A Study of Relationship between Accruals and Managerial Operating Decisions over Firm Life Cycle among Listed Firms in Tehran Stock Exchange

Vahideh Jouyban

Young Researchers Club, Borujerd Branch, Islamic Azad University, Borujerd, Iran.
Corresponding author Email: jouyban_88@yahoo.com

Abstract: The link between accruals and 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 backward multiple linear regression (BMLR) on modified accruals as criterion variable and performance as predictor. SPSS was used to analyze the regression of total modified accruals. Among the performance variables (capital expenditure, cash flow from operating activities (CFO) and cash flow from financing activities (CFF), firm age, and cost of goods sold (CGS)), firm age and CGS were not significantly related to accruals in any stage of firm's life cycle while a significant relationship was found between the rest of the variables (capital expenditures, variation in revenue, CFO, and CFF) and accruals.
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1. Introduction

Since future outcomes and events are uncertain and cannot be predicted with complete confidence, decisions are often made under uncertainty. Therefore, decision making requires information, knowledge, and awareness, in order to achieve goals and desirable outcome, thereby reducing uncertainty. Examples of decisions made under uncertainty are managerial operating decisions which, based on available information in connection with previous periods together with financial reasoning, enable a firm to make smart decisions. Decision makers, thus, need financial data. A source of data is accounting information. On the other hand, a firm is influenced by variety of accounting methods, accounting estimations, and different forms of judgments and decisions.

Anthony and Ramesh (1992) proposed a model for sales, net income, operational cash flow, investment, and funding 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.

Previous empirical studies on qualities of accruals have assumed that managerial operating decisions and qualities of accruals do not vary as a firm moves from one stage of life cycle to another. Michelle M. Lie argues that managerial operating decisions in growing firms are different from those of mature or declining firms. This results in distinctions in firms accruals. Liu proposed a measure of life cycle stage to demonstrate that accruals vary as operating environment in firms become subject to changes. This finding is important for those future studies which examine qualities of accruals based on differences in such qualities.

Lie's findings were in line with the fact that accruals variations induced by managerial operating decisions in consecutive stages of life cycle cam be distinguished from those variations resulting from difference in quality of accounting decisions. Managers tend to increase the length of income-growth periods and reduce variations in accruals over consecutive stages of life cycle. Therefore, it is anticipated that abnormal accruals for growing, mature, and declining firms will be positive, negative, and again positive, respectively, forming a V-shaped curve. In fact, abnormal accruals show an intermediate level; i.e. positive for growing firms and negative for declining firms.

Accrual estimation models regard accruals as a function of performance variables such as cash flow and variation in income (Jones, 1991; Dechow, Kothari, and Watts, 1998; Dechow , P. and Dichev, 2002; McNichols, 2002; Ball, R., Shivakumar, 2005).

In their study on the impacts of life cycle stage and conservatism on firm value, Karami and Omrani (2009) divided life cycle into three stages: growth, maturity, and decline. They found that investors attach greater importance to net operating assets and

abnormal operating income of growing firms compared to those of mature or declining firms.

Liu (2006) assigned a combined rating of six items, namely capital expenditure, firm age, variations in revenue, CGS, CFO, and CFF, to a compound variable of life cycle ranging from 1 to 100 in each group of industries. Based on annual observations, firms ranking 1-20, 21-40, 41-60, 61-80, and 81-100 were assigned to startup, consolidation, maturity, declining, and declined groups.

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

Given the small average value of accruals, we multiplied each value by 1,000,000.

yy= y × 1,000,000
yy = normalized accrual
yy1 = reciprocal of normalized accrual

$$yy1 = \frac{1}{(y \times 1.000.000) + 5}$$

Furthermore:

To normalize mean values some workings were needed. To eliminate the minus sign, we add 5 to the values obtained in the previous step; that is, a logarithmic transformation was performed (we add 5 to numbers since the log of a negative number is undefined).

A basic assumption in variance analysis and multiple linear regression (MLR) is the assumption of normal distribution of error in the model fitted to the data. Since the response variable (accrual) was highly dispersed, we used the transformation

$$yy1 = \frac{1}{(y \times 1.000.000) + 5}$$

to obtain a normal distribution for the response variable.

A primary hypothesis was proposed in this study:

(H_1): Accruals are significantly related to performance variables of firms over their consecutive stages of life cycles.

Backward multiple linear regression (BMLR) was utilized to test hypotheses using modified accruals as criterion and performance variables as predictors.

Given the five stages of life cycle, five secondary hypotheses were proposed:

H_{1a}: Accruals of a mature firm are significantly related to performance variables.

Table I: Relationship between modified accruals and performance variables of mature firms

Step	Coefficient of correlation	Coefficient of determination (R^2)	Adjusted R^2	Standard deviation
Step 1	0.81	0.65	0.65	0.01
Step 2	0.81	0.65	0.65	0.01
Step 3	0.81	0.65	0.65	0.01

In the first step, all variables were simultaneously introduced to the equation. As seen in the table above, these variables can determine 65% of variations in modified accruals.

In the second and third steps, firm age (p=0.90) and CGS (p=0.28) were respectively eliminated from the equation due to lack of a significant connection to accruals. Other performance variables were significantly related to modified accruals of mature firms and, therefore, were kept in the equation.

Table II: Relationship between modified accruals and performance variables of mature firms

Variable	Non-standardized coefficient		Standard coefficient	t	Significance level	Tolerance	VIF
	β	Standard error	β				
Constant	0.20	0.00		870.94	p<0.001		
Capital expenditures	-0.003	0.00	-0.20	-8.29	p<0.001	0.99	1.01
Variation in revenue	0.00	0.00	-0.08	-3.27	P=0.001	0.99	1.00
CFO	-0.03	0.001	-0.63	-24.97	p<0.001	0.87	1.15
CFF	-0.04	0.001	-0.74	-29.28	p<0.001	0.87	1.15

As seen in the table, there is a significant relationship between modified accruals and managerial operating decisions in mature firms. Using non-standard coefficients (β), the following equation can be proposed to predict accruals:

Accruals = 0.2 – (capital expenditure*0.003)-(variations in Revenue *0.00)-(CFO*0.03)-(CFF*0.04)

According to β values, it follows that a variable with larger absolute value of β (i.e. regardless of minus or plus sign) has larger effect on predicted accruals.

Since VIF<10, other variables of operating decisions are not dependent on each other.

H_{1b}: Accruals of a declining firm are significantly related to performance variables

Table III: Relationship between modified accruals and performance variables of declining firms

Step	Coefficient of correlation	Coefficient of determination (R2)	Adjus ted R2	Standard deviation
Step 1	0.99	0.98	0.97	0.01
Step 2	0.99	0.98	0.97	0.01
Step 3	0.99	0.98	0.97	0.01

In the first step, all variables were simultaneously introduced to the equation. As seen in the table above, these variables can determine 97% of variations in modified accruals.

In the second step, firm age (p=0.87) and in the third step CFO (p=0.49) were eliminated from the equation due to lack of a significant connection to accruals. Other performance variables were significantly related to modified accruals of declining firms and, therefore, were kept in the equation. The value of 1.661 for Durbin-Watson statistic indicates independence of error values.

As seen in the table, there is a significant relationship between modified accruals and managerial operating decisions in mature firms. Using non-standard coefficients (β), the following equation can be proposed to predict accruals:

Accruals = 0.2 – (capital expenditure*0.006)-(variations in Revenue *0.001)-(CFO*0.01)-(CFF*0.03)

According to β values, it follows that a variable with larger absolute value of β (i.e. regardless of minus or plus sign) has larger effect on predicted accruals.

Since VIF<10, other variables of operating decisions are not dependent on each other.

H_{1c}: Accruals of a consolidating firm are significantly related to performance variables.

Table IV: Relationship between modified accruals and performance variables of declining firms

Variable	Non-standardized coefficient		Standard coefficient	t	Significance level	Tolerance	VIF
	B	Standard error	β				
Constant	0.20	0.001		312.66	p<0.001		
Capital expenditures	-0.06	0.01	-0.55	-6.02	p<0.001	0.22	4.61
Variation in revenue	0.001	0.00	0.34	3.93	p=0.002	0.25	3.96
CFO	-0.01	0.001	-0.41	-8.90	p<0.001	0.86	1.16
CFF	-0.03	0.003	-0.67	-11.91	p<0.001	0.59	1.71

Table V: Relationship between modified accruals and performance variables of consolidating firms

Step	Coefficient of correlation	Coefficient of determination (R2)	Adjusted R2	Standard deviation
Step 1	0.85	0.73	0.73	0.01
Step 2	0.85	0.73	0.73	0.01
Step 3	0.85	0.73	0.73	0.01

In the first step, all variables were simultaneously introduced to the equation. As seen in the table above, these variables can determine 73% of variations in modified accruals.

In the second step, firm age (p=0.69) and in the third step CGS (p=0.29) were eliminated from the

Equation due to lack of a significant connection to accruals. Other performance variables were significantly related to modified accruals of consolidating firms and, therefore, were kept in the equation. The value of 0.829 for Durbin-Watson statistic indicates independence of error values.

Table VI: Relationship between modified accruals and performance variables of consolidating firms

Variable	Non-standardized coefficient		Standard coefficient	t	Significance level	Tolerance	VIF
	B	Standard error	B				
Constant	0.20	0.00		1090.73	p<0.001		
Capital expenditures	-0.002	0.00	-0.14	-7.94	p<0.001	0.99	1.01
Variation in revenue	-0.00010	0.00	-0.07	-3.65	p<0.001	0.98	1.02
CFO	-0.03	0.001	-0.48	-26.83	p<0.001	0.96	1.04
CFF	-0.04	0.001	-0.74	-40.96	p<0.001	0.97	1.03

As seen in the table, there is a significant relationship between modified accruals and managerial operating decisions in consolidating firms. Using non-standard coefficients (β), the following equation can be proposed to predict accruals:

Accruals = 0.2 – (capital expenditure*0.002)-(variations in Revenue *0.0001)-(CFO*0.03)-(CFF*0.04)

According to β values, it follows that a variable with larger absolute value of β (i.e. regardless of minus or plus sign) has larger effect on predicted accruals.

Since VIF<10, other variables of operating decisions are not dependent on each other.

H_{1d}: Accruals of a startup firm are significantly related to performance variables.

In the first step, all variables were simultaneously introduced to the equation. As seen in the table above, these variables can determine 71% of variations in modified accruals.

In the second, third, and fourth steps, firm age (p=0.99) and CGS (p=0.18), and capital expenditure (p=0.11) were eliminated from the equation due to lack of a significant connection to accruals. Other performance variables were significantly related to modified accruals of startup firms and, therefore, were kept in the equation. The value of 0.333 for Durbin-Watson statistic indicates independence of error values.

Table VII: Relationship between modified accruals and performance variables of startup firms

Step	Coefficient of correlation	Coefficient of determination (R2)	Adjusted R2	Standard deviation
Step 1	0.85	0.72	0.71	0.01
Step 2	0.85	0.72	0.71	0.01
Step 3	0.85	0.72	0.71	0.01
Step 4	0.84	0.71	0.71	0.01

Table VIII: Relationship between modified accruals and performance variables of consolidating firms

Variable	Non-standardized coefficient		Standard coefficient	t	Significance level	Tolerance	VIF
	B	Standard error	B				
Constant	0.20	0.00		430.17	p<0.001		
Variation in revenue	0.00	0.00	-0.09	-2.01	p=0.05	0.98	1.02
CFO	-0.03	0.003	-0.45	-10.25	p<0.001	0.99	1.01
CFF	-0.04	0.002	-0.72	-16.27	p<0.001	0.98	1.02

As seen in the table, there is a significant relationship between modified accruals and managerial operating decisions in startup firms. Using non-standard coefficients (β), the following equation can be proposed to predict accruals:

Accruals = 0.2 – (variations in Revenue *0.0001)-(CFO*0.03)-(CFF*0.04)

According to β values, it follows that a variable with larger absolute value of β (i.e. regardless of minus or plus sign) has larger effect on predicted accruals.

Since VIF<10, other variables of operating decisions are not dependent on each other.

H_{1e}: Accruals of a declined firm are significantly related to performance variables.

Given the very small number of declined firms, no analysis was performed on these firms.

4.Conclusion

Given the fivefold division used in this study for firm life cycles, the primary hypothesis may be further divided into 5 secondary hypotheses. Declined firms were eliminated due to their small

number, leaving 4 secondary hypotheses for testing:

H_{1a}: Accruals of a mature firm are significantly related to performance variables.

Among the six variables used in this study, firm age (p=0.90) and CGS (p=0.28) were not significantly related to accruals of mature firms. However, there are significant relationships between the remaining variables (capital expenditure, variation in revenue, CFO, and CFF) and accruals of mature firms. In addition, these variables may be ordered as follows, from the most to the lest important, in terms of their impact on accruals:

CFF (β=0.74) with the largest impact on accruals, followed by CFO (β=0.63), capital expenditure (β=0.2), and variation in revenue (β=0.08).

H_{1b}: Accruals of a declining firm are significantly related to performance variables.

Among the six variables used in this study, firm age (p=0.87) and CFO (p=0.49) were not significantly related to accruals of mature firms. However, there are significant relationships between the remaining variables (capital expenditure, variation in revenue, CGS, and CFF) and accruals of declining firms. In addition, these variables may be ordered in terms of their impact on accruals:

CFF (β=0.647) with the largest impact on accruals, followed by capital expenditure (β=0.55), CGS (β=0.41), and variation in revenue (β=0.34).

H_{1c}: Accruals of a consolidating firm are significantly related to performance variables.

Among the six variables used in this study, firm age (p=0.69) and CGS (p=0.29) were not significantly related to accruals of consolidating firms. However, there are significant relationships between the remaining variables (capital expenditure, variation in revenue, CFO, and CFF) and accruals of consolidating firms. In addition, these variables may be ordered in terms of their impact on accruals:

CFF (β=0.74) with the largest impact on accruals of consolidating firms, followed by CFO (β=0.48), capital expenditure (β=0.14), and variation in revenue (β=0.07).

H_{1d}: Accruals of a startup firm are significantly related to performance variables.

Among the six variables used in this study, firm age (p=0.99), CGS (p=0.18), and capital expenditure (p=0.11) were not significantly related to accruals of startup firms. However, there are significant relationships between the remaining variables (variation in revenue, CFO, and CFF) and accruals of accrual firms. In addition, these three variables may be ordered in terms of their impact on accruals:

CFF (β=0.74) with the largest impact on accruals of startup firms, followed by CFO (β=0.45), and variation in revenue (β=0.09).

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