

# DEBT COSTS DURING LIFE CYCLES OF LISTED COMPANIES IN THE TEHRAN STOCK EXCHANGE

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## ABSTRACT

The main goal of this research was to study the relationship between life cycles and debt costs of listed companies in the Tehran Stock Exchange. Intended to be an applied research, this study used a correlational method. The statistical sample consisted of 107 listed companies for a ten-year period from 2005 to 2014, which were examined by regression models. Life cycle was the dependent variable and debt cost the independent variable. The Dickinson's Model (2011) was used to measure life cycle. This research found that debt cost was not lower during the slow stage of the life cycle than during the maturity and emergence stages, but debt cost was lower in the growth and decline stages.

**Keywords:** life cycle, debt cost, cost of capital

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## **INTRODUCTION**

Recent literature in accounting and finance shows interest in firms' life cycles. Hasan et al. (2015) argue that similar to living organisms, a firm's life cycle has a series of predictable patterns of development. The firm life cycle theory indicates that allocation of resources, financing strategies, and management planning and control depend on the corresponding stage of development. In fact, a firm's operating performance and investment and financing decisions are greatly influenced by change in the firm's organizational capabilities (life cycle stages). The Life Cycle Theory provides guidelines and strategic tools to manage the amount and source of financing at different stages of development. Fama and French (2005) believe that a firm's growth and advancement are at the center of that firm's financing decisions. According to Berger and Udell (1998), firms rely more on debt financing as firms grow from early the stage to "adolescence", but need less debt, as they become "middle-aged" and "old".

One method of creating value is by decreasing finance costs for companies (Ahmadpur et al., 2010). On the other hand, companies need financing to maximize their equity and continue their businesses. There are costs for both internal and external financing (Shahbazi & Mashayekhi, 2014). Nissim and Penman (2011) found that in the emergence stage, cash flows from operating activities are low until the products are accepted by the market. Thus, firms need high cash flows elsewhere to take advantage of their growth opportunities. In this step, an agency makes plans for development, higher capital to attain long-term competitive advantages, and new products. Therefore, it needs large finance cash flows to meet its goals for growth.

In the theoretical literature, a firm's life cycle is divided into five stages: emergence, growth, maturity, slowness, and decline. The Life Cycle Theory indicates that a company in its emergence stage incurs costs to get its products recognized. It has limited internal resources for financing these costs and thus may incur higher financing costs, because the market does not yet have an appetite for the products. When a product enters its growth period, primary customers notice it and new customers try to buy that product. In this period, the company can obtain operating cash flows by selling its products, which decreases its external financing needs (Bushee et

al., 2010; Hasan et al., 2015). The maturity period is the product's stability period. In this period, a company's marketing tries to maximize earnings and maintain its market share. The goal of a company at its slowness and declining stages is to minimize costs and obtain the product's final earnings (Hasan et al., 2015).

Vos and Forlong (1996) points out that it is generally accepted that debt financing is relevant to shareholder wealth; however, it is not known exactly how the role of debt financing changes at various stages of a firm's development. Several research articles have studied various aspects of cost of equity during a firm's life cycle, (Banz, 1981; Fama & French, 1989, Genhardt et al., 2001; and Hasan et al., 2015). However, studies on the association between a firm's cost of debt and life cycle are rare, especially for economically emerging countries. It is unknown whether cost of debt capital would have similar behavior as cost of equity capital at different stages of firms' life cycles.

This study was primarily intended to focus on cost of debt during the life cycles of listed companies in the Tehran Stock Exchange. This research might be attractive for the following reasons:

1. Equity markets are not as popular in economically emerging countries like Iran as in developed countries. Therefore, the main source of financing is loans from banks and/ or the government.
2. Due to the high level of inflation in Iran, borrowing interest rates are very high. Therefore, cost of debt is a significant portion of a firm's total expenses.
3. Even though charging interest on borrowings is forbidden in Islam, Islamic countries including Iran charge a very high rate on bank loans in the form of bank service fees.

Regarding the above items, the study of financing patterns of Iranian companies during their life cycles is attractive for investors and other providers of external resources. The result of this study may help managers establish strategies to manage appropriate resources for different stages of firms' life cycles. In addition, these findings can help investors, managers,

and providers of financial resources evaluate the financial performance of companies and get a clear understanding of financing strategies in different stages of corporate life cycles. This study tests the life cycle hypotheses and analyzes the association between debt cost and firms' different life cycles stages.

## **THEORETICAL LITERATURE**

### **Company Life Cycle**

Company life cycle is a modern concept that has entered different fields in recent decades. Yan and Zhao (2009) and Haire (1959) suggest that the life cycle concept and ecological growth curve can be used to analyze the development of companies. The Life Cycle Theory shows that companies pass through some predictable patterns regarding resources. Capacities, strategies, structures, and performances of companies will develop along with these changes (Miller & Friesen, 1980, 1984; Quinn & Cameron, 1983). The Life Cycle Theory identifies some parameters, guidelines, and tools for management to be able to evaluate the transfer potential of a company from one stage to another. Thus, understanding the nature of life cycles helps companies use their valuable resources better, optimizes performance (Adizes, 1979), and helps managers overcome difficulties at various stages.

Recent studies in accounting and finance (DeAngelo et al., 2006, 2010; Dickinson, 2011) indicate that life cycle stages contain important concepts for understanding the financial performance of companies. Gardner (1965) argues that each company has its own life cycle. Following this opinion, many studies (Anthony & Ramesh, 1992; Miller & Friesen, 1984; Mueller, 1972) provide patterns about how the company life cycle concept is related to other human sciences fields, including financial and accounting (Yan & Zhao, 2009). The main content of these studies is based on the different stages that exist in a company's life cycle and the exclusive features of each stage (Kallunki & Silvola, 2008; Cao & Chen, 2012).

Life cycles comprise of five major stages of emergence, growth, maturity, slowness, and decline. Different criteria and variables are used to distinguish each stage from the others. The criteria for measuring each stage

include company age, sales growth, company size, capital expenditures, dividend ratio, investment and growth opportunities, capital cost, leverage, cash flow patterns, and capital structure profitability (Anthony & Ramesh, 1992; Thanatawee, 2011; DeAngelo et al., 2006; Dickinson, 2011; Chen et al., 2012; and Ramalingegowda et al., 2013).

This research used the Dickinson's model (2011), which suggests that different strata of companies' cash flows reflect their profitability, growth, and risks. Thus, data disclosed in cash flow statements is suitable to identify different stages of the life cycle (emergence, growth, maturity, slowness, and decline).

## **RESEARCH BACKGROUND**

### **External Research**

After classifying companies by their stages in the life cycle (growth, maturity, decline), Anthony and Ramesh (1992) studied the relationship between accounting variables (sales growth, capital expenditures, cash earnings) and stock market price. Their findings show a significantly different relationship between accounting variables and stock market price in different periods of the life cycle.

In their research, Feltham and Ohlson Model (1995), Jenkins et al. (2004) study the effect of conservatism and the reaction of investors towards net operational assets and irregular operational profits in different periods of the life cycle. Their results show that investors give more importance (weight) to net operational assets and irregular operational profits in the growth stage than in the maturity and decline stages.

Wang (2013), in a study titled "Profit Division Policy and Life Cycle Theory", analyzes profit division at different stages of a corporate life cycle. He points out that firms at a young stage have a lot of investment opportunities, but with a relative shortage of financial resources. Therefore, they tend to retain profits for reinvestment. On the other hand, enterprises in a mature stage, which have fewer investment opportunities, prefer to distribute cash dividends.

Thanatawee (2013) analyzed the Free Cash Flow hypothesis and the Life Cycle Theory in Thailand. He used the cash flows from operating activities after deducting necessary funds for investment purposes. He also used the ratio of accumulated profit to book value of equity to test the Life Cycle Theory. The results show that there is a positive and significant relationship between free cash flows, life cycle stages, and profit division policy.

Mnif (2014) studied the relationship between life cycle and profit quality. He found that the more advanced the life cycle of a company, the higher the anticipated profit.

Hasan et al. (2015) studied the effect of life cycle on capital expenditures. Their findings show that capital expenditures varied during the life cycles of companies. Specially, when the Dickinson's (2011) criterion was used to measure life cycle, capital expenditure was higher in the emergence and decline stages, and lower in the growth and maturity stage. However, when the DeAngelo's (2006) model was used to calculate life cycle, capital expenditure decreased proportionally with accumulated profit.

## **Internal Research**

Ghorbani (2006) studied the relationship between earnings, cash flow, and company value within the life cycle framework. His findings show that the relationship between cash flows and company value is stronger than the relationship between earnings and company value, in the growth and decline stages.

Rahmani and Musavi (2011) studied the relationship between profitability and stock return with regard to life cycle and company size of the listed companies in the Tehran Stock Exchange. Their results show that the life cycle and company size variables affected the relationship between profitability and return, and increased the adjusted determination factor.

Hosseini et al. (2013) compared financial information based on cash flows and accruals to information about stock returns and life cycle. Their findings showed a significant relationship between cash flow information and stock returns, and accrual financial information and stock returns during the

life cycle. On the other hand, Wang (2013) argued that cash flow information is more important in determining stock return than accrual information during the growth and decline stages; and vice versa for the maturity stage.

## **Research Hypotheses**

According to the Life Cycle Theory, companies demonstrate different behaviors in different periods of their life cycles; that is, the financial and economic features of a company are affected by the current stage of the life cycle the company is in.

Hasan et al. (2015) suggested that capital cost changes during a company's life cycle. Their results show that equity cost is higher in the emergence and decline stages and lower in the growth and maturity stages. To our knowledge, no research has focused on the association of cost of debt costs and stages of firms' life cycles in economically emerging countries. We developed the following hypotheses to cover this gap in the accounting literature:

**H1:** In the slowness stage, debt cost is lower than in the maturity stage.

**H2:** In the slowness stage, debt cost is lower than in the growth stage.

Companies have limited resources in their early stages, and these resources further decrease in the decline stage (Hasan et al., 2015). This is the reason for the increase in borrowing resources and in financial costs. Thus, Hypotheses 3 and 4 are:

**H3:** In the slowness stage, debt cost is lower than in the emergence stage.

**H4:** In the slowness stage, debt cost is lower than in the decline stage.

## **METHODOLOGY**

Intended to be an applied research, this study used a correlational method. This research studied the relationship between variables using historical data. Thus, it is post-event research. We used descriptive data gathering, in which we gathered the historical data of sample companies from the library.

## Statistical Sample

The statistical sample of this research was the listed companies in the Tehran Stock Exchange from 2005 to 2014. We used the systematic omission method for sampling regarding the following conditions:

1. The company was in a bourse from 2005 to 2014.
2. The company is not a bank, insurance company, or investment company.
3. The company's financial year ends on March 20<sup>th</sup> (the last day of the Iranian calendar), without changes in its financial year during this period.
4. The transactions did not stop for more than four months in a one-year period.

107 companies were selected using the conditions above among the listed companies in the Tehran Stock Exchange.

## Data Analysis

The data was tested using the regression model provided by Hasan et al. (2015). In this model, debt cost is the dependent variable and is a function of different life cycle stages.

$$COL_{i,t} = \beta_0 + \beta_1 CLCDUM1_{i,t} + \beta_2 CLCDUM2_{i,t} + \beta_3 CLCDUM3_{i,t} + \beta_4 CLCDUM4_{i,t} + \beta_5 BM_{i,t} + \beta_6 \text{Betai,t} + \beta_7 \text{LOSS}_{i,t} + \beta_8 \text{Lev}_{i,t} + \epsilon_{i,t}$$

Where:

- $COL_{i,t}$  : Debt cost of company, Cost of Liability (dependent variable)
- $CLCDUM1$  : Life cycle of company (emergence stage); this is a virtual variable which is 1 if the company is in its emergence stage in that year; otherwise it's zero.  
(Independent variable)



- CLCDUM2 : Life cycle of company (growth stage); this is a virtual variable which is 1 if the company is in its growth stage in that year; otherwise it's zero  
(Independent variable)
- CLCDUM3 : Life cycle of company (maturity stage); this is a virtual variable which is 1 if the company is in its maturity stage in that year; otherwise it's zero  
(Independent variable)
- CLCDUM4 : Life cycle of company (decline stage); this is a virtual variable which is 1 if the company is in its decline stage in that year; otherwise it's zero  
(Independent variable)
- BM : Ratio of book value of equity to stock market value  
(control variable)
- BETA : Systematic stock risk (control variable)
- LOSS : This is a virtual variable which is 1 if the company had a loss in that year; otherwise it's zero (control variable)
- Lev : Financial leverage (control variable)

### **Measurement of Independent Variable**

We followed the Dickinson's Model (2011) to calculate life cycle. Dickinson (2011) suggested that different cash flow classes reflect profitability, growth, and risk. Thus, the disclosed information in the cash flow statement can be used to identify the different life cycle stages (emergence, growth, maturity, slowness, and decline). In the Dickinson Model (2011), the following steps measure life cycle stages:

1. Emergence stage: If CFO<0, CFI<0, CFF>0
2. Growth stage: If CFO>0, CFI<0, CFF>0
3. Maturity stage: If CFO>0, CFI<0, CFF<0
4. Decline stage: If CFO<0, CFI>0, CFF≥0

CFO : Cash flows due to operating activities

CFI : Cash flows due to investment activities

CFF : Cash flows due to financing activities

Cash flow features for different life cycle stages may be determined by economic theory. However, estimating cash flows effects in the decline stage is much more difficult. Thus, in the Dickinson’s method, companies that are not included in the other four stages are included in the slowness stage. Consequently, this was used as the base for comparison with the other life cycle stages.

### Measurement of Dependent Variable

Hejazi et al. (2012) used the ratio of interest costs to total borrowing to calculate debt cost. This ratio reflects the resources that a company used for borrowing, and it indicates the company’s percentage of borrowing interest.

$$COL_1 = \frac{\text{Interest cost}}{\text{Total borrowing}}$$

## RESEARCH FINDINGS

### Descriptive Statistics

To analyze the data, we should first calculate the descriptive statistics. Table 1 shows the descriptive statistics for the variables in the test model.

Table 1: Descriptive Statistics

Variable	Debt cost (COL)	BETA	Book value to market value (BM)	Leverage (LEV)
Average	0.306217	0.604260	0.756756	0.595974
Median	0.133231	0.270000	0.562404	0.611803
Max.	96.70673	102.8300	6.903927	0.996719
Min.	0.0000	-7.560000	0.001396	0.065760
SD	3.174232	3.753480	0.664170	0.185279
Skewness	27.56493	20.43280	2.988909	-0.319432
Extension	812.0301	528.8736	18.92191	2.544384
No. of observations	1070	1070	1070	1070

Table 1 shows that SD (standard deviation) for debt cost is higher than the average, which indicates the relative irregularity of distribution to this variable (as a dependent variable). It is very important to analyze the behavior of this variable in the regression model. Thus, we first normalize the dependent variable. After normalization, the data of the dependent variable obeys the normal distribution criteria. For the control variable, the findings show that the book values of these companies are more than 75% of their market values. Furthermore, about 60% of the assets of sampled companies are financed by debt.

## **Regression Results**

We applied a regression model to study the relationship between life cycle and debt cost, in which debt cost was the dependent variable and is a function of the independent and control variables. First, we identified a suitable regression model with a statistical test. To do so, the Chaw & Hassman Test was used. The Chaw Test helps by selecting the best estimation method between the pooled and panel methods; and the Hassman Test compares the fixed effects estimation method with the random effects estimation method. Thus, the Pooled Regression Model was fitted first and then the Chaw Test was fitted on the regression model. Since the significance level of this test was less than 0.05, the panel-data method was recommended.

Panel-based data models require the method to be tested for random or fixed effects, then the most suitable method is selected. To do so, first, the random-based regression model was fitted; then its suitability was examined with the Hassman Test. The findings show that the significance level of the Hassman Test was less than 0.05; so the fixed effects regression model was recommended.

Table 2 shows the results of the regression model fitness. The F Statistic indicates the total significance of this model. Non-collinearity between the independent variables, dependent of remainders, and model sufficiency were confirmed.

**Table 2: Results of Statistical Analysis of Regression Model**

Variable	Beta or $\beta_i$	t	Sig.
Fixed coefficient	-1.170223	-6.128011	0.0000
CLC1	-0.396084	-2.705093	0.0070
CLC2	0.298149	3.568089	0.0004
CLC3	0.142521	1.609742	0.1078
CLC4	-0.074433	-0.332685	0.7394
BM	-0.097918	-1.820833	0.0689
BETA	0.021919	2.581434	0.0100
LOSS	0.264498	1.956526	0.0507
LEV	-1.098725	-3.827984	0.0001
Adjusted coefficient:	0.332	F:	5.659
Durbin-Watson statistic:	1.532	F significance level:	0.000

CLC1: Emergence; CLC2: Growth; CLC3: Maturity; CLC4: Decline

### Test of Hypothesis 1

H1: In the slowness stage, debt cost is lower than in the maturity stage.

According to Table 2, the estimated coefficient for CLC3, which indicates the relationship between the maturity stage and the debt cost, is 0.142 with a significance level of 0.107, which is greater than 0.05 (error level). This indicates that there is not a significant relationship between these variables. Since this conflicts with the claim of Hypothesis 1, this is rejected at the 95% confidence level.

### Test of Hypothesis 2

H2: In the slowness stage, debt cost is lower than in the growth stage.

According to Table 2, the estimated coefficient for CLC2, which indicates the relationship between the growth stage and the debt cost, is 0.298 with a significance level of 0.000, which is less than 0.05 (error level). This indicates that there is a significant relationship between these variables. This finding indicates that debt cost is higher in the growth stage,

which is compatible with the claim of Hypothesis 2. So, this is accepted at the significance level of 95%.

### **Test of Hypothesis 3**

H3: In the slowness stage, debt cost is lower than in the emergence stage.

According to Table 2, the estimated coefficient for CLC1, which indicates the relationship between the emergence stage and the debt cost, is -0.396 with a significance level of 0.007, which is less than 0.05 (error level). This indicates that there is a reverse and significant relationship between these variables. So the Hypothesis 3 is accepted at the significance level of 95%.

### **Test of Hypothesis 4**

H4: In the slowness stage, debt cost is lower than in the decline stage.

According to Table 2, the estimated coefficient for CLC4, which indicates the relationship between the decline stage and the debt cost, is -0.074 with a significance level of 0.739, which is greater than 0.05 (error level). This indicates that there is not a significant relationship between these variables. Since this conflicts with the claim of Hypothesis 4, this is rejected at the significance level of 95%.

## **CONCLUSION**

The goal of this research was to study the relationship between life cycles of a company and its debt cost. This research was done for a ten-year period (2005-2014), comprising 107 companies. We applied a regression model to study our data. According to the findings for Hypothesis 1, debt cost in the slowness stage is not less than in the maturity stage. Bushee et al. (2010) argue that the maturity stage is when a company tends to maximize earnings and defend its market share. In this stage, profitability and internal cash flows are at a desirable level and it appears that a company does not tend to finance from external sources. Thus, capital and debt costs are low. Therefore, it is argued that Hypothesis 1 reflects a non-reaction of creditors towards the maturity stage of the life cycle. It seems that creditors do not

have a clear perception of this stage; or the sample companies had significant costs, which required them to borrow despite the fact that they are in the maturity stage. This finding conflicts with the results of Makhova and Zinecker (2014). Their study finds that major economic policies, such as fiscal and monetary policies had a significant relation with capital structure decisions in the different stages of the life cycle.

According to the test of Hypothesis 2, debt cost in the slowness stage is less than that of the growth stage. Armstrong et al. (2011) argued that abilities of companies change in different stages of their life cycles. Thus, the findings of Hypothesis 2 may be noted by either the changing roles of the creditors in a company, or the fact that managers of the sample companies use their resources efficiently and prevent high-interest borrowing. These findings comply with those of Rostami et al. (2014). They find that the average Tobin's Q has a significant difference in the growth and decline stages, and its average in the decline stage is more than that in the growth stage.

According to the findings for Hypothesis 3, the debt cost in the slowness stage is greater than in the emergence stage. In the emergence stage, a company bears the pressures of introducing its products. Meanwhile, it has limited internal resources for supplying such costs, because its product has not yet been accepted in the market; so the company must bear high financial costs. Since companies are new in the market in their emergence stages, their ability to finance with debt is low, because creditors cannot trust them. This is because those companies are not known in the money and capital market, and they must pay higher debt costs to attract creditors. On the other hand, the findings are compatible with those of Rostami et al. (2014). They find that the average Tobin's Q has a significant difference in the growth and decline stages, and its average in the decline stage is more than that in the growth stage.

According to the findings for Hypothesis 4, the debt cost in the slowness stage is less than in the decline stage. Hasan et al. (2015) argue that the decline stage is one in which a company experiences its final earnings periods. Thus, a company tries to decrease its costs and preserve its current situation, and is not willing to engage in external borrowing. Thus, the decline stage has no significant role in the debt costs of companies. These findings do not comply with those of Rostami et al. (2014).

## Recommendations for Future Research

Looking at the life cycle of companies, this study focus on the relationship between life cycles and debt costs of listed companies in the Tehran Stock Exchange. Given the limited scope in this study, it is recommended that future research to study on the other factors that may influence the company life cycle. This includes the competition level in the product market, information asymmetry of capital structure, and performance of joint-stock companies.

## Applied Propositions

Regarding the findings from testing Hypothesis 2, indicating that debt cost is lower in the slowness stage than in the growth stage, it is recommended to the managers of joint-stock companies that are seeking financing from external sources by debt, to try to match their company performance to those of growing companies in order to decrease their debt cost. Such actions should be taken before obtaining debt, in order to minimize debt cost.

Moreover, from Hypothesis 3, it was found that debt cost is lower in the slowness stage than in the emergence stage, therefore, it is recommended to creditors to try to evaluate the life cycles of companies and use them as a determinant criterion before granting credit.

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