Categorize the Companies Based on Life Cycle**

Antoni and Ramesh (1992) used 4variables such as (Sales growth, capital expenditure, dividends and age of the company) in their research to separate the companies to the steps of life cycle: in this research, separating the companies to different steps of life cycle was done by using 4 mentioned variables and according to the methodology of the park and Chen (2006) as following:

First, following four variables value would be calculated annually for each company

The companies are categorized to 5 classifications based on four mentioned variables and also by using statistical crouches and according to being located in regarding classification, they would receive score 1 to 5 based on table 1.

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**Table 1: The life cycle of the company**

Life cycle steps	Sale growth	Dividends	Capital costs	The age of the company
First crouch	1	5(1)1	1	5
Second crouch	2	4(2)3	2	4
Third crouch	3	3	3	3
Fourth crouch	4	3	4	2
Fifth crouch	5	3	5	1

Then, for per year, one compound score would be gained and would be categorized according to following terms in one of development, maturity or descend steps:

- A) If the total score is between 16 to 20 would be categorized in development step.
- B) If the total score is between 9 to 15 would be categorized in maturity step.
- C) If the total score is between 4 to 8 would be categorized in descend step.

*The Research Models*

In this research Fama and French model (1992) is used to measure capital cost as following:

$$\text{Equation 1: Cost\_of\_Capital}_{i,t} = R_{f,t} + \beta_1 (R_m - R_f)_t + \beta_2 \overline{\text{SMB}}_t + \beta_3 \overline{\text{HML}}_t$$

Also to estimate beta coefficient in following equation, equation is used as following:

$$\text{Equation 2: } R_{i,t} - R_{f,t} = \alpha_1 + \beta_1 (R_{m,t} - R_{f,t}) + \beta_2 \text{SMB}_t + \beta_3 \text{HML}_t + \varepsilon_{i,t}$$

In above models Cost\_of\_Capital is normal stock capital cost, HML is stock return risk factor related to the ratio of book value to company market value; SMB is stock return risk factor that is related to the size of the companies, Ri-Rf is company stock monthly return difference and risk-free rate of return and Rm-Rf is market return difference and Risk-free interest rate per month.

*Independent Variable*

In this research negative correlation between the changes in discretionary accruals index ( $\Delta DA$ ) and the change in optional pre-determined profit ( $\Delta PDI$ ) are used.

To asses discretionary accruals, (DA) from balanced version of Jones model done by Kothari et al is used:

$$\frac{TA_{it}}{A_{it-1}} = \alpha_1 \left( \frac{1}{A_{it-1}} \right) + \alpha_2 \left( \frac{\Delta REV_{it}}{A_{it-1}} \right) + \alpha_3 \left( \frac{PPE_{it}}{A_{it-1}} \right) + \alpha_4 \left( \frac{ROA_{it}}{A_{it-1}} \right) + \varepsilon_{it}$$

In this equation TA introduces total accruals (The difference between net profit and cash flow from operations) A is Total assets, REV is the total income (sales), PPE is properties, machineries and gross equipment. Return on assets (ROAt) as a control variable is added to the model, as previous researches of Decho *et al.*, (1995) and Kotari *et al.*, (2005) concluded that Jones model isn't proper for good or poor performance models. After assessing the parameters of model 1 through time series and cross-sectional models, Non-discretionary accruals1 (NDA) would be calculated as following for assessment period:

$$NDA_{it} = \alpha_1 \left( \frac{1}{A_{it-1}} \right) + \alpha_2 \left( \frac{\Delta REV_{it}}{A_{it-1}} \right) + \alpha_3 \left( \frac{PPE_{it}}{A_{it-1}} \right) + \alpha_4 \left( \frac{ROA_{it}}{A_{it-1}} \right)$$

In last step, Non-discretionary accruals2 (DA) would be calculated as following:

$$DA_{it} = \frac{TA_{it}}{A_{it-1}} - NDA_{it}$$

Optional pre-determined profit (PDI) is calculated through discretionary accruals difference and net income (NI):

$$PDI = DA - NI$$

According to gained data from 2 above models (Non-discretionary accruals and pre-determined profit, income smoothing criterion means: Pearson coefficient is among changes in optional discretionary accruals and optional pre-determined profit  $\text{Corr}(\Delta TA\_Smoot, \Delta PDI)$  that is gained through current year data and last four years. To control the effects of time and industry, commercial units are categorized reversely between zero to one regarding the rate of profit smoothing. As result, business units are located

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in higher rate with more negative correlation regarding profit smoothing. The gained grade is defined as Dt variable and is implemented by using research main model.

**Control Variables**

In a research, the effect of all variables on each other couldn't be studied simultaneously. Therefore, the researcher controlled the effect of some variables or neutralized them. Used control variables are as following:

Lev<sub>i,t</sub> Is the total of debts divided by total assets of i company in t year, LnAsset<sub>i,t</sub> is natural logarithm of I company total assest in t year to million rials , Standard\_Dev\_Rate is annual standard deviation , I company stock monthly return in t year and RFR<sub>i,t</sub> is risk-free rate of return.

*The First Hypothesis Research Model*

Finally, research model is presented as following for first hypothesis.

$$\begin{aligned} \text{Cost\_of\_Capital}_t &= \beta_1 + \beta_2 TA\_Smoot_{i,t} + \beta_3 LnAsset_{i,t} + \beta_4 Lev_{i,t} + \beta_5 RFR_{i,t} \\ &+ \beta_6 Standard\_Dev\_Rate_{i,t} + \varepsilon_{i,t} \end{aligned}$$

In above model, Cost\_of\_Capital<sub>t</sub>, is the criteria of I company capital cost in t year and TA\_Smoot<sub>i,t</sub> is income smoothing index of I company in t year.

*The Second Hypothesis Research Model and Variables*

Also to test second hypothesis, 3 virtual variables for the companies which are in different steps of life cycle are defined and presented as following:

$$\text{Cost\_of\_Capital}_{it} = \alpha_0 + \beta_1 D_1 TA\_Smoot_{i,t} + \beta_2 D_2 TA\_Smoot_{i,t} + \beta_3 D_3 TA\_Smoot_{i,t} + \varepsilon_{it}$$

D<sub>1</sub> Is virtual variable which is 1 for the companies in development stage and 0 for other companies?

D<sub>2</sub> Is virtual variable which is 1 for the companies in maturity stage and 0 for other companies?

D<sub>3</sub> Is virtual variable which is 1 for the companies in descending stage and 0 for other companies?

β<sub>1</sub> ,β<sub>2</sub> Andβ<sub>3</sub> are respectively income smoothing variable coefficient on capital cost in development, maturity and descending stages. As above coefficients are different, it could be asserted that the method of income smoothing variable effectiveness in different stages of development has different effect on capital cost, so Wald Test would be used.

As the result, in the case that probability level of Zero hypothesis of Wald test unit level is less than 0/05

The second hypothesis would be confirmed  $\beta_1 = \beta_2 = \beta_3 = 0$

**RESULTS AND DISCUSSION**

**The Research Results**

In this section the research hypothesis test would be focused. Therefore, first and according to the standards, some specifications of observed variables would be assessed:

**Table 4-1: Descriptive statistics of research variables**

Variables	Average	Mean	Max	Min	Skewness	Tension	Jarge-bra statistic	Probability level
C	3.23	2/00	30.88	0/001	2/43	12/71	3418	0/000
T	0/50	0/50	1/00	0/001	-0/0001	1/79	41/87	0/000
L	0/63	0/64	2/07	0/10	0/99	9/43	1282	0/000
L	18.50	20/00	20/00	16/00	-0/60	1/47	108	0/000
R	13.58	13.50	18/45	10/03	0/60	4/10	90	0/000
S	14.36	11.43	427/16	0/05	0/68	320/07	2938427	0/000

Source: research results based on Eviewers 8

According to table3, the average of company financial leverage sample is equal to 0/6295 and indicates that companies spent average 62/95 percent of their properties for cross-company financing. The maximum and minimum value of this variable in the total time interval is respectively 0/1802 and 1/143.

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Observing skewness and tension of financial leverage variable indicates: this variable is having normal distribution as the skewness is equal to 0/086 and the tension is equal to 2/975.

**Panel Unit Root Test**

The first stage of econometric process is observing variable`s static. Generally, two proper categorizations with the compound data are introduced to econometric literature. In first categorization, the first hypothesis is that autoregressive coefficients (parameters) are the same in different intervals. The second categorization is also based on autoregressive coefficients of variability between the intervals. Zero hypothesis and against these tests are as following:

$H_0: \alpha_i = \alpha = 0$  It means there is unit root

$H_1: \alpha_i = \alpha < 0$  It means there is no unit root

In the case that statistic probability level is less than 5%, zero hypothesis of test would reject unit root (variable poor stability). It means, with minimum 95% probability level of certainty, it could be said that observed variable is stable. Table 3-4 shows the results of Hadri and Fisher-PP reliability test. The results show: all research variables are in stable level. As the calculated statistic value in both observations is bigger than absolute value of Critical value, so according to related probability level that is less than 1%, the zero hypotheses based on unit root (instability) was rejected at 99% level of confidence. Therefore, it could be mentioned that all research variables are in stable level.

**Table 4-3: The panel stability test result of Luvin, Lin, Chu , Im and sons, Shin at variable level**

Variable	Test type	Variable level		Result
		Statistic value	Probability level	
C	Hadri	15.60	0/00	I(0)
	Fisher-PP	313/08	0/00	I(0)
T	Hadri	15.48	0/00	I(0)
	Fisher-PP	287.98	0/00	I(0)
L	Hadri	16.62	0/00	I(0)
	Fisher-PP	127.23	0/00	I(0)
L	Hadri	13.383	0/00	I(0)
	Fisher-PP	303.16	0/00	I(0)
R	Hadri	13.35	0/00	I(0)
	Fisher-PP	162.59	0/00	I(0)
S	Hadri	9.26	0/00	I(0)
	Fisher-PP	338.98	0/00	I(0)

**The Results Gained from Research Hypothesis Test**

In research main hypothesis, the relation between income smoothing and capital cost is observed and statistical hypothesis could be explained as following:

$H_1$ : Income smoothing wouldn't reduce the capital cost of the companies listed in Tehran stock exchange.

To test this hypothesis, model 1 is used that is regression model and is assessed through panel data method:

$$\begin{aligned} \text{Cost\_of\_Capital}_{i,t} &= \beta_1 + \beta_2 TA\_Smoot_{i,t} + \beta_3 LnAsset_{i,t} + \beta_4 Lev_{i,t} + \beta_5 RFR_{i,t} \\ &+ \beta_6 Standard\_Dev\_Rate_{i,t} + \epsilon_{i,t} \end{aligned}$$

**F lymer Test Results for Research First Hypothesis**

In this step, the goal is to determine entered items on econometric model. In other words, first it should be clarified that regression equation in observed sample is having intercept heterogeneous and homogeneous slope or the hypothesis of homogeneous intercept and slope in different intervals. In this case, F lymer is

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utilized. According to this test, first model was assessed generally and chained with homogeneous intercept and slope (pulling) and calculated Restricted Residual Sum of Squares. Then the model was assessed unchained and by assuming heterogeneous intercept in homogeneous slope and intervals and Unrestricted Residual Sum of Squares is gained. F lymer test statistics was calculated based on following equation and compared with table F value:

$$F_{(nt-n-t-k,n)} = \frac{[RRSS-URSS]/(n)}{URSS/(nt-n-t-k)}$$

Zero hypothesis: Lack of individual fixed effects

N is the number of the intervals, t is time intervals and k is the number of model Explanatory variables. In the case that calculated F value is bigger than F value in table with specified degrees of freedom, the hypothesis of zero based on homogeneous intervals and intercepts (pulling method) is rejected. Therefore the effect of group is accepted and different intercepts should be considered. In the other words, compound method to asses Coefficients should be used. Table4-5 shows the results of F test and observes the lack of Individual fixed effects against individual fixed effects.

**Table 4-5: F lymer test result for research main hypothesis**

Zero hypothesis	Probability level	Test statistics	Zero hypothesis
The lack of individual fixed effects	1.20	there is no sectional fixed effects	0/08

Source: research results and by using EVIEWERS 8

As the table results indicate statistics value for no fixed sectional effect hypothesis is equal to 1.20 and isn't located in critical part (probability level value is bigger than 5%) means: there is no fixed sectional effect. It means: the companies aren't meaningfully different regarding capital cost. Finally, it could be concluded that consolidated method (instead of panel regression) could be used to estimate coefficients.

*Estimating Model and First Model Coefficient*

According to the tests of the previous sections, model number 1 is done by using panel data with the following results:

**Table 4-6: The results to assess first hypothesis model**

Independent variables	coefficient	Standard deviation	T statistic	Probability level	VIF
c	-29.48	6.74	-4.37	0.00	-
T	-1.45	0.74	-1.94	0.05	1.05
L	2.14	0.56	3.81	0.00	1.04
L	-1.08	1.35	-0.79	0.42	1.05
R	0.15	0.10	1.56	0.11	1.04
S	0.04	0/007	5.11	0.00	1.03

**Diagnostic Statistics**

The coefficient of determination	0.28	F statistics(probability level)	1.88
		Durbin Watson	2.33

Source: the research results and according to EVIEWRS8

Before interpreting the results mentioned in above table, considering following items seems important:

- The coefficient of determination indicates the probability rate of the correlation between the two sets of data in future. In fact approximate results of desired parameter is defined in mathematics model in future that is based on existing data and is equal to 28%. It means: on the results of present research, more than 28% of Changes at dependent variable would be explained.

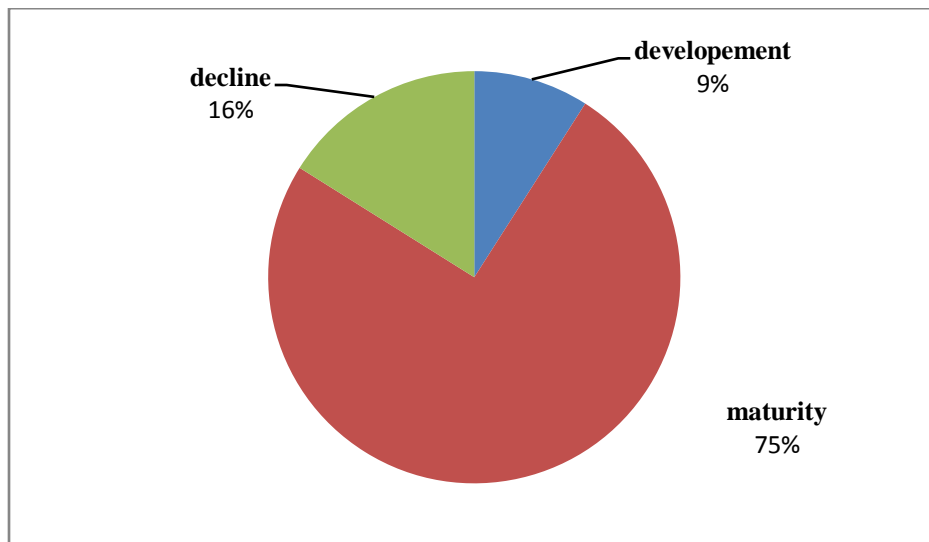


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- F statistics indicates general meaningfulness of regression regardless of meaningfulness or meaningfulness of research variables. According to F statistics, regression totality is meaningful.
- On the other hand, one of the hypotheses considered in regression is the independence of error sentences (the difference between real value and predicted value by regression equation) from each other. In fact, in the case that independency of error sentences is rejected and the errors are correlated, the results of model estimation wouldn't be interpreted by regression, therefore to observe the independency of the error sentences, Durbin Watson statistic is utilized. In the case that rate of statistic is between 1/5 and 2/5, the independency of error sentences could be accepted. In present research, Durbin Watson statistics also shows lack of autocorrelation in model remaining.
- In statistical issues, Variance inflation factor indicates ordinary least squares regression analysis of multicollinearity. In fact an index is introduced that offers that how changes related to assessed coefficient increased due to multicollinearity. Now if VIF (variance inflation factor) is close to 1 indicates the lack of Multicollinearity. On the other hand, if the rate of this factor is higher than 5, Multicollinearity would be problematic. In research results, it could be seen that: inflation rate of variance is close to 1, therefore it could be said that the variables of Multicollinearity of research wouldn't be acceptable.

#### Interpreting Research First Hypothesis Test

According to presented results in table4-6 the significant level of t statistics, income smoothing variable is having negative and meaningful effect on capital cost, as by increasing income smoothing index, capital cost would be decreased and by decreasing income smoothing index, capital cost rate of the companies would be increased and expected output of the stockholders would be increased. Therefore, the first hypothesis of the research is confirmed statistically in 95% minimum probability level.



**Diagram 1: The company's categorization based on life cycle**

The logarithm of company total property is having positive and meaningful effect on capital cost, as by increasing one unit of company total property, the companies capital cost index would increase to 2.14. Also the company stock return annual standard deviation variables and also risk-free rate of return is also having meaningful and positive effect on capital cost, so the company financial leverage variable wouldn't have meaningful effect on capital cost. However this negative coefficient is estimated.

#### Research Second Hypothesis Test Results

In second hypothesis of research, the relation between income smoothing and capital cost related to company's capital cost is observed and the statistical hypothesis is offered as following:

$H_0$ : the effect of income smoothing in company's capital cost in different stages of company's life (development, maturity and decline) isn't different

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H1: the effect of income smoothing on company`s capital cost in different levels of company`s life (development, maturity and decline) is different.

In first step, the sample companies are categorized through Park Chan methodology to different periods of development, maturity and decline. Among 696 companies, 63 companies have been on development stage, 521 were in maturity stage and 112 have been in decline stage. Diagram 1 shows the combination of sample companies based on life cycle.

To test first sub hypothesis, model number 2 is utilized which was a regression model and is assessed through panel data method.

$$\text{Cost\_of\_Capital}_{it} = \alpha_0 + \beta_1 D_1 TA\_Smoot_{i,t} + \beta_2 D_2 TA\_Smoot_{i,t} + \beta_3 D_3 TA\_Smoot_{i,t} + \varepsilon_{it}$$

Model 2: in fact  $\beta_1$  shows the effect of income smoothing index on the capital costs of the companies which are in development stage.  $\beta_2$  and  $\beta_3$  respectively are mentioned coefficients for the companies which are in maturity and decline stages, while  $\beta_1$ ,  $\beta_2$  and  $\beta_3$  are significantly opposite, the research second hypothesis could be confirmed. In the case that mentioned coefficients were opposite, it could be said that the effect of income smoothing on capital cost wouldn't follow the position of the company in the stage of life cycle.

*The Results of F lymer Second Hypothesis*

Similarly, first  $\beta_1$ ,  $\beta_2$  and  $\beta_3$  coefficients should be estimated. In this regard, compound data are used and before that the right combination of data, compared with panel data should be ensured. Therefore, F lymer test was used and results are mentioned in following table.

**Table 4-8: The results of F lymer test for second hypothesis**

Zero hypothesis	Probability level	Test statistics	Zero hypothesis
The lack of individual fixed effects	1.20	there is no sectional fixed effects	0/41

Source: research results and by using EVIEWERS 8

As the table results show, F statistics value for lack of fixed sectional effects was 1.02 and it isn't located in critical area. (Probability level value is bigger than 5%) it means: the companies aren't different regarding capital cost. Finally, it could be concluded that Integration method (instead of panel regression) to estimate coefficients should be used.

*Estimating Model and Assessing the Coefficient of Research Second Model*

According to the tests of previous sections, model number 2 is conducted through integrated data.

**Table 4-6: The results to assess second hypothesis model**

Independent variables	coefficient	Standard deviation	T statistic	Probability level	VIF
intercept					
	-5.52	1.37	-4.02	0.00	1.19
	-2.37	0.95	-2.47	0.01	1.47
	-0.52	1.24	-0.42	0.67	1.35
Cost_of_Capital	-0.21	0.05	-3.82	0.00	1.00

**Diagnostic Statistics**

The coefficient of determination	0.25	F statistics(probability level)	1.88
		Durbin Watson	2.03

Source: the research results and according to EVIEWRS8

According to the results of present research, the research variables explained more than 25% of dependent variable's change and according to F statistics, The totality of regression is significant. Durbin Watson

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statistics also indicates lack of autocorrelation in model remaining. It is considerable to mention that in first model, according to Durbin Watson statistics, the existence of autocorrelation among the remaining was defined and to remove that, the first halt of dependent variable was added to model and led to autocorrelation. Also variance inflation factor indicates lack of multicollinearity between the variables of research.

*Interpreting Research Second Hypothesis Test*

According to the presented results in table 4-6 P-value, the income smoothing variable effect coefficient on capital cost for the companies in stages of development, maturity and decline is respectively -2.37, -0.52 and -0.21, except related coefficient to decline is significantly meaningful. Therefore, in 95% confidence, it could be asserted that; income smoothing index of the companies which are in stages of development, maturity of life cycle, is having negative and significant effect on capital cost, therefore this relation for the companies which are in decline stage wouldn't be meaningful, even though this impact is negative. T compares the exact observation and research second hypothesis statistics, Wald test is used as following in table 4-10.

**Table 4-10: Wald test result for research model 2**

H <sub>0</sub> hypothesis	F statistics	Freedom degree	Significant level	Conclusion
$\beta_1 = \beta_2 = \beta_3$	6.33	2.460	0.00	Confirmation of research second hypothesis
$\beta_1 = \beta_2$	2.73	1.460	0.00	Confirmation of research second hypothesis
$\beta_1 = \beta_3$	3.55	1.460	0.00	Confirmation of research second hypothesis
$\beta_2 = \beta_3$	1.99	1.460	0.04	Confirmation of research second hypothesis

According to this table, in simultaneous comparison of  $\beta_1$ ,  $\beta_2$  and  $\beta_3$  coefficients, Wald test F statistics significant level was less than 0/05(0/00) and rejected test zero hypothesis (based on lack of difference in income smoothing effect on capital cost in different periods of life cycle. Therefore, the research second hypothesis is confirmed statistically and it could be asserted that income smoothing effect on capital cost is different in company's different stages of life cycle. Accordingly, it could be asserted that the highest negative effect of income smoothing on capital cost is related to the companies which are in development level and the lowest one is related to the companies which are in maturity level. Also as it is mentioned, in companies which are in decline stage, income smoothing is having meaningful effect on capital cost.

**Conclusion and Recommendations**

The present research is seeking to answer the fact that whether income smoothing could lead to capital cost reduction or not or whether the effect of income smoothing on capital cost is starting from the stage which company starts in life cycle (development, maturity and decline)?

To seek the response to mentioned questions, in chapter 3, 116 companies have been chosen as statistical population and according to some terms from 2008 to 2011 from 696 companies. The research first hypothesis according to F lymer test results was tested through panel data method and the result showed negative and significant effect of income smoothing index on capital cost .therefore research first hypothesis was confirmed statistically. According to results of income smoothing variable is having negative and significant effect on capital cost, as by increasing income smoothing index, capital cost would be decreased and vice versa ,by decreasing income index, the company's capital cost would be increased and stockholder's expected return would be increased. Therefore, probably with 95% confidence, the first hypothesis is statistically confirmed.

Then mentioned companies categorized by introduced method of Antoni and Ramesh to different cycle of (development, maturity and decline). It could be seem that 9% of the sample companies in development

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stage, 75% in maturity stage and the others are located in decline stage. After categorizing the companies to different levels of life cycle, retest was done and result showed: coefficient effect of income smoothing variable on capital cost for the companies in different stages of development, maturity and decline, was significant respectively -2.37, -0.52 and -0.21, except related coefficient to decline period. Therefore in 95% confidence, it could be mentioned that the income smoothing of the companies which are in stages of development, maturity and decline is having negative meaningful effect on capital cost, so this relation for the companies in decline stage isn't significant, even though this effect is negative. To compare research second hypothesis statistically and accurately Wald Test was used and the results rejected test zero hypothesis (based on lack of difference in effect of income smoothing on capital cost in different levels of life cycle). Therefore research second hypothesis was confirmed statistically and it could be asserted that income smoothing effect on capital cost is different in different stages of company's life cycle.

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