

A study on Relation Between Profit and Loss Items with Predictive Ability of Accrual Models for Companies in Tehran Stock Exchange

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Abstract: Prediction is an important element in decision making process. As it reflects what is going to happen in future. Financial prediction is of great importance for economic decision making. Necessity for cash flow prediction is undeniable for different economic decision making, as it is a basis for Dividend, interest, liability payment, etc. The present study is aimed to survey the relation between profit and loss items and predictive ability of accrual models. Statistic society is comprised of companies in Tehran Stock Exchange between 2002-2009. Using Cochran formula and presumptions for choosing the participating companies in the study, 88 companies were adopted randomly. First, correlation of models' errors was calculated using Durbin-Watson test, afterward correlation coefficient and test 'F' were applied. In doing so, effects of volatility of the rate of inventory at the end of period to next year sale, along with sale and operation profit volatility were surveyed as an index of changes in business environment on predictive ability of accrual model. Results showed that volatility of the rate of inventory at the end of period to next year sale, sales and operation profits are effective on predictive ability of models and The more volatility, less predictive power.

Keywords: Future cash flow, profit and loss items, volatility of operation profits, volatility of sale, volatility of the rate of inventory at the end of period to next year sale

INTRODUCTION

Nowadays, enterprises try to identify every factor affecting their development. Among most effective is cash deposit and lack of programming in this regard, which is cause of many issues for an enterprise. Not only it is an advantage for companies, knowing amount of cash deposit for each year helps proper programming for resources and expenditures in future. Investors tend to make their investment in companies with higher cash flow as they avoid companies without free cash deposit. Input and output cash flows and accessibility to them is the foundation of many decision made by users of financial statements Financial Accounting Standards Board (FASB, 1987).

Accurate cash flow prediction demands accurate information and analyses on current and previous years' cash flow. Developing an accurate and correct perception of the past and the present and detecting most effective method to this end are of other requirements. Several models have been suggested to give more accurate prediction of future cash flow by many researchers. Considering elements in each model used for prediction, there is a wide range of factors affecting predictive

ability. Knowing this, effects of profit and loss items (volatility of inventory at the end of period to next year sale rate and volatility of sales and operational profits)-as fundamental effective factors-are surveyed separately in what follows.

Question statement: Conceptual concept of financial reporting emphasizes that, for predictive future cash flows, accrual items need to have higher predictive ability comparing to the situations where only current cash flows are under consideration. Actual time frame where future cash flows are supposed to be predictable is left as an open question in the concept. However, there are evidences regarding tendency of investors to predict short-term and current cash flows. An important factor for stockholders in making an investment is liquidity from stocks. Other beneficiaries may express interest to short-term cash flows. Commercial creditors are interested in status of enterprise in short-term unless the enterprise is an old client and its business has to do with transaction of the commercial body.

It is of great importance for those who use cash flows statement for prediction of future cash flows, whether the cash flow resulted from the statement is enough to predict

future cash flows or not? Or, is it possible to use accrual item models for the prediction? There are many factors affecting predictive ability of accrual models for prediction of future cash flows and knowing them may help more accurate prediction by financial analysts and management.

Necessity and important of the research: First aim of conducting this research is to study the relation between profit and loss items of company with predictive ability of accrual models among companies in Tehran Stock Exchange.

Other goals are:

- Informing investors about prediction of cash flows by companies
- Guiding companies to make cash flows prediction based on market conditions
- Helping creditors with recommendations for better decision making based on the factors affecting future cash flows prediction.

Theoretical frame and research background: Statement of financial accounting concepts No. 1 by Financial Accounting Standards Board (FASB, 1978). Implies that financial reporting is to be helpful for potential and actual investors, creditors and other users of information to predict value, risk and maturity date of future incomes. Perspective of future incomes is affected by company's ability to create enough cash flow to meet its liability at due date and also to provide cash for operations and to pay cash dividend Financial Accounting Standards Board (FASB, 1978).

Conceptual concepts of financial reporting emphasizes on ability of accrual items for predictive future cash flows and recognizes accrual accounting as a part of financial reporting, which may be helpful for predictive effective cash flows Financial Accounting Standards Board (FASB, 1987).

This shows emphasis put by the board on utilization of accrual accounting and importance of cash flows prediction for commercial bodies

Research approaches regarding profitability of accrual items for prediction of future cash flows: According to Yoder (2007), there are three research approaches for experimental appraisal of accrual items profitability regarding future cash flows:

Value relevance method: This approach relies on value relevant of accrual items based on their relation with bonds values simultaneously. Adopting value relevance method for appraising profitability of accrual items is rooted in two assumption of effectiveness of market and adequate and proper risk control.

Barth *et al.* (2001), argued for superiority of classified profits model on liquidity and high profits with

higher R^2 , when market value of stocks acts as a dependent variable. In contrast, there are researchers which have tested predictive ability of accounting figures regarding future cash flows and relation between them and market value of stocks based on out of sample prediction error.

Information content method: Researches based on this approach emphasized on relation between accrual items, future cash flows and profits. Dechow *et al.* (1998), Barth *et al.* (2001) and Kim and Wilam (2005), predicted the relation between accrual items of current period and cash flows of future period using cash flow regression at " $t + 1$ " period on cash flows and accrual items in period of " t ". Their results showed power of regression.

Predictive ability method: Researches based on this approach implied for usefulness of accrual items regarding their excessive predictive ability in comparison with future cash flows and assessment profits. Barth *et al.* (2001), concluded that relation between future cash flow and current cash flows are stronger than that with current profits. They argued that current profit divided into operational cash flow and accrual items elements have more important relation with future cash flows than current profit and cash flow in of itself. Another noticeable research based on this approach is that by Lorek *et al.* (1993), Lorek and Willinger (1996) and Yoder (2007).

Items of profit and loss: In their research, Dechow and Dichev (2002), surveyed and examined items of profit and loss as effective factors on quality of accrual items and prediction of future cash flows. They expressed that these items may be used as a tool to appraise quality of accrual items. Among profit and loss items are operation cycle length, sale standard deviation, cash flow, accrual items and operational profit.

Considering the effect of profit and loss items on predictive ability of accrual models, the relation between volatility of inventory at the end of period to next year sale rate, along with sale and operation profit volatility on predictive ability of the models are examined in this study.

Volatility of inventory at the end of period to next year sale rate: Barth *et al.* (2001) developed two hypotheses to predict future cash flows. First, sales changes (company's growth) are zero. Second, inventory changes only occur in response to sudden changes in sales of the current period. However, (Yoder, 2007), Proved that first assumption regarding unchanged sale is not real and add to that, inventory change not only is a sign of sudden change in current year sale, but it also signals managers' expectation for coming year sale. Sales of the coming period affect cash flows of the coming period. This way, in his accrual model, (Yoder, 2007). Used inventory at the

end of the period for predicting future sale. Ability of goods inventory at the end of the period depends on validity of central hypothesis of his model-inventory at time "t" is a percentage (y) of the end price of the sold goods (sales) at time "t + 1". In other words, we have $(NV_t = y)(1-\pi)$ Sales_{t+1}. He believed that more stable rate of goods inventory at the end of the period to next year sale results is more reliable prediction of sales based on goods inventory and finally more accurate prediction of future cash flows.

Sales volatility and operation sale: Sales volatility and operational profits are rooted in profit prediction literatures and effects of such volatility on profit prediction. This relation can be examined looking at effects of profit changes on accrual items and consequently prediction future cash flows. Sale volatility and operational profits reflect volatility of operational environment. More stability of them, therefore results in less cash flows prediction errors and more accurate decision making, (Finger, 1994).

Firm size: Another characteristic of a company and effective on prediction of cash flows is firm size. Bigger company assumed to have more stable parameters (customers, retailers) in accrual items models. The bigger the company, the less effective losing a customer or a contract on earnings and consequently less effective on cash flows. In this regard, there is probably a negative correlation between firm size and volatility of cash flows. It is expected therefore, that with increase in firm size, predictability of cash flows prediction model increase, (Yoder, 2007).

Considering importance and role of firm size in predictive ability of accrual models, it is used in this research as control variable and average total assets are taken as total assets.

- **Related researches:** Dechow *et al.* (1998), studied relation between profits and cash flows using a new model for predictive future cash flows. The model was comprised of profits, cash and accrual items and built on the assumption that sale process occurs as random walk. The results showed that profits are better than current cash flows in predictive future cash flows. In addition, using the prediction model, it was expressed that different ability of current profits and flows for predictive future cash flows is a positive factor of expected operational cash cycles.
- Kim and William (2005), argued that predictive ability of profit for operational cash flows are not decreasing but increasing. A stage length regression method was used in the research and R² was used to compare prediction error. They argued that the relation between profits and operational cash flows increases through time. In addition, not only R²

increases with time, but distribution is decreasing with time.

- Kim and William (2005) studied the relation between value of profits and prediction of future cash flows and concluded that conceptual statement by Financial accounting Standard Board which holds future cash flows as a proper tool to reduction of total future cash flows is not free of any question.
- Cheng and Hollie (2007), Huston University surveyed accuracy of cash flow items for predictive future cash flows. Their results were consistent with recommendation of financial analysts regarding that cash and non-cash financial effects are separate. In addition the found that direct and indirect cash flows reporting are useful for assessment of future cash flows.
- Brochett *et al.* (2008), surveyed accrual items and prediction of future cash flows. Their results were consistent with recommendation of financial analysts regarding that cash and non-cash financial effects are separate. In addition the found that direct and indirect cash flows reporting are useful for assessment of future cash flows.

HYPOTHESES AND METHODOLOGY

Following hypotheses are defined to answer questions of the research:

Hypothesis 1: Ability of prediction for accrual items based models decreases with volatility of inventory at the end the period to next year sale rate.

Hypothesis 2: Ability of prediction for accrual items based models decreases with volatility of sales.

Hypothesis 3: Ability of prediction for accrual items based models decreases with volatility operational profits.

This study is conducted in correlative way from nature and content viewpoint and it is an applied research from objectives viewpoint. The research is conducted in inductive-comparative frame. So that, conceptual frame and research background is library and Internet based and gathered through a posteriori reasoning. A deductive reasoning method was used to test the hypotheses. Data gathering was conducted in Tehran Stock Exchange.

Research variables and calculations:

Dependent variable: Predictability of accrual items

Independent variable: Considering the hypotheses, independent variable include volatility inventory at the end of the period to next year sale rate, volatility of sales and volatility of operational profits.

Control variable: Firm size

- **Volatility of inventory at the end of period to next year sale rate (IRVOL):** According to specific standard deviation of each company from inventory at the end of period to next year sale (INV_t/S_{t+1}) is calculated for every years.
- **Sales volatility (SALESVOL)":** According to standard deviation from sale to total average as sets (S_AvgTA) is calculated for all sample years (Yoder, 2007).
- **Firs size:** Researchers adopted different standards such total assets equity, total sale, number staffs and market value of stockholders' debts and logarithm of total assets equity in determining firm size. Considering that average total assets has been used by other studies (Yoder, 2007) As measure of first size, the same was used in this study as main measure for determining firm size.
- **Volatility of operational profits (OPVOL):** According to standard deviation for each company, operational profit equalized with average total assets was calculated for all sample years.
- **Research model:** Accrual item-based model have been used by many researches for predictive future cash flows. First hypothesis of this study tries to help volatility of accrual items relative to prediction of future cash flows. Two prediction models based on accrual items Barth *et al.* (2001), developed by Yoder (2007), were examined in this study. In Barth's *et al.* (2001) model sales growth is zero. However, Yoder left this assumption and applied cash flows from sales in his models.
- **Model No. 111 Accrual Parameters model (ACCPAR):** Here, change in paid account in Barth's *et al.* (2001) model is divided into three items of changes in payable accounts, change in payable expenditure (delayed) and change in payable. In addition, ($G_{i,t+1}$) and ($G_{i,t+2}$) were used in the model as sales growth in $t+1$ and $t+2$ period:

$$E(CFO_{i,t+1}) = CFO_{i,t} + \Delta AR_{i,t} - \Delta AP_{i,t} - \Delta AccExp_{i,t} \\ - \Delta accIT_{i,t} + (111111 - \beta) \Delta INV_{i,t} + [(11 - \alpha) - (11 - \beta)] \\ (11 - \pi) + \lambda [[G_{i,t+1} - (11 - \beta) \gamma (11 - \pi)] G_{i,t+2}]$$

Variable definitions:

Variable	=	Definition
CFO	=	Cash flow from operations
ΔAR	=	Change in accounts receivable(net)
ΔInv	=	Change in inventory
ΔAP	=	Change in accounts payable
$\Delta AccExp$	=	Change in accrued expense
$\Delta AccIT$	=	Change in accrued income tax payable
Inv	=	Level of ending inventory
S	=	Annual sales (net)
G	=	Growth in sales calculated $S_t - S_{t-1}$

Avg TA	= Beginning plus ending total assets divided by two
IRVOL	= Volatility of the ratio of ending inventory to next period sales measured as the firm specific standard deviation of INV_t/S_{t+1} over all sample years
SALESVOL	= Volatility of sales measured as the firm-specific standard deviation of $S_t/AvgTA$ over all sample years
EARNVOL	= Volatility of earnings measured as the firm-specific standard deviation of income before extraordinary items scaled by average total assets over all sample years
α	= Ratio of year-end accounts receivable to sales
β	= Ratio of year-end accounts payable to inventory purchases plus operating expenses
γ	= Fraction of next period's Cost of Goods Sold (COGS) included in ending inventory measured as $INV_t/COGSt+1$
π	= Gross profit percentage measured as $(St - COGSt)/St$
λ	= Ratio of Operating Expenses (OE) to sales measured as OE_t/St

Model No. 2: Accrual Regression model (ACCREG): Coefficients in the model are estimated based on regression of squares minimum average. Coefficients ($CFO, \Delta AR, \Delta AP, \Delta accExp, \Delta accIT$).

Were obtained based on theoretic values in main analysis model:

$$E(CFO_{i,t+1}) = \theta_0 + CFO_{i,t} + \Delta AR_{i,t} - \Delta AP_{i,t} \\ - \Delta accExp_{i,t} - \Delta accIT_{i,t} + \theta_1 \Delta INV_{i,t} + \theta_2 G_{t+1} + \theta_3 G_t$$

Statistic society and sampling method: The research is conducted between 2002-2009 (8 years). Through systematic deletion method 129 companies were determined during the period and 88 were chosen at accuracy level of 5%.

Data analysis: To test the hypothesis and related data a multi-variable regression was applied at accuracy level of 95% and SPSS software was used for calculations. Table 1 illustrates descriptive statistics in the study.

Any correlation relation between two independent and dependent variables was investigated for each hypothesis. First Kolmogorov-Smirnov Test was applied on variables of hypotheses and the result for each variable was found equal to ($0.000 > 0.05$). This means the variable are not normal, thus logarithm of the variable is taken into account as normal variables.

Multi-variable regression test to test research model: Have normality test conducted, data was inserted in SPSS software to check any significant relation between

Table 1: Data descriptive statistics

Variables	Mean	Median	S.D	Min	Max
Predictive ability of the accrual items	165313.3815	74390.0000	6.81672E5	1002251.00	10716239.00
IR VOL	0.3263	0.2700	0.27794	0.00	4.09
SA LES VOL	0.9195	0.8550	0.45514	0.01	3.47
OP VOL	0.1306	0.0700	0.21381	0.00	2.23
CFO(t+1)	1.5127E5	7.4934E4	5.98289E5	-1.00E6	1.07E7
AVGTA	1.0631E6	2.3878E5	5.31915E6	2.42E4	7.76E7
CFO (t)	1.6531E5	7.4390E4	6.81672E5	-1.00E6	1.07E7
D_AR	5.86E4	6204.00	4.312E5	-1.E6	7984540
D_INV	5.63E4	4173.50	6.191E5	-4.E6	1.E7
D_AP	5493.9890	475.5000	3.68711E4	-32267.00	596407.00
D_ACCIT	267.6039	04.0000	1.61811E	-1.54E5	1.27E5
INV	2.08E5	6.35E4	7.403E5	0	9006112
SALES (t)	8.4573E5	1.9966E5	4.28117E6	1.09E4	6.60E7
ED_SALES2	-258.3166	20738.5000	2.52114E6	-4.44E7	2.37E7

Min: Minimum; Max: Maximum

Table 2: Durbin-Watson test

Hypothesis	R	R ²	Adjusted R ²	SEE of the estimate	Durbin-Watson
H ₁	0.826 ^a	0.682	0.644	357068.28	1.721
H ₂	0.556 ^a	0.309	0.644	357068.28	1.678
H ₃	0.844 ^a	0.712	0.644	357068.28	1.837

(a) Predictors: (Constant), AVGTA; (b) Dependent variable: CFO (t+1)

independent and independent variables. Variables were converted to logarithmic variables. Five results were obtained from the test. Stepwise method was applied in inserting variables in regression. A feature of the method is that it survey effect of an independent variable on dependent variable without taking into account effects from other independent variables. This results in more accurate result about the variables. Having multi-variable regression test conducted on accrual parametric and regression model, the former was taken as basis of dependent variable.

Durbin-Watson test in regression analysis was applied to survey self-correlation (Table 2).

Considering Durbin-Watson statistics was found between 1.5-2.5, no correlation hypothesis between the errors is rejected.

As the next step of the test, significance of test was carried out on regression model (Table 3). As listed in the table, probability of F (level of significance) is >0.05 for all hypotheses. It is acceptable that there is a significance regression pattern at 95% of accuracy level of each hypothesis.

For hypotheses H₀ and H₁ we have:

$$\begin{cases} 0.05 \geq \text{SigR}: H_0 \\ H_1: \text{SigR} < 0.05 \end{cases}$$

considering that 0.05 is significance level, H₀ and otherwise the other H₁ is confirmed with significance level of correlation coefficient higher or equal to 0.05. we

found Sig R = 0.00, thus H₁ implies that there is a significant positive relation between the predictive ability of accrual items-based model and changes in inventory at the end of the period to next year sale, sale changes and operational profit changes rates.

Considering test "F" for H₀ and H₁ we have:

$$\begin{cases} H_0: \text{sigF} \geq 0.05 \\ < 0.05: \text{sigF}: H_1 \end{cases}$$

Considering significance level at $\alpha = 0.05$ and sig F = 0.00, H₁) predictive ability of accrual items-based model decreases with change in inventory of goods at the end of the period to next year sale, changes in sale and changes in operational profit rates.

Table 4 lists coefficient of regression model for each hypothesis. The coefficients are significant and their line equation is:

Testing hypothesis using regression line equation:

$$Y = \beta_0 + \beta_1 X_1 \beta_2 + 2X_2 + X_1 X_2 + \epsilon_i \lambda$$

$$H_1: Y = -495265/66 + 2024662/62 X_1 + 0/105 X_2 + \epsilon_i \lambda$$

$$H_2: Y = -600403/047 + 832711/885 X_1 + 0/105 X_2 + \epsilon_i \lambda$$

$$H_3: Y = -1086040/796 + 2690628/707 X_1 + 0/105 X_2 + \epsilon_i \lambda$$

where,

Y : Predictive ability of accrual items

X₁ : In each hypothesis is rate of goods inventory at the end of the period to next year sale, sales change, operational profits changes respectively

X₂ : Firm size

Research findings: Results of surveying hypothesis one (changes in rate of goods inventory at the end of period to next year sale affect on predictive ability of accrual models) showed a positive and significant relation between

Table 3: Regression model significance test ANOVA

	Model	SS	df	MS	F-value	Sig.
H1	regression	1.595E14	2	1.595E13	283.584	0.000
	residual	2.909E13	614	5.626E10		
		1.886E14	616			
H2	regression	1.594E14	2	1.992E13	353.587	0.000
	residual	2.924E13	614	5.635E10		
		1.886E14	616			
H3	regression	1.529E14	2	2.549E13	371.938	0.000
	residual	3.570E13	614	6.853E10		
		1.886e14	616			

(b) Dependent variable: CFO (t+1)

Table 4: Coefficients^a

Hypothesis	Model	Unstandardized coefficients		Standardized coefficients		
		β	SE	β	t-value	Sig.
H_1	(constant)	68606.471	24600.420	-495265.660	2.789	0.000
	IRVOL	-38307.590	56260.86	2024662.620	-0.681	0.000
H_2	(constant)	91606.400	24600.424	-600403.047	2.789	0.000
	SALESVOL	-78307.500	56260.800	832711.885	-0.681	0.000
H_3	(constant)	452126.471	323600.424	-1086040.79	62.789	0.000
	OPVOL	-265507.599	46260.861	2690628.707	-0.681	0.000
	AVGTA	0.105	0.003	0.105	30.809	0.000

(a) Dependent variable: CFO (t+1)

the rate and errors of predictions made by the model, so that changes in the rate result in less predictive ability.

Results of surveys on hypothesis 2 showed a positive and significant relation between sale volatility and absolute error of prediction by accrual regression model. In other words, with changes in sales, errors of prediction of accrual models increases and consequently predictive ability decreases.

Surveys on hypothesis 3 showed a positive and significant relation between changes and operational profits and error of prediction by accrual regression model. In other words, with changes in operational profit, errors of prediction of accrual models increases and consequently predictive ability decreases.

Results of correlation between the items under consideration showed a positive and significant correlation between volatility of rate of goods inventory at the end of the period to next year sale, sales volatility and operational profits. In other words, predictive ability of the model decreases, with increase in volatility of profit and loss items.

In addition, results of the tests carried on firm size and predictive model of accrual models showed a negative and significant correlation. In other words, predictive ability of models decreases with increase in firm size. An explanation is that firms with bigger size have more stable customer list, so that losing one customer is of trivial effect on profitability and cash flows.

CONCLUSION AND RECOMMENDATIONS

Considering the results followings are some recommendations to improve Tehran Stock Exchange performance:

- Taking into account consideration power of accrual models for predicting future cash flows, stockholders and financial analysts are recommended to pay more attention to accrual items. In addition, financial statement users, analysts and investors may have better results by paying more attention to cash flows statements. Comparison statement of operational cash flow and cash flow statement bear significant information for predicting future cash flows. Using cash flow predicting models and paying more attention to financial statement and especially cash flows result in more logical decisions.
- Considering different factors' effects(e.g. profit and loss items) on predictive ability of future cash flows using the models, it is essential-to have more accurate prediction-to apply accrual models for predicting cash flows and pay more attention on effects of the factors on ability of predictive ability of the models.
- Financial analysts use financial statement items-based statistic models to predict cash flows and results of such prediction are used as an index to appraise their prediction and managers' performance. In addition, it is recommend to apply results accrual items-based statistical models' results for predicting future cash flows and take the results a basis to determine base stocks price in stock Exchange.
- Results of this research may help users of financial statements to make better decisions. Potential and actual stockholders and creditors may use the information to estimate future cash flows for appraise liquidity, liability payment power and performance measurement.

- Policy making bodies such as Audit Association and Stock Exchange may use the result of this study to make decision about which part of information should be emphasized more to preserve public interests and optimum decision making.

Summary: Different factors affecting the models for prediction of cash flows have made previous researches to obtain different answers and misled the users. This research surveyed some items of profit and loss affecting predictive ability of accrual model. Results of this study showed a positive relation between operational cash flows of coming years with change in accounts receivable, average total assets, volatility of accounts paid, volatility of taxes paid, volatility of goods inventory and a negative relation between operational cash flows with operational cash flow of current years, volatility of delayed costs, expectation at the end of period "t" from sales in t+1 to t+2. The results showed that volatility of variables is effective on predictive ability of the models and with increase in volatility, less predictive ability is expected from accrual models. And accrual regression model is taken as preferred to other models for predicting cash flows.

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