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

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Abstract: The link between accruals and managerial operating decisions 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. First, the regression over total modified accruals, prior to eliminating of outliers, was examined through SPSS and then, final regression results, after eliminating all outliers, were analyzed. Among the managerial operating variables (capital expenditure, variations in revenue, 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 while a significant relationship was found between the rest of the variables (capital expenditures, variation in revenue, CFO, and CFF) and accruals.

Key words: Accruals; Managerial Operating Decisions; Capital Expenditures; Variation in revenue; Cash Flow from Operating Activities; Cash Flow from Financing Activities; Firm Age; Cost of Goods Sold.

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, an economic entity is influenced by variety of accounting methods, accounting estimations, and different forms of judgments and decisions.

Operating decisions differ in the quality of their underlying accounting decisions which result in different qualities of accruals. Entities use capital expenditure to gain positive accruals. By examination of significant relationships between accruals and managerial operating decisions, one can assess the path adopted in accounting information system, including procedures used in measurement and reporting to provide users with required information (Liu, 2006).

Accounting income can be divided into two elements: cash and accrual. Accruals, in turn, are further classified into discretionary and non-discretionary accruals. Managers can control or influence the discretionary part (Khoshtinant & Esmaeili, 2006). However, since income is recognized based on accruals, accrual-basis accounting creates discrepancies between reported operating income and net cash flow from operating activities, by reporting a number of accruals on financial statements (Saghafi & Hashemi, 2004; Mashayekhi & Shariati Ivari, 2009).

Dechow *et al* (1995) showed that non-discretionary accruals are constant and therefore cannot be used in income smoothing. The larger is the discretionary portion of accruals, the more likely income management will be. Managers may employ different techniques, such as accounting items, to control reported earnings (Baradaran et al, 2009).

Jones (1991) believes that accruals probably arise from managerial discretions and changes in economic conditions of a firm. Jones model draws on two basic assumptions: (1) Current accruals (changes in working capital accounts), which stem from variations in economic environment within a firm, are connected to changes in sales; (2) Investments in property, plants, and equipment (PP&E) influence changes in non-discretionary accruals resulting from depreciation expenses.

The idea of using the two variables – variations in income and gross PP&E – to control changes in non-discretionary accruals results in a potentially more accurate model. Jones model completely ignores sales manipulation since it assumes that all revenues over the period in question are non-discretionary.

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Dechow *et al* (1995) presented a modified version of Jones model. They argued that changes in sales (revenue) over the estimation period are caused by earnings management. They found that earnings management by exercising discretion through recognition of revenue from credit sales is easier than earnings management by recognizing revenues from cash sales. The modified Jones model was obtained by introducing trade account receivables into the original Jones model.

Another model, known as "the margin model" was proposed by Peasnell *et al* (2002). The model is similar to the original and modified Jones models. It divides working capital into two parts: gross profit on credit sale and marginal liquidity. Based on this view, working capital accruals are considered abnormal, if they come from credit sales and amount of cash received over the period. In effect, they compared features and assessment abilities of Jones model, modified Jones model, and the margin model and found that both the modified model and the margin model outperform the original Jones model in determining earnings management.

Mashayekhi *et al* (2005) studied the link between accruals and CFO and found that, in the firms covered by their study, when CFO drops as a result of poor business performance, managers turn to accruals to compensate for this and to increase earnings.

Nourvash *et al* (2005) showed that as debt levels increase, managers are more motivated to use accruals to reduce tax burden on their firms.

A Study by Moradi & Soltanian (2008) found that when stock prices experience remarkable increase or when small growth is observed the prices, different cycles in stock exchange do not influence investors' responses to unexpected changes in accruals. However, at the time of average rise in stock prices, no significant relationship is observed between unexpected changes in accruals and abnormal return because in such periods non-professional investors leave the market and more reflections are made on the figures provided in financial statements.

Roychodhury (2006) assumed that instead of using accruals, firm managers probably rely on actual activities to reach agreed upon terms in connection to earnings. He found that the firms slightly above the zero-profit basis (1) provide discount to increase salves over short term; or (2) produce in excess of their capacities to cut CGS; or (3) cut discretionary costs.

MATERIALS 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.

RESULTS AND DISCUSSION

Given the small average value of accruals, we multiplied each value by 1,000,000.
y = 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 $yl = \dfrac{1}{(y \times 1.000.000) + 5}$ to obtain a normal distribution for the response variable.

Although yy1 is a variable with normal distribution, in testing assumptions through regression, the significant presence of outliers observed in the scatter plot adversely influence the accuracy of the regression model. Thus, outliers should be eliminated to improve accuracy while taking into account the four assumptions of linear regression. Finally, the remaining acceptable values for accrual can be used as values for another variable like YY2.

For Steps for Regression

At each step, we eliminate firms with outlying accruals and then we test regression assumptions in order to achieve desirable accuracy.

Step 1: Durbin-Watson statistic

The statistic, which is assessed in the first table (model summary) after eliminating outliers, is based on the hypothesis that errors are serially independent. The closer is the resulting coefficient to 2, the more acceptable it is.

In the table, R represents correlation coefficient and indicates how accurate the predictions are for the accruals. Values of R closer to 1 show a better prediction for accruals by the regression model.

Step 2: Normal distribution

The next table used for testing the assumptions of regression is analysis of variance (ANOVA). The table indicates to what extent the regression is valid. P-values smaller than 0.05 show the validity of regression of modified accruals on managerial operating decisions.

The next table is the table of coefficients. It presents a mathematical equation whose coefficients can be used along with the variables of managerial operating decisions to predict accruals with high levels of accuracy.

Step 3: Scatter plot

Scatter plot is drawn at different stages of elimination of outliers and for the remaining data to determine variance stabilization. Higher concentrations around a certain location in the plot (e.g. a funnel-like shape) indicate better regression.

Step 4: Multicollinearity

If VIF (variance inflation factor) value for each variable of managerial operating decision is smaller than 10, then the variables are not correlated; i.e. the variables are independent of each other.

The following section provides descriptive statistics of the variables prior to and after eliminating outliers:

Table I: Maximum value, minimum value, mean, and standard deviation for the variables prior to normalization.

Variable	Min	Max	Mean	Standard deviation	Median
Accruals	-903.78	1389.41	0.59	38.49	0
Firm Age	4	78	36.95	10.99	40
Capital Expenditures	-92.14	11.30	0.05	2.24	0
Variation in Revenue	-231.59	148,369.2	81.39	3,422.69	0
CGS	-67.22	125.80	0.10	3.42	0
CFO	-450.41	83.42	-0.20	10.71	0
CFF	-453.04	29.77	-0.22	10.57	0

Descriptive statistics after normalization and elimination of some outliers

Table II: Maximum value, minimum value, mean, and standard deviation for the variables after normalization.

Variable	Min	Max	Mean	Standard deviation	Median
Accruals	-11.63	18.61	0.13	1.43	0
Firm Age	4	78	36.95	10.99	40
Capital Expenditures	-7.18	7.18	0.09	0.66	0
Variation in Revenue	-48.53	66.81	0.86	6.04	0
CGS	-4.62	5.83	0.06	0.58	0
CFO	-4.55	3.79	0.01	0.31	0
CFF	-6.94	3.18	-0.01	0.37	0

To test the research hypothesis, we utilized backward multiple linear regression (BMLR) using accruals as criterion and variables of firm performance as predictors. We performed the regression on total modified

accruals prior to elimination of outliers through SPSS and then analyzed the results obtained through regression after eliminating all outliers.

Analysis of Step 1, prior to elimination of outliers

Table III: Relationship between modified accruals and firm performance variables.

Step	Coefficient of regression	Coefficient of determination (R^2)	Adjusted R^2	Standard deviation
Step 1	0.38	0.14	0.14	0.03
Step 2	0.38	0.14	0.14	0.03
Step 3	0.38	0.14	0.14	0.03
Step 4	0.37	0.14	0.14	0.03
Step 5	0.37	0.14	0.14	0.03

In this step, all variables were simultaneously introduced to the equation. As seen in the table above, these variables can determine 14% of variations in modified accruals. Moreover, the value of Durbin-Watson statistic is 1.281, showing to what extent errors are independent.

In the second step, CFO was eliminated from the equation (p=0.97) and in the third step firm age (p=0.69) was excluded due to lack of a significant connection to accruals. In the fourth and fifth steps, CGS (p=0.25) and variations in revenue (p=0.20) were removed, respectively, leaving capital expenditures (p=0.02) and CFF (p<0.001) as the only variables significantly related to modified accruals.

Analysis of Step 2, prior to elimination of outliers:

Table IV: Analysis of variance for modified accruals and firm performance.

Source of variation		Sum of squares	Degree of freedom	Mean squared	F	Significance level
Step 1	Regression	0.21	6	0.04	49.75	P<0.001
	Residual	1.28	1,827	0.001		
	Sum	1.48	1,833			
Step 2	Regression	0.21	5	0.04	59.74	P<0.001
	Residual	1.28	1,828	0.001		
	Sum	1.48	1,833			
Step 3	Regression	0.21	4	0.05	74.67	P<0.001
	Residual	1.28	1,829	0.001		
	Sum	1.48	1,833			
Step 4	Regression	0.21	3	0.07	99.10	P<0.001
	Residual	1.28	1,830	0.001		
	Sum	1.48	1,833			
Step 5	Regression	0.21	2	0.10	147.76	P<0.001
	Residual	1.28	1,831	0.001		
	Sum	1.48	1,833			

Since P-VALUE < 0.001, regression of modified accruals on managerial operating decisions is acceptably valid for the statistical population.

Table V: Regression coefficient for modified accruals and firm performance variables.

Variable	Non-standardized coefficient		Standard coefficient	t	Significance level
	B	Standard error	β		
Fixed	0.20	0.001		318.38	P<0.001
Capital expenditures	-0.002	0.001	-0.05	-2.29	P=0.02
CFF	-0.04	0.002	-0.37	16.90	P<0.001

As seen in the table, those decision variables found to have influence on accruals in the first step of regression are ordered based on values of β (0.05<0.37) regardless of the sign of these values. One can conclude that CFA is more effective in predicting accruals compared to capital expenditures.

Analysis of Step 3, prior to elimination of outliers:

The following figures show scatterplots (regression residuals vs. explanatory variable) for the third step:

Analysis of Step 4, prior to elimination of outliers:

Table VII: Variance inflation factor.

Description	VIF	Tolerance
Capital expenditures	1,002	0.998
CFF	1,002	0.998

Normal P-P Plot of Regression Standardized Residual

Dependent Variable: COMPUTE yy1 = 1/(yy+5) (COMPUT

Scatterplot

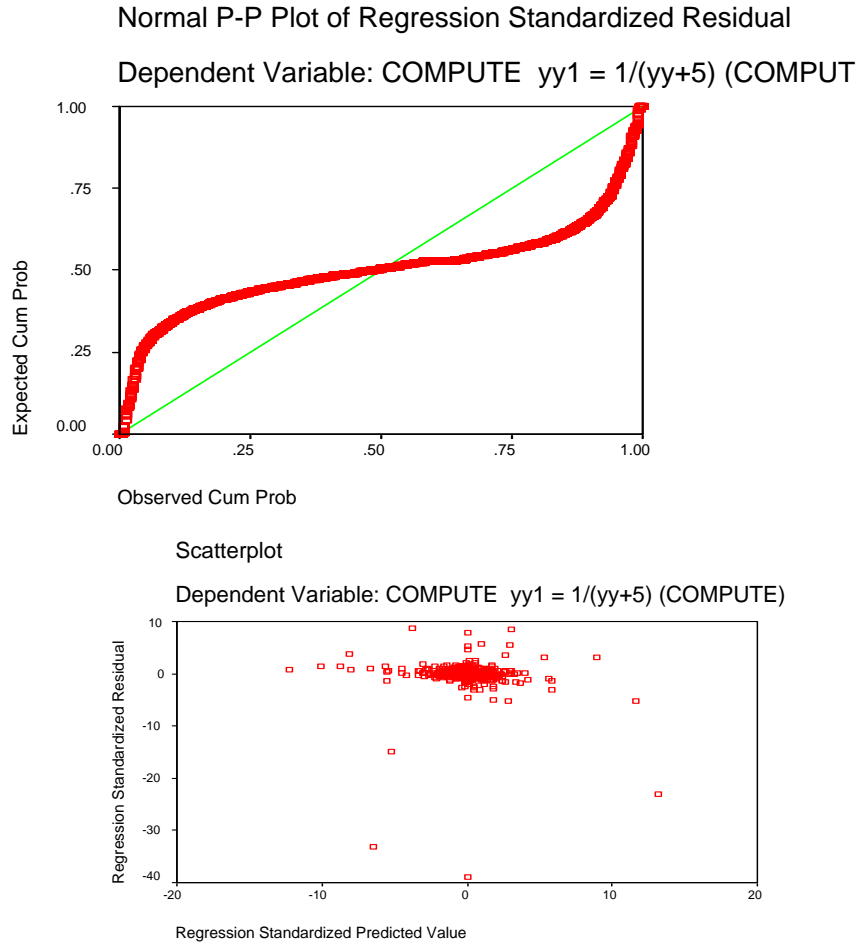### Dependent Variable: COMPUTE yy1 = 1/(yy+5) (COMPUTE)

Fig. 1: Scatterplots prior to elimination of outliers.

Since VIF is smaller than 10, the remaining variables of managerial operating decisions are not dependent on each other.

Once 8 stages were carried out to improve regression results, the following data were obtained. The following section provides description of basic regression steps.

Description of the first regression step in the eighth stage of elimination of outliers

Table VIII: Relationship between modified accruals and firm performance variables.

Step	Coefficient of correlation	Coefficient of determination (R^2)	Adjusted R^2	Standard deviation
Step 1	0.84	0.70	0.70	0.01
Step 2	0.84	0.70	0.70	0.01
Step 3	0.84	0.70	0.70	0.01

In the first step, all variables were simultaneously introduced to the equation. The table above indicates that these variables are able to predict almost 70% of variations in modified accruals. The value of Durbin-Watson statistic is 0.341 that shows to what extend errors are independent.

In the second step, firm age ($p=0.88$) and in the third step CGS ($p=0.37$) were eliminated from the equation due to lack of a significant connection to accruals leaving the remaining variables as variables significantly related to modified accruals.

Description of the second regression step in the eighth stage of elimination of outliers

According to this table, in the eighth stage of eliminating outliers, a significant relationship was found between modified accruals and managerial operating decisions. Based on the data presented in the column "non-standardized coefficient", accruals can be predicted as follows:

Accruals = 0.2 – (capital expenditure*0.002)- (variations in Revenue *0.00)-(CFO*0.03)-(CFF*0.04)

In addition, based on absolute values of β, one can determine which variables have greater impact on predicted accruals.

Table IX: Analysis of variance for modified accruals and firm performance.

Source of variation		Sum of squares	Degree of freedom	Mean squared	F	Significance level
Step 1	Regression	0.11	6	0.02		
	Residual	0.05	1,681	0.00	644.47	P<0.001
	Sum	0.16	1,687			
Step 2	Regression	0.11	5	0.02		
	Residual	0.05	1,682	0.00	773.81	P<0.001
	Sum	0.16	1,687			
Step 3	Regression	0.11	4	0.03		
	Residual	0.05	1,683	0.00	967.19	P<0.001
	Sum	0.16	1,687			

Since P-VALUE < 0.001, regression of modified accruals on managerial operating decisions is acceptably valid for the statistical population.

Table X: Regression coefficient for modified accruals and firm performance variables.

Variable	Non-standardized coefficient		Standard coefficient	t	Significance level
	B	Standard error	β		
Fixed	0.20	0		1,460.19	P<0.001
Capital expenditures	-0.002	0	-0.15	10.79	P<0.001
Variations in Revenue	10	0	-0.07	-5.52	P<0.001
CFO	-0.03	0.001	-0.53	-38.35	P<0.001
CFF	-0.04	0.001	-0.73	-53.34	P<0.001

Description of the third regression step in the eighth stage of elimination of outliers

The following figures show scatterplots (regression residuals vs. explanatory variable) for the third step in this stage:
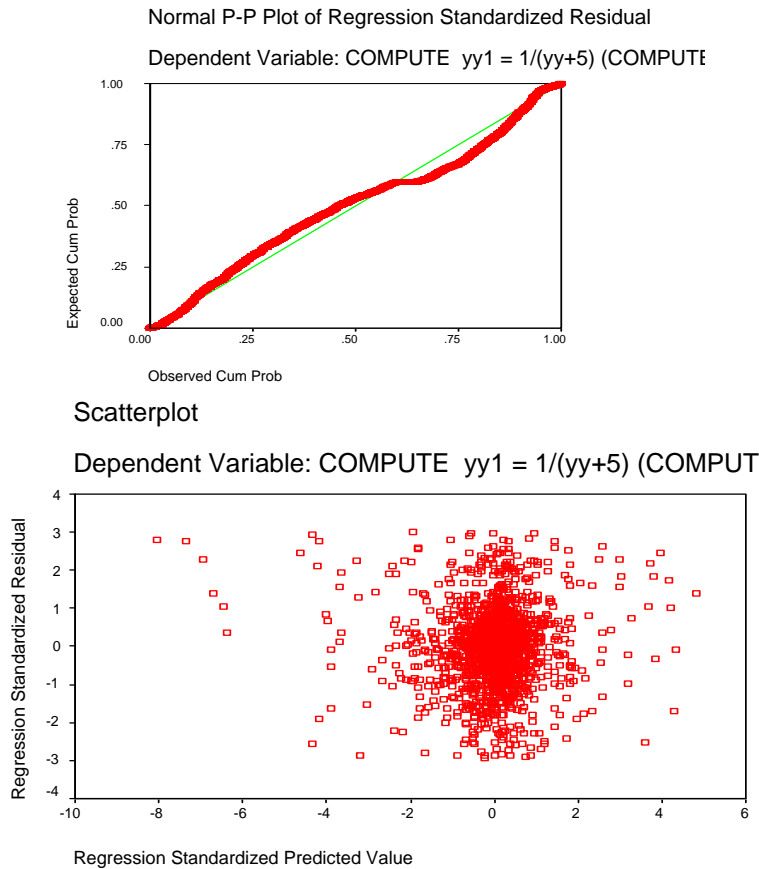

Fig. 2: Scatterplots after elimination of outliers.

A comparison to scatterplots obtained for the first stage shows the changes that occurred during these eight stages.
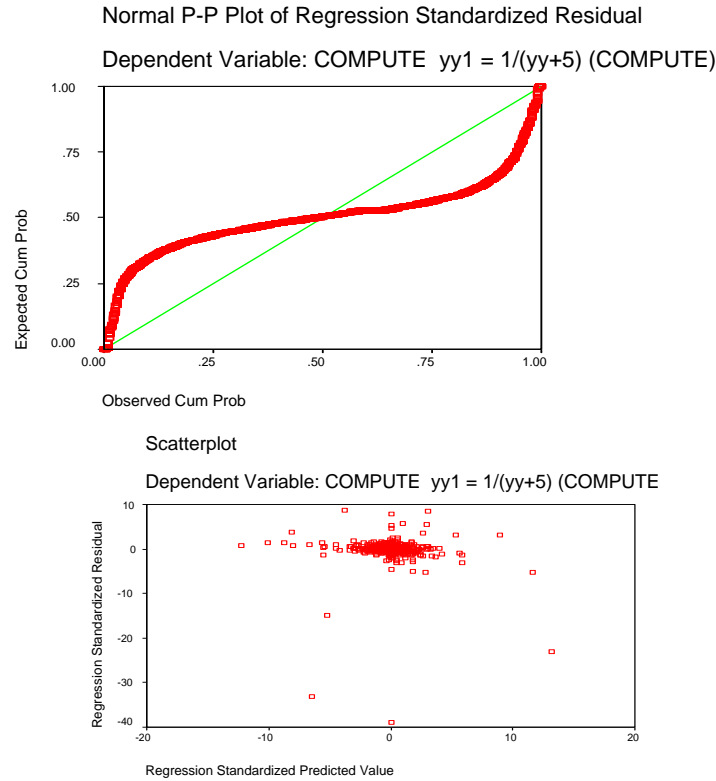
Normal P-P Plot of Regression Standardized Residual

Dependent Variable: COMPUTE yy1 = 1/(yy+5) (COMPUTE)

Scatterplot

Dependent Variable: COMPUTE yy1 = 1/(yy+5) (COMPUTE

Fig. 3: Scatterplots before elimination of outliers.

A closer look at these plots reveals how the data in the eighth stage are different from those in the first stage.
Description of the fourth regression step in the eighth stage of elimination of outliers

Table XIII: Variance inflation factor.

Description	VIF	Tolerance
Capital expenditures	1.007	0.994
Variations in Revenue	1.008	0.992
CFO	1.051	0.951
CFF	1.050	0.952

Since VIF is smaller than 10, the remaining variables of managerial operating decisions are not dependent on each other.

Conclusion:
Based on the results obtained through regression for examining potential significant relationship between managerial operating decisions and accruals, and according to Table X, the following conclusions can be made:

Table X: Regression coefficient for modified accruals and firm performance variables.

Variable	Non-standardized coefficient		Standard coefficient	t	Significance level
	B	Standard error	β		
Fixed	0.20	0		1,460.19	P<0.001
Capital expenditures	-0.002	0	-0.15	10.79	P<0.001
Variations in Revenue	10	0	-0.07	-5.52	P<0.001
CFO	-0.03	0.001	-0.53	-38.35	P<0.001
CFF	-0.04	0.001	-0.73	-53.34	P<0.001

Firm age (p=0.88) and CGS (p=0.37) are not significantly related to accruals.

The remaining four variables (capital expenditures, variations in Revenue, CFO, and CFF) are significantly connected to modified accruals.

These four variables can predict 70% of variations in modified accruals based on the following equation whose coefficients were extracted from the column "non-standardized coefficient" in the table above:

Accruals = 0.2 – (capital expenditure*0.002)- (variations in revenue *0.00)-(CFO*0.03)-(CFF*0.04)

Using the coefficients presented in the column "standardized coefficients", once can determined to what extent these four variables (capital expenditures, variations in Revenue, CFO, and CFF) influence accruals (regardless of sign of β): CFF (β=0.73) has the greatest impact on accruals, followed by CFO (β=0.53), capital expenditures (β=0.15), and variations in Revenue (β=0.07).

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