THE RELATIONSHIP BETWEEN COST OF CAPITAL AND CORPORATE LIFE CYCLES IN TEHRAN STOCK EXCHANGE

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ABSTRACT

In this study, the relationship between cost of capital and life-cycles of the companies listed in Tehran Stock Exchange was investigated. Multivariate regression model with panel and cross-sectional data were used in this study. Information on the companies from 2003 to 2013 (11 years) was checked. The companies were classified into three stages of growth, maturity and decline using Park and Chen variables and methodological categories. EViews 6 and SPSS 19 were used to analyze descriptive data, testing hypotheses and extracting the regression model. The results showed that cost of capital, cost of debt and cost of equity in various corporate life cycles (growth, maturity and decline) were significantly different.

Keywords: cost of capital, cost of debt, cost of equity

INTRODUCTION

Selection or an appropriate combination of long-term financial resources is one procedure used for maximization of corporate value and shareholder wealth. In such combination, financial resources with features like low cost of capital could significantly increase return on investment. Thus, cost of capital is also closely related to theory of capital structure. An optimal capital structure increases corporate value and minimizes total cost of capital. An optimal capital structure refers to combination of debt and equity, which maximizes corporate value.

In this study, the relationship between cost of capital and life-cycles of the companies listed in Tehran Stock Exchange was investigated. The rest of this chapter is organized as follows: outline of the study, operational definition of hypotheses, objectives, variables and statistical methods used to test the hypotheses.

Statement of the Problem

All living organisms like plants, animals and people follow a certain life cycle

(period). These creatures are born, grow up, grow old and eventually die. Living systems follow specific behavioral patterns in order to overcome their problems and difficulties in transition from one period to another period at every stage of their lives (Edizes, 1989). Like living organisms, growing and aging commercial units are primarily involved with the relationship between flexibility and control. In adulthood, organizations are flexible but often uncontrollable. In old organizations, relationship varies, control increases and flexibility decreases. On the other hand, growing old is eventually accompanied by a loss of control. Then, "young" shows that organizations change easily. On the other hand, young organizations experience the lowest level of control due to lack of prediction. "Old" indicates behavioral control, inflexibility, unwillingness to change. Life span do not show growth and aging. Large companies with a long life-cycle are either old or young.

In the field of accounting, such scholars as Anthony and Ramesh (1992), Blake (1998) and Aharoni (2003) have studied the effect of life cycle on accounting information.

These academics have explained four stages in order to describe corporate life cycle as follows:

1. The stage of birth or emergence
2. The stage of growth
3. The stage of maturity
4. The stage of decline or stagnation

At the stage of emergence, corporate assets are usually at low levels. Cash flow from operating and profitable activities is low too. The companies require high liquidity levels for financing and growth opportunities. Dividend payout ratio in these companies is at least equal to zero and at maximum equal to 10%. Return on investment is negligible in comparison with weighted rate of financing (Zhu, 2007).

At the stage of growth, size of growing companies is larger than emerging companies. Financial resources are largely invested in facilities and equipment (productive asset investment). Corporate liquidity indicators are within appropriate ranges. Corporate dividend payout ratio varies from 10% to 50%. In most cases, investment returns is more than weighted rate of cost of capital.
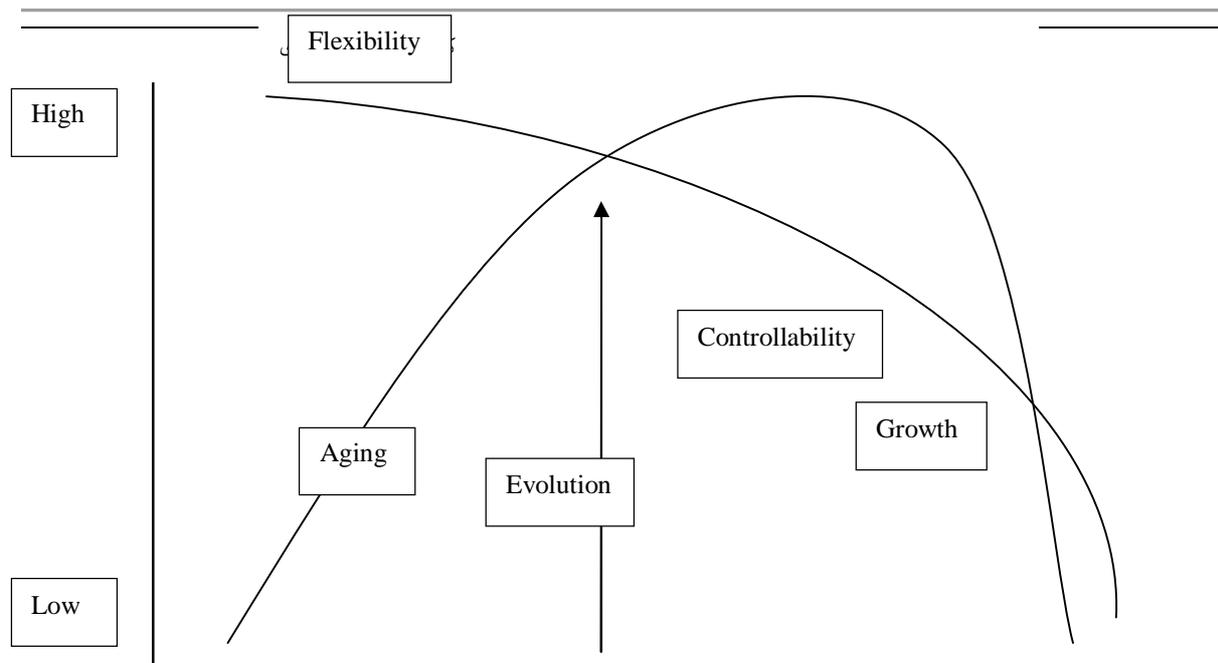
Figure 1-1- the relationship between flexibility and controllability in an enterprise life cycle

At the stage of maturity, the companies experience a stable and balanced sales growth rate. In most cases, the need for cash is met by domestic sources. The size of assets in mature companies is larger than growing companies. Corporate dividend payout ratio is at least equal to 50% and at maximum equal to 100%. Due to abundance of liquidity and deceased reliance on outsourcing funding policy, return on investments is generally equal to or greater than weighted rate of funding in these companies.

At the stage of decline, growth opportunities are negligible if any was found. Profitability and liquidity indicators and accruals had downward trends. The companies experience an intense competitive environment. In addition, the cost of financing is high due to outsource financing. As a result, return on investment is lower than the rate of financing in most cases.

Given the above-mentioned materials, the present study aimed to compare and investigate cost of capital at different stages of corporate life cycle (growth, maturity and decline).

Research Objectives

The present study aimed to evaluate the effect of corporate life cycle on cost of capital in the companies listed in Tehran Stock Exchange. The study also aimed to review empirical evidence and adapt the existing facts with the theories discussed in the field of the effect of corporate life cycle on cost of capital. Findings of the study can help capital market participants, decision-makers, financial analysts as well as potential and actual investors in stock

exchange to analyze the investment plans relevant to financial assets and securities with regard to corporate life cycle effective factors, which could help to select an optimal investment portfolio with the least risk and maximum return on investment while doubling transparency of both decision-making and the results.

LITERATURE

Evo *et al.* (1989) investigated the effect of corporate life cycle on informational content of financial ratios in order to forecast stock returns. Sustainable Growth Rate Ratio (SGRR) was used in the former study to analyze the statistical sample. Mean and standard deviation were calculated and converted to standard variables in each industry. The variables were compared with regard to a certain range in the area under the normal distribution curve and divided to four stages of birth, growth, maturity and decline. The results showed that in at 5% error level:

1. At the stage of birth, no significant relationship was found between changes in stock returns and financial ratios.

2. At the stages of growth and maturity, no significant relationship was found between changes in return on equity and financial ratios derived from financial statement

and balance sheets. Therefore, the relationship between financial ratios derived from cash flow statements was not significant.

3. At the stage of decline, no significant relationship was found between changes in stock returns and the financial ratios derived from financial statements.

Dehdar (2007) investigated the effect of life cycle on increasing explanatory power of profit-based valuation models and accruals in comparison with those models based on operating cash flows, investments and financing. The period from 1999 to 2004 was studied. The statistical sample consisted of 160 companies in both experimental and control groups. The companies were classified as growing, mature and declined based on mathematical expectations of two standardized criteria of sales growth and dividend payout ratio. The findings showed that profit-based valuation models and accruals are associated with higher increasing explanatory power compared to those models based on operating cash flows, investment and financing at the stages of growth and maturity. The reverse case scenario was observed at decline stage. In total, the findings showed that cumulative percent of information content of profits and other accruals explain corporate value based on

life cycle while operating, investing and financing cash flow do not follow the same pattern.

MATERIALS AND METHODS

In this chapter, research hypothesis, period of the study, statistical population and data collection methods were described. Then, statistical tests for testing the hypotheses were explained. Multiple regression equation was discussed in this chapter. In the next chapter, research findings were discussed and analyzed. This was an applied study with post hoc analysis (using data from the past). A library method was used to collect the required data using available information on Stock Exchange website, Rahavord Novin and Tadbir Pardaz software. In this study, panel data was used according to data type and statistical analysis methods.

Hypotheses

The main hypothesis: the cost of capital was significantly different at various stages of corporate life cycle (growth, maturity and decline).

The first sub-hypothesis: the cost of debt was significantly different at various stages of corporate life cycle (growth, maturity and decline).

The second sub-hypothesis: the cost of equity was significantly different at various stages of corporate life cycle (growth, maturity and decline).

Research models and operational definition of variables

The model for testing the main hypothesis:

$$\beta LEV_{i,t} + \varepsilon_{i,t4} + \beta BETA_{i,t3} \beta SIZE_{i} + {}_2\beta \sum_{i=1}^{r} \beta_i CLC\_DUM_{i,t} + {}_1 + \alpha_0 COE_{i,t} =$$

The model for testing the first sub-hypothesis:

$$\beta LEV_{i,t} + \varepsilon_{i,t4} + \beta BETA_{i,t3} \beta SIZE_{i} + {}_2\beta \sum_{i=1}^{r} \beta_i CLC\_DUM_{i,t} + {}_1 + \alpha_0 COD_{i,t} =$$

The model for testing the second sub-hypothesis:

$$\beta LEV_{i,t} + \varepsilon_{i,t4} + \beta BETA_{i,t3} \beta SIZE_{i} + {}_2\beta \sum_{i=1}^{r} \beta_i CLC\_DUM_{i,t} + {}_1 + \alpha_0 COS_{i,t} =$$

Statistical population and sample

The statistical population consisted of all the companies listed in Tehran Stock Exchange from the beginning of 2003 until the end of 2013. Final sample size was determined based on systematic elimination sampling method by applying restrictions and following terms:

1- Available information to calculate operating parameters

2- Active companies listed in Tehran Stock Exchange from the beginning of 2007 to the end of the study

3- The financial year ends at 29 March

4- Not involved with banks as well as financial and investment institutions

Final sample size was determined as 174 according to above terms and restrictions to the study.

Data collection

Secondary sources were used to collect theoretical data and findings of previous studies and required data accurately. Library method was used to collect data on literature and formulas for extracting research variables. The statistical data related to research hypotheses was extracted from financial statements using corporate organizational documents. The collected data was used to calculate research variables according to hypotheses. The collected data was derived from audited documents. Therefore, the formulas used in the scientific population was used to convert the collected data. As a result, it was claimed that measurement tool was valid. Certain formulas known as standard global tools were used for calculation of studied indices. The tools were specifically used to measure the desired traits according to a review of literature and theoretical principles of the study. Thus, measurement tool was reliable.

Therefore, the required data was collected through computer databases and visiting library of Securities and Exchange Organization as well as Rah Avard Novin software and website of Securities and Exchange (www.rdis.ir) (management, development and Islamic studies). Corporate financial statements such as balance sheets, cash flow statements and the notes attached to financial statements at the end of each financial year (29 March) were used as research tools.

Statistical methods for testing the hypotheses

Multivariate regression with cross-sectional and panel data were used in this study. Descriptive and inferential statistics were used to analyze the collected data and testing the hypotheses. Descriptive statistics was used to explain and describe demographic data. Then, classical regression assumptions were examined to estimate parameters and test the hypotheses. EViews 6.0 and SPSS 19 were used to analyze descriptive data, testing the hypotheses and extracting the regression model.

Structure and model of panel data

In this study, panel and cross-sectional data were used to estimate model parameters and testing hypotheses according to data type and statistical analysis methods. Panel data is also known as time-series cross-sectional data. A variety of models and forms are used for panel data. One certain

model was used according to term of the study.

RESULTS AND DISCUSSION

At the first stage, appropriate fitted regression model was determined using Chow and Hausman statistics (combined or panel data with fixed and random effects). Reliability of the variables was investigated using such statistics as Eim, sons and Levin Xin and Levin. At the second stage, classical assumptions of regression model were examined as follows: normal distribution of variables, independent distribution of errors, normal distribution of errors, heteroscedasticity and independence of independent variables. The final model was extracted due to significance of the overall model as well as significance of individual model coefficients.

Chow test

F test results for the regression model are shown in Table 4-4.

Table 4-4 Chow test

Regression model	F-statistics	Probability	Test result	
First	84.909	0.0076	Rejecting the null hypothesis	Panel model
Second	33.212	0.022	Rejecting the null hypothesis	Panel model
Third	55.32	0.037	Rejecting the null hypothesis	Panel model

Hausman Test

It was shown that the intercept was not the same for different years. Then, a certain method should be determined for model estimation (fixed and random effects). For this purpose, Hausman Test was used.

The null hypothesis claims consistency of random effect estimates while the first hypothesis claims inconsistency of random effect estimates.

The null hypothesis was not confirmed in cases of the first to the third models due to significance of Chow test results. In other words, individual or group effect are involved in those cases. Then, panel data should be used to estimate the regression model in the study. Then, Hausman Test was used to determine the type of panel model (with random effects or fixed effects).

Table 4-5 Hausman test

Regression model	X^2	Probability	Test result	
First	27.323	0.017	Rejecting the null hypothesis	Panel with fixed effects
Second	40.909	0.0087	Rejecting the null hypothesis	Panel with fixed effects
Third	18.212	0.015	Rejecting the null hypothesis	Panel with fixed effects

The results of Hausman Test for the first to third models are shown in table 4-5. The results showed that x^2 is significant at 95% confidence level. Then, the first hypothesis is confirmed. Thus, the first regression

model was appropriately fitted to panel data with fixed effects.

Examining classic regression assumptions

As mentioned in Chapter 3, assumptions of linear regression should be examined prior to regression model fitness.

Normality test

Kolmogorov-Smirnov test was used to examine normal distribution of the dependent variable. The test was conducted for the dependent variable. K-S test outputs in SPSS for this variable is shown in Table 4-6. The null hypothesis was confirmed since the level of significance was greater than 0.05 according to the above table and Kolmogorov-Smirnov statistic (z-value). Therefore, the dependent variable was normally distributed in the regression model with 95% confidence.

Examining independence of errors

Durbin-Watson statistic examines serial correlation between residuals (errors) in regression model based on the following null hypothesis:

H0: There is no correlation between the errors.

H1: There is a correlation between the errors.

Durbin Watson statistic with critical values at 1% error level is shown in Table 4-7. Since calculated Durbin-Watson statistic in the regression model was greater than the critical value at 0.01 error level, there was no serial or consecutive correlation between residuals in the first to third regression models at 0.01 significance level.

Examining normal distribution of errors

One regression assumption lies in the issue that errors of regression equation follow a normal distribution with zero mean. Error component regression curve is plotted to examine normality of equation errors. As shown in Figure 4-1, mean of distribution of errors is almost zero and relevant standard deviation is close to one (0.974) in the first regression model. As a result, regression model errors are normally distributed.
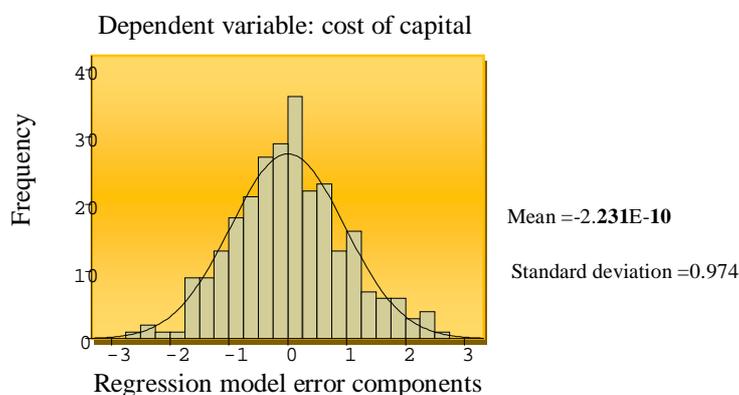
Dependent variable: cost of capital

Mean =-2.**231**E-**10**

Standard deviation =0.974

Chart 4-1 curve of error components - model (1)

According to Table 4-9, the expected value and variance factor were greater than 0.2 for all independent variables. Variance inflation factor was also close to 1 (largely less than 5). As a result, co-linearity between independent variables was not confirmed.

The results of regression model fitness

Model of the main hypothesis

$$\beta LEV_{i,t} + \varepsilon_{i,t4} + \beta\ BETA_{i,t3}\beta\ SIZE_{i,} + {}_2\beta \sum_{i=1}^{r} \beta_i CLC\_DUM_{i,t} + {}_1 + \alpha_0 COE_{i,t} =$$

Model of the first sub-hypothesis:

$$\beta LEV_{i,t} + \varepsilon_{i,t4} + \beta\ BETA_{i,t3}\beta\ SIZE_{i,} + {}_2\beta \sum_{i=1}^{r} \beta_i CLC\_DUM_{i,t} + {}_1 + \alpha_0 COD_{i,t} =$$

Model of the second sub-hypothesis:

$$\beta LEV_{i,t} + \varepsilon_{i,t4} + \beta\ BETA_{i,t3}\beta\ SIZE_{i,} + {}_2\beta \sum_{i=1}^{r} \beta_i CLC\_DUM_{i,t} + {}_1 + \alpha_0 COS_{i,t} =$$

determination coefficient of the above models. Positive values (negative) in coefficient column represent direct impact (reverse) of each variable on changes in cost of capital of the companies.

Heteroscedasticity

Heteroscedasticity is one important issue discussed in econometrics, which refers to unequal variances of error terms in order to estimate the regression model. White Test was used to estimate variance of heteroscedasticity. The results are shown in Table 4-8.

Linear test of independent variables

The results of regression equation model fitness are presented in Table 4 -10 to 4-12. F-value (16.092) also indicates the significance of regression model. Lower section of Table 4-10 to 4-12 show determination coefficient and adjusted

Table 4-10- the results of fitness of regression equation

$$\beta LEV_{i,t} + \varepsilon_{i,t4} + \beta\ BETA_{i,t3}\beta\ SIZE_{i,} + {}_2\beta \sum_{i=1}^{r} \beta_i CLC\_DUM_{i,t} + {}_1 + \alpha_0 COE_{i,t} =$$

Variable name		Variable coefficient	Coefficient value	t statistics	Level of significance
Constant value		β0	0.788	2.332	0.046
Growth stage	CLC_1	β1	-0.554	-3.073	0.013
Maturity stage	CLC_2	β2	-0.776	-3.838	0.0017
Declining stage	CLC_3	β3	0.331	2.388	0.041
Corporate size	SIZE	β4	-0.753	-2.141	0.048
Systematic risk coefficient	BETA	β5	1.894	2.601	0.031
Financial leverage	LEV	β7	0.967	0.576	0.121
Determination coefficient		0.526	F-statistic		16.092
		0.479	Significance of P-value		0.0003

			Durbin-Watson statistic	2.212

Testing the main hypothesis

The main hypothesis: the cost of capital was significantly different at various stages of corporate life cycle (growth, maturity and decline).

Test result

According to Table 4-10, the level of significance (sig) of stages of corporate life cycle (growth, maturity and decline) was less than the significance level considered in this study (5%). Absolute value of t-statistic was greater than the t-statistic obtained from the table with the same degree of freedom. Thus, H_0 hypothesis is rejected at 95% confidence level. Considering that coefficients of life cycle stages are significantly different from each other (growth stage = -0.554, maturity stage = -0.776 and decline stage = 0.331), the first hypothesis was confirmed. Thus, the cost of capital was significantly different at various stages of corporate life cycle (growth, maturity and decline).

Testing the first sub-hypothesis

The cost of debt was significantly different at various stages of corporate life cycle (growth, maturity and decline).

Testing the second sub-hypothesis

The cost of equity was significantly different at various stages corporate life cycle (growth, maturity and decline).

CONCLUSION

The results showed that cost of capital at different stages of corporate life cycle (growth, maturity and decline) was significantly different. The significant level (sig) of stages of corporate life cycle (growth, maturity and decline) was less than the significance level considered in this study (5%). Absolute value of t-statistic was greater than the t-statistic obtained from the table with the same degree of freedom. H_0 hypothesis was rejected at 95% confidence level. Considering that coefficients of life cycle stages were significantly different from each other (growth stage = -0.554, maturity stage = -0.776 and decline stage = 0.331), H_1 was confirmed. In other words, the cost of capital was significantly different at various stages of corporate life cycle (growth, maturity and decline). The cost of debt was significantly different at various stages of corporate life cycle (growth, maturity and decline). The cost of equity was significantly different at various stages of corporate life cycle (growth, maturity, and decline).

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