

A Study of the Relationship between Managerial Operating Decisions by Firms Listed in Tehran Stock Exchange over Firm Life Cycle

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Abstract: The link between the mean values of the variables representing managerial operating decisions over firms' life cycles was examined in 1,880 firm-year (235 firms in 8 years) in 2011 among the firms listed in Tehran Stock Exchange (TSE) for the period 2002 to 2009 using analysis of variance (ANOVA). After performing required normalization over life cycles, SPSS was used to analyze the data. Among the operational variables utilized by managers (capital expenditure, variation in income, cash flow from operating activities (CFO), cash flow from financing activities (CFF), firm age, and cost of goods sold (CGS)), a significant relationship was observed in average firm age over life cycle while other variables (capital expenditure, variation in income, CFO, and CFF) had no significant relationship over the firm's life cycle.

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1. Introduction

Economic and management theories divide the life cycle of firms and institutions into several stages. Depending on their stages of economic lives, firms and institutions follow certain policies and guidelines. Such policies are in some way reflected in accounting information of firms (Bixia, 2007). Within the context of accounting, several researchers have studied the impacts of life cycle on accounting information (Mashayekhi, 2009).

Anthony and Ramesh (1992) proposed a model for sales, net income, CFO, investment, and financing in a firm life cycle and incorporated this model into their studies. They divided a firm life cycle into three stages (growth, maturity, and decline) to use it as a basis for measuring dividends, capital expenditure, growth in sales, and age of firms. In particular, Anthony and Ramesh (1992) assumed that the shift from growth to decline is characterized by increased dividends, reduction in sales growth, reduced capital expenditure, and aging. The authors applied a mixed regression model to assessment of differences in market reactions to accounting variables at each stage of life cycle. The null hypothesis, that assumed no relationship between market reaction and accounting variables over the life cycle, was rejected at the 10% level of significance.

According to Gordon and Walter, firms can be classified into three groups, based on the stages of their life cycles: growing firms, mature firms, and declining firms. Growing firms retain earnings to increase the price of their stocks. Mature firms do not have adequate opportunity and their profit-sharing

policies do not affect the prices of their stocks, although their fixed dividends lower the risks to which they are exposed. Declining firms are left with no option but sharing profits and are exposed to very high levels of risk (Tehrani, 2005). Firms may be assigned into these classes based on variety of factors. Firms that are at early stages of life cycle and experience high levels of growths in sales and capital expenditures are identified as growing firms while aged firms with low levels of growths in sales and capital expenditure are labeled as declining firms. And mature firms occupy a place somewhere between these two classes of firms (Tehrani, 2005).

On the other hand, Michell M. Liu (2006) identified six operational variables (capital expenditure, variation in income, CGS, firm age, CFO, and CFF) and examined the relationships between these variables by controlling for managerial operating decisions at consecutive stages of life cycle (growing, consolidating, mature, declining, and declined firms).

Liu's goal was to demonstrate the direct impacts of managerial operating decisions in growing, mature, and declining firms and that such decisions reflect diversities in normal or expected accruals.

Managerial operation decisions at growing firms require larger investments in working capital since investments in fixed assets together with investments in working capital are needed to support growth (Bushman, Smith, and Zhang, 2005). This, in turn, creates large positive accruals in working capital.

In its decisions, a mature firm emphasizes maintaining the present income (through quality

control, promotion, and efficient production processes). Thus, investments in working capital are lowered, thereby reducing accruals in working capital.

On the other hand, a declining firm adjusts the book values of its assets based on dissolution values, adjustments in inventory value, account receivables, and property, plant, and equipment (PPE) (Francis, Hanna, and Vincent, 1996; Rees, Gill, and Gore, 1996; Riedl, 2004). Therefore, recorded adjustments in a declining firm are expected to result in adjustments in negative accruals.

In the present study, Liu's typology was used to classify firms as growing, consolidating, mature, declining, and declined firms, as described below:

First, the values of capital expenditure, variation in income, CGS, CFO, CFF, and age are determined for each year-firm.

For the purpose of normalization, all values,

except for age, are divided by total average assets.

For each year-firm, a compound score is obtained based on these six normalized variables. These scores are used to classify firms as growing, consolidating, mature, declining, or declined:

- 1- A growing firm has a total score ranging from 1 to 20.
- 2- A consolidating firm has a total score ranging from 21 to 40.
- 3- A mature firm has a total score ranging from 41 to 60.
- 4- A declining firm has a total score ranging from 61 to 80.
- 5- A declined firm has a total score ranging from 81 to 100.

The following table summarizes this classification:

Firm classification based on the stage of life cycle					
life cycle rank	1-20	21-40	41-60	61-80	81-100
Firm classification	Growing	Consolidating	Mature	Declining	Declined

$$(2) \text{ Capex} + \Delta\text{Rev} + \text{CGS} + \text{Age} + \text{CFO} + \text{CFF} = \text{Life cycle Rank}$$

$$(3) \text{ Capex} = \text{Fix Assets} (t, t-1) / (\text{market value of equity} + \text{book value of debt})$$

Capex: capital expenditure

Life cycle rank: stage of life cycle

Fixed assets (t,t-1): changes in fixed assets from t to t-1

Market value of equity: total cash value (based on the current market price) of the fully diluted outstanding shares

Book value of debts: value of debts recorded in books

Performance variables

Lie argues that growing firms have large capital expenditures which result in significant positive accruals. In one part of his analysis, Liu developed a measure of stages in firm's life cycle. He began his analysis by identifying six operating variables at the firm level and by assuming that managerial decisions over these stages are controlled by these variables.

These six variables included capital expenditure, variation in income, CGS, age, CFO, and CFF.

Based on the preceding discussion as well as the results of ANOVA, which will be discussed below, we attempt to identify potential links between the averages of performance variables over the firm's life cycle.

- 1- There is a significant relationship between average capital expenditures of the firms studied here in terms of the stages of their life cycle.
- 2- There is a significant relationship between average variations in income of the firms

studied here in terms of the stages of their life cycle.

- 3- There is a significant relationship between average CGS of the firms studied here in terms of the stages of their life cycle.
- 4- There is a significant relationship between average ages of the firms studied here in terms of the stages of their life cycle.
- 5- There is a significant relationship between average CFO of the firms studied here in terms of the stages of their life cycle.
- 6- There is a significant relationship between average CFF of the firms studied here in terms of the stages of their life cycle.

2. Material and Methods

The present study covers a period starting from 2002 and ending in 2009. We examined the firms listed in Tehran Stock Exchange (TSE). Our statistical population consisted of the TSE firms that

- (1) Have not modified their fiscal year during the period covered by this study;
- (2) Were listed in TSE prior to 2001;
- (3) Publicly disclosed required information;
- (4) Made available those information needed to evaluate the variables over all years covered by the period; and
- (5) Did not experience interruption in firm activities.

Systematic screening was employed to create a sample consisting of 1,880 firm-year (235 firms over 8 years).

Excel and SPSS were used for the purpose of this study. Initial data were fed to Excel for preliminary processing and calculations. Then, descriptive statistics techniques were applied to examine frequency distribution and obtain an overall

view of the variables. Finally, SPSS was used for hypothesis testing and fitting the equations on the available data.

3. Results and discussion

Table I: comparison of average firm ages in terms of the stage of life cycle

Stage of life cycle	N	Mean	Standard deviation
Mature	703	46.43	4.47
Declining	24	68.88	7.67
Consolidating	981	32.86	5.47
Growing	170	16.46	5.29
Total	1,878	36.91	10.94

ANOVA results

Source of variation	Sum of squares	Degree of freedom	Mean of squares	F	Significance level
Inter-group	175,355.03	3	58,451.68		
Intra-group	49,429.48	1,874	26.38	2,216.06	p<0.001
Total	224,784.50	1,877			

As seen in the table above, the largest and the smallest average firm age belong to declining firms (68.88±7.67) and growing firms (16.46±5.29), respectively.

ANOVA results indicated a significant difference at least between two of these groups (p<0.001).

Results obtained through least significant difference (LSD; a post-hoc test) indicated that

- Average firm age of declining firms was significantly larger than that of other firms.
- Average age of mature firms was significantly larger than that of growing and consolidating firms; and average age of consolidating firms was significantly larger than that of growing firms.

Table II: comparison of average capital expenditures in terms of the stage of life cycle

Stage of life cycle	N	Mean	Standard deviation
Mature	703	0.11	0.56
Declining	24	0.01	0.11
Consolidating	981	0.004	3.04
Growing	170	0.04	1.00
Total	1,878	0.05	2.24

ANOVA results

Source of variation	Sum of squares	Degree of freedom	Mean of squares	F	Significance level
Inter-group	4.95	3	1.65		
Intra-group	9,453.22	1,874	5.04	0.33	p=0.81
Total	9,458.18	1,877			

As seen in the table above, the largest and the smallest average capital expenditure belong to mature firms (0.11±0.56) and consolidating firms (0.004±3.04), respectively. However, no significant difference was found between the capital expenditure of the firms studied here in terms of their stage of life cycle (p=0.81).

Table III: comparison of average variations in income terms of the stage of life cycle

Stage of life cycle	N	Mean	Standard deviation
Mature	703	0.57	4.62
Declining	24	-5.26	30.02
Consolidating	981	155.50	4,738.12
Growing	170	1.12	6.33
Total	1,878	81.48	3,424.51

ANOVA results

Source of variation	Sum of squares	Degree of freedom	Mean of squares	F	Significance level
Inter-group	11,255,658	3	3,751,886.09		
Intra-group	22,000,000,000	1,874	11,740,039.08	0.32	p=0.81
Total	22,000,000,000	1,877			

As seen in the table above, No significant difference was found between the variations in income of the firms studied here in terms of their stage of life cycle (p=0.81).

Table IV: comparison of average CGS in terms of the stage of life cycle

Stage of life cycle	N	Mean	Standard deviation
Mature	703	0.12	0.84
Declining	24	0.89	4.29
Consolidating	981	0.08	4.63
Growing	170	0.03	0.45
Total	1,878	0.10	3.42

ANOVA results

Source of variation	Sum of squares	Degree of freedom	Mean of squares	F	Significance level
Inter-group	16.35	3	5.45		
Intra-group	21,970.34	1,874	11.72	0.47	p=0.71
Total	21,986.69	1,877			

As seen in the table above, the largest and the smallest average CGS belong to declining firms (0.89±4.29) and consolidating firms (0.08±4.63), respectively. However, no significant difference was found between average CGS of the firms studied here in terms of their stage of life cycle (p=0.71).

Table V: comparison of average CFO in terms of the stage of life cycle

Stage of life cycle	N	Mean	Standard deviation
Mature	703	0.002	0.47
Declining	24	-1.13	6.57
Consolidating	981	-0.34	14.65
Growing	170	-0.30	2.94
Total	1,878	-0.22	10.65

ANOVA results

Source of variation	Sum of squares	Degree of freedom	Mean of squares	F	Significance level
Inter-group	69.46	3	23.15		
Intra-group	213,021	1,874	113.67	0.20	p=0.89
Total	213,091.05	1,877			

No significant difference was found between average CFO of the firms studied here in terms of their stage of life cycle (p=0.89).

Table VI: comparison of average CFF in terms of the stage of life cycle

Stage of life cycle	N	Mean	Standard deviation
Mature	703	0.02	1.06
Declining	24	1.89	8.47
Consolidating	981	-0.49	14.48
Growing	170	0.09	1.24
Total	1,878	-0.22	10.53

ANOVA results						
Source of variation	Sum of squares	Degree of freedom	Mean of squares	F	Significance level	
Inter-group	233.38	3	77.80			
Intra-group	208,079.28	1,874	111.04	0.70	p=0.55	
Total	208,312.66	1,877				

No significant difference was found between average CFF of the firms studied here in terms of their stage of life cycle (p=0.55).

4. Conclusion

In simple words, as far as the relationship between average values of managerial operating decision variables over the firm's life cycle is concerned, only the average values of firm age had significant relationship over the life cycle while no significant relationship was found between the other operating decision variables and the life cycle.

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