

A Diagnostic for Earnings Management by Using Changes in Asset Turnover and Profit Margin

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Abstract

Financial users are interested in evaluating companies' performance and there are various methods for it. DuPont analysis is one of them. In DuPont analysis, a firm's return on assets is decomposed into asset turnover (ATO) and profit margin (PM). Sale is a fundamental driver of net operating assets in the balance sheet and the main drive of net operating income in the income statement. The basis of this observation is in the articulation of the income statement and balance sheet, which ensures the effect of earnings management on operating income and net operating assets as a result of which ATO and PM move in the opposite directions. This study examines if the ratio of ATO / PM provides higher information content in detecting earnings management compared to non-discretionary accruals. Study sample includes 100 companies listed in Tehran Stock Exchange from 2002-2011. For research patterns, multivariate regression analysis using ordinary least squares and logistic regression were utilized. To identify data arrangement (panel or cross-sectional), Chow and Hausman tests were used. Based on the results, ratio of ATO / PM provides higher information content than non-discretionary accruals; changes of ATO and PM in the opposite direction are more likely for earnings management.

Key Words: *Non-Discretionary Accruals, Profit Margin, Asset Turnover, Earnings Management, Joan Dupont Ratio.*

Introduction

Identifying earnings management is important to the users of financial statements for evaluating present economic performance, predicting future profitability, and determining corporate value. However, identifying earnings management is time-consuming and difficult, especially when there is no clear motivation for earnings management. While, in academic settings, different indexes have been used for

earnings management, some recent studies have used non-discretionary accruals as a measure for earnings management. For example, Field et al. (2001) have suggested that using extant discretionary accruals may create serious inferential problems. Accordingly, this study follows a simple diagnostic of earnings management, based on Joan DuPont's analysis in which a firm's return on assets is decomposed into asset turnover (ATO, the ratio of sales to net operating assets) and profit margin (PM, the ratio of operating income to sales). Sale is a fundamental driver of net operating assets in the balance sheet and the main driver of net operating income in the income statement. In fact, main books of financial statements' analysis are advocates of predicting accruals of income statement and balance sheet based on sale predictions. For example, Penman (2007) offers a framework for forecasting, suggesting that sale prediction is a starting point. This view which uses Joan DuPont analysis implies that there should be a constant correlation between operating sale and income in income statement and between sale and net operating assets in the balance sheet. The basis of this observation is in the articulation of the income statement and balance sheet, which ensures the effect of earnings management on operating income and net operating assets as a result of which ATO and PM move in the opposite directions. As an illustration, at a sale level, if a company has an upward earnings management because of the expense of bad debts, both net income compared with sale and net receivable value of receivable accounts compared to sale will increase.

This increase in net income compared with sale leads to PM increase while an increase in net received accounts compared to sale induces ATO decrease. Also, if a company doesn't register the costs of its bad debts in a period for earnings management but faces an increase in the expenses of its bad debts in the next period, probably for the changes in ATO and PM in the opposite direction in the next period, identifying ATO/PM leads to an increase of PM in first period as an evidence of upward earnings management and decrease of ATO in the second period as an evidence of downward earnings management (Jansen et al. 2012).

According to mentioned points, changes in opposite direction of ATO and PM in the company can be a sign of potential earnings management. Specially, simultaneous increase (decrease) in PM and decrease (increase) in ATO as a diagnostic of upward (downward) earnings management will be examined in this study. Then, according to mentioned points, the following hypotheses were stated:

H1a. Simultaneous increase of PM and decrease of ATO is a sign of upward earnings management.

H1b. Simultaneous decrease of PM and increase of ATO is a sign of downward earnings management.

Identifying earnings management through ATO / PM is similar to non-discretionary accruals, leading to determining the growth of non-discretionary accruals of balance sheets. However, diagnosing ATO/PM is via using an accounting model for creating more understanding about earnings management, resulted from the model of non-discretionary accruals. For example, consider the investment of a company in current operating assets in predicting sale growth in future. In this case, non-discretionary accruals are more likely positive, even when earnings management is upward; because, more investment on current capital is not necessarily along with sale growth.

From the other hand, ATO/PM diagnostic is not upward earnings management. Because, if ATO decreases, investment on operating assets does not affect current PM's predicting future sale growth. This study suggests that opposite direction in changes of ATO and PM can be a useful complement for non-discretionary accruals in identifying earnings management in scientific studies. The correlation between earnings management and ATO/PM is preserved when the correlation between net operating assets and sale is consistent and earnings is managed by the costs.

Burgstahler and Eames (2006) showed that being or not being based on forecasts is a sign of earnings management (Burgstahler and Eames, 2006). We reason that when companies lose their expected return with a high difference, they are likely to manage downward earnings (smooth earnings). Thus, we examine if ATO/PM measure has significantly higher ability in identifying companies which fulfill or don't fulfill

earnings expectations and possibility of surprisingly earnings maximization than modified non-discretionary accruals, identifying companies which report the most differences (Jansen et al, 2012). Based on the mentioned points, second hypothesis is stated as follows:

H2. ATO/ PM ratio provides higher information content than non-discretionary accruals in identifying earnings management.

Background

As a measure of decision-making, reported earnings in the company has a great significance. It is considered an important measure in evaluating performance and identifying the value of economic corporation, used by a wide group of users. Since calculating the earnings of an economic corporation is affected by accounting's estimation methods and also providing financial statements rests on the manager of a business entity, he may resort to managing earnings (Valizadeh, 2008).

Schipper (1989) defines earnings as follows: 'earnings management should include manipulating real earnings created through timed investment or financial provision decisions for changing reported earnings or some of its components'. Healy and Wahlen (1999) state that earnings management occurs when managers use their personal judgments in financial reporting and manipulate transactions' structure for changing financial reporting (Zakeri, 2010).

Jaberi and Arabmazar (2011) showed that DuPont's components of operating assets don't increase the ability of predicting profitability changes but changes of these components can increase predictability. Also, changes in net operating assets turnover have higher predictability than changes in operating earnings ratio. In another study, Soliman examined components of DuPont, used by market players. He suggested that since changes in operating assets turnover are significant in predicting changes of future net operating assets return, the market reacts to these changes sharply.

Jansen et al. (2012) offered a new diagnostic method for earnings management based on the changes in operating earnings and assets turnover ratio. They found that by simultaneous increase in PM and decrease in ATO, earnings management is upward; while a simultaneous decrease in PM and an increase in ATO show that earnings management is downward. They also showed that in all other states of earnings management, relative explanatory power of ATO / PM's diagnostic method is considerably higher than non-discretionary accruals.

Bolo et al. (2012) showed that there is a significant and negative correlation between restating financial statements and earnings quality. In this way, increase of restating financial statements leads to the decrease of earnings quality and vice versa. Gonzalo Rodriguez and Van Hemmen used five methods for estimating discretionary accruals as a proxy for earnings management. They concluded that in the absence of diversification, debt has a negative effect on earnings management. They also observed that asymmetry resulting from diversification may be abused by the managers, confirmed by 5 management models (Rodriguez and Hemmen, 2010).

Mendesa et al. (2012) analyzed specific strategies of earnings management. They used accruals as a tool for earnings management. They concluded that earnings report becomes artificial by decreasing variability. Adut et al. (2013) identified predictive and opportunistic earnings management's companies by examining the relationship between discretionary accruals and future cash flow. They found that predictive (opportunistic) management's companies have higher (lower) levels of income, reward, and bonus compared to the companies, classified as neither predictive nor opportunistic. Moreover, they found that future returns depend on earnings management. Future returns are positive for predictive earnings management's companies; while they are negative for opportunistic management's companies.

Methodology

This study is correlation with applied goals. To gather theories of this study, library method was used. Resources for gathering data included stock exchange archives, Internet data bases, banks or information of software packages such as Rahavardnovin and Tadbirpardaz. Time span of the study was from 2002 - 2011. The statistical population included all accepted companies in Tehran Stock Exchange from 2002 - 2011. To select sample, systematic random sampling was used. The firms with the following conditions were included in the sample:

- They were accepted in Tehran Stock Exchange till last month of winter of 2002.
- Their fiscal year ended in last month of winter.
- The company didn't change its fiscal year from 2002 -2011.
- Their required financial information during study years was accessible.
- They were manufacturing companies, thus, financial institutes, investment firms, banks, insurance, leasing, and holding companies were excluded from the sample.

Based on above-mentioned conditions, 100 companies of Tehran Stock Exchange were included in the sample.

Variables

Research variables and their measurement methods are shown in Table 1(Appendix1).

Research Patterns

According to research variables, a regression model in Equation 1 was designed (Appendix2).

Results

To estimate research patterns, multivariate regression of ordinary least squares and logistic regression were used. To identify the ways of data arrangement (either panel or cross-sectional form) Chow and Hausman test was used. This model is measured in three states: 1. with all variables, 2. with the variable of adjusted performance of non-discretionary accruals, 3. with upward and downward earnings management. After measuring the model, the test of significance of coefficients is conducted and the hypotheses are tested.

Measuring Fitness of First Model

Since dependent variable takes the values of 0 and 1, ^{logistic panel data} is used. First model of the study is shown in Equation 2 (Appendix2).

Logistic Test of Panel Data

Summary of the results of testing first model is shown in Table 2 .

Based on Table 2 and regarding LR statistics, achieved P Value is significant. This shows general effect of independent variable on dependent variable. Considering determination coefficient of the model which is 0.4414, it is concluded that 44.14% of the changes in dependent variable is explained by independent variable. Regarding the value of ΔATO variable, 0.117 and ΔPM , -0.174 which is statistically significant, H1b is accepted. In other words, simultaneous decrease of PM and increase of ATO is a sign of downward earnings management.

As shown in Table 2, in all states of regression model, since LR and P-Value are significant and regarding determination coefficient of them, it is seen that the value of determination coefficient for the first state is higher than second and third state (0.4414). Thus, H2 is accepted and ATO/ PM ratio offers higher information content in identifying earnings management than non-discretionary accruals.

Fitness of Second Model

Since dependent variable takes the values of 0 and 1, ^{logistic panel data} is used. Second model of the study is shown in Equation 3(Appendix2).

Logistic Test of Panel Data

Summary of the results of testing second model is shown in Table 2. Based on Table 3 and regarding LR statistics, achieved P Value is significant. This shows general effect of independent variable on dependent variable. Considering determination coefficient of the model which is 0.2502, it is concluded that 25.02% of the changes in dependent variable is explained by independent variable. Regarding the value of ΔATO variable, -0.132 and ΔPM , 0.177 which is statistically significant, H1a is accepted. In other words, simultaneous increase of PM and decrease of ATO is a sign of downward earnings management.

Considering determination coefficient of the model which is 0.2448, it is concluded that 24.48% of the changes in dependent variable is explained by independent variable. Regarding the values of 0.2503 and 0.2502 for third and second states which are statistically significant, H2 is accepted. Since the value of the first state is higher than the other two values. In other words, H2 is accepted and ATO/ PM ratio offers higher information content in identifying earnings management than non-discretionary accruals.

Fitness of Third Model

Since dependent variable takes the values of 0 and 1, ^{logistic panel data} is used. Third model of the study is shown in Equation 4(Appendix2).

Chow Test

Chow (1960) introduced a test for selecting between ordinary least square method and panel method. In this test, H0 implies homogeneity of intercepts and coefficients in the companies. Test results confirmed rejection of H0 and necessity of using panel data in three states for this group of data.

Hausman Test

Since Chow method has confirmed panel data method, either fixed effect or random effect method needs to be selected. For this purpose, in panel data, Hausman test was used. Results of Hausman test rejected H0 and confirmed selecting fixed effect method, shown in Table 5.

Panel Data Test

Summary of the results of testing second model is shown in Table 6. Based on Table 6 and regarding LR statistics, achieved P Value is significant. This shows general effect of independent variable on dependent variable. Considering determination coefficient of the model which is 0.5461, it is concluded that 54.61% of the changes in dependent variable is explained by independent variable. Regarding the value of ΔATO variable, 148166.300 and value of -16075.830 ΔPM which is statistically significant, H1b is accepted. In other words, simultaneous decrease of PM and increase of ATO is a sign of downward earnings management.

As shown in Table 2, in all states of regression model, since *LR* and P-Value are significant and regarding determination coefficient of them, it is seen that the value of determination coefficient for the first state (0.5461) is higher than second and third state. Thus, H2 is accepted and *ATO / PM* ratio offers higher information content in identifying earnings management than non-discretionary accruals.

Conclusion

This study aimed to offer a diagnostic tool, using changes in asset turnover and profit margin according to the model of Jansen et al. (2012) in listed companies of Tehran Stock Exchange. They found that simultaneous increases in *PM* and decreases in *ATO* signal upward earnings management, and that contemporaneous decreases in *PM* and increases in *ATO* signal downward earnings management. Also, *ATO/PM* ratio has higher information content than non-discretionary accruals. Findings of this study agree with their results. Results showed that creating the possibility of restating earnings of a company, probability of fulfilling or not fulfilling analyst's prediction, provides the possibility of earnings maximization of a company in a surprising manner, leading to a general increase(decrease) of an artificial and transparent profit along with yielding opposite results in future profitability. In every analysis, *ATO / PM* measure yields more information than performance-adjusted non-discretionary accruals. Also, a diagnostic can be useful for earnings management which is based on an accounting model and general accounting ratios, including enough data with easy calculations and useful information about earnings management when there is no clear incentive for earnings management of a company. The results should, therefore, benefit academic researchers as well as educators and practitioners of financial statement analysis.

Limitations

Data resulting from financial statements were not adjusted with inflation. Thus, in case they adjust, they may yield different results. Also, used financial ratios in this study are limited to the ratios of past studies in a specific time period. In case of using other financial ratios, different results may be achieved.

Suggestions

Industries of listed companies can be differentiated according to their industry and then their results should be analyzed accordingly. Stock market should clarify the information of asset turnover ratio and earnings margin for the users to enable them to identify created earnings management in the companies.

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Appendix 1

Table 1. Research variables and their measurement methods

dependent	Earnings management	3-month predicted earnings difference and real annual earnings	MBE	1 if $SURP \geq$ or < 0.02 , otherwise 0 $SURP = 3\text{-month predicted earnings difference and real annual earnings}$
		6-month predicted earnings difference and real annual earnings	UP_REST ATE	{ 1 if is negative SURP, otherwise 0 $SURP = 3\text{-month predicted earnings difference and real annual earnings}$
		Change in return of net operating assets	$\Delta RNOA$	$\Delta RNOA_t = RNOA_{t-1} - RNOA_t$ $RNOA_t = \text{operating profit of year } t / \text{mean net operating assets of year } t$ $\text{mean net operating assets of year } t = (\text{net operating assets of year } t + \text{mean net operating assets of year } t-1) / 2$
		Unusual return	ABRET	$R_{it} = R_{it} - \bar{R}_{it}$ $R_{it} = \text{ratio of difference of the last transaction price in year } t \text{ to last price of year } t-1$ $\bar{R}_{it} = \text{mean of stock return 3 days after announcement of 3-month earnings}$
independent	Adjusted performance of non-discretionary accruals	-	PABNAC	$TAC_t / Ta_{t-1} = a_1(1 / Ta_{t-1}) + a_2((\Delta REV_t - \Delta REC_t) / Ta_{t-1}) + a_3(PPE_t / Ta_{t-1}) + a_4(RNOA_{t-1} / Ta_{t-1}) + e_t$ $TAC_t = \text{earnings before accruals of year } t - \text{operating cash flow of year } t; (CFO)_t$ $Ta_{t-1} = \text{total assets of year } t-1$ $\Delta REV_t = \text{changes in sale of year } t$ $\Delta REC_t = \text{changes in receivables of year } t$ $PPE_t = \text{gross assets, land, equipments}$ $RNOA_t = \text{net return of operating assets}$ $CFO_t = \text{net cash flow of operating cash flows in 2002 and after that}$ $CFO_t = \text{operating cash flow in year } t - \text{changes in current assets of year } t+$

				changes in cash flow and short-term investment+ changes in current debts of year t
	Upward earnings management	-	EM_UP	{1 If $0 > \Delta ATO_t, 0 < \Delta PM_t$ O.W 0
	downward earnings management	-	EM_DN	{1 If $0 < \Delta ATO_t, 0 > \Delta PM_t$ O.W 0
control	Changes in profit margin	-	ΔPM	$\Delta PM_t = (\text{operating income}_t / \text{sales}_t) - (\text{operating income}_{t-1} / \text{sales}_{t-1})$ OI =operating earnings S=sale
	Changes in asset turnover	-	ΔATO	$\Delta ATO_t = (\text{sales}_t / \text{net operating assets}_t) - (\text{sales}_{t-1} / \text{net operating assets}_{t-1})$ S=sale NOA=net operating assets
	Market value to book value ratio	-	MTB	Market value of stockholder equity to book value ratio
	Market value of stockholders' equity	-	MVE	$MVE_t = P_{it} * N_{it}$ P_{it} = latest transaction price of each share of <i>i</i> th company at the end of year t N_{it} =stock number of <i>i</i> th company at the end of year t
	Return of net operating assets	-	RNOA	$RNOA_t = \text{operating income}_t / \text{average net operating assets}_t$ OI=operating income $RNOA_t = (\text{Return of net operating assets in year t} + \text{average of net operating assets in year t-1})/2$
	net operating assets	-	NOA	$NOA_t = \text{net operating assets}_t / \text{sales}_t$ NOA= net operating assets S=sale
	Changes in net operating assets	-	ΔNOA	$\Delta NOA_t = \text{net operating assets}_t - \text{net operating assets}_{t-1} / \text{net operating assets}_{t-1}$ NOA= net operating asset

Table 2. Summary of the results of testing first regression model

variable	1 st state		2 nd state		3 rd state	
	Value	P-Value	Value	P-Value	Value	P-Value
Constant of model	-1.094	0.0001	-0.752	0.0001	-0.772	0.0001
<i>PABNAC</i>	-0.051	0.702	-0.016	0.899		
<i>MTB</i>	0.0001	0.898	0.0001	0.986	0.0001	0.955
<i>MVE</i>	0.0001	0.021	0.0001	0.153	0.0001	0.168
<i>ΔATO</i>	0.117	0.018	0.105	0.033	0.103	0.018
<i>ΔPM</i>	-0.174	0.049	-0.173	0.060	-0.176	0.016
<i>RNOA</i>	0.0001	0.004	0.0001	0.001	0.0001	0.001

<i>ΔRNOA</i>	0.0001	0.905	0.0001-	0.687	0.0001-	0.741
<i>NOA</i>	0.076	0.210	-0.003	0.630	-0.003	0.646
<i>ΔNOA</i>	-0.023	0.065	-0.016	0.111	-0.015	0.122
<i>EM-UP</i>	-0.203	0.070			0.102	0.351
<i>EM-DN</i>	-0.123	0.312			-0.051	0.667
<i>r²</i>	0.4414		0.2203		0.2251	
P-Value	0.0001		0.02900		0.01126	

***significance at 1% level, ** significance at 5% level, * significance at 10% level

Resource:Findings of the study

Table 3. Summary of the results of testing second regression model

variable	1 st state		2 nd state		3 rd state	
	Value	P-Value	Value	P-Value	Value	P-Value
Constant of model	1.458	0.0001	1.319	0.0001	1.458	0.0001
PABNAC	0.026	0.892	0.024	0.898		
MTB	-0.002	0.786	-0.001	0.787	-0.002	0.787
MVE	-0.0001	0.333	-0.0001	0.280	-0.0001	0.335
ΔATO	-0.132	0.032	-0.137	0.013	-0.132	0.037
ΔPM	0.177	0.036	0.190	0.019	0.176	0.039
RNOA	0.0001-	0.012	0.0001-	0.011	0.0001-	0.012
ΔRNOA	-0.0001	0.150	-0.0001	0.170	-0.0001	0.150
NOA	0.016	0.134	0.016	0.137	0.015	0.137
ΔNOA	0.032	0.116	0.034	0.070	0.032	0.116
EM-UP	-0.411	0.013			-0.411	0.013
EM-DN	0.032	0.866			0.032	0.865
<i>r²</i>	0.2502		0.2448		0.2503	
P-Value	0.0001		0.0001		0.0001	

***significance at 1% level, ** significance at 5% level, * significance at 10% level

Resource:Findings of the study

Table 4. Chow test results

State	Effect test	Test statistics	P-Value
First	F	***1.8162	0.0001
Second	F	***1.8287	0.0001
Third	F	***1.8188	0.0001

***significance at 1% level, ** significance at 5% level, * significance at 10% level

Resource:findings of the study

Table 5.Hausman test results

State	Test statistics	P-Value
First	***160.9582	0.0001
Second	***160.7750	0.0001
Third	***161.0628	0.0001

***significance at 1% level, ** significance at 5% level, * significance at 10% level

Resource:findings of the study

Table 6. Summary of the results of testing third regression model

variable	1 st state		2 nd state		3 rd state	
	Value	P-Value	Value	P-Value	Value	P-Value
Constant of model	-499180.600	0.0001	-534648.000	0.0001	-499928.400	0.0001
ΔATO	148166.300	0.001	146641.800	0.001	148132.600	0.001
ΔPM	-16075.830	0.460	-12592.020	0.889	-14753.440	0.870
$RNOA$	-0.010	0.562	-0.010	0.547	-0.010	0.562
$\Delta RNOA$	-0.214	0.0001	-0.213	0.0001	-0.214	0.0001
NOA	-2450.619	0.821	-2212.161	0.837	-2252.533	0.832
ΔNOA	-46992.910	0.002	-46580.340	0.002	-47092.570	0.002
PABNAC	-23943.020	0.923	-19033.550	0.939		
$EM-UP$	-93529.810	0.613			-92666.450	0.615
$EM-DN$	-13650.180	0.945			-12769.590	0.948
r^2	0.5461		0.5460		0.5461	
P-Value	0.0001		0.0001		0.0001	

***significance at 1% level, ** significance at 5% level, * significance at 10% level

Resource: Findings of the study

Appendix 2

Equation 1

- $$MBE_t = r_0 + r_1 PABNAC_t + r_2 MTB_t + r_3 MVE_t + r_4 \Delta ATO_t + r_5 \Delta PM_t + r_6 RNOA_t + r_7 \Delta RNOA_t + r_8 NOA_t + r_9 \Delta NOA_t + r_{10} EM-UP_t + r_{11} EM-DN_t + \xi_{t+1}$$
- $$ABRET_{t+1} = r_0 + r_1 \Delta ATO_t + r_2 \Delta PM_t + r_3 RNOA_t + r_4 \Delta RNOA_t + r_5 NOA_t + r_6 \Delta NOA_t + r_7 PABNAC_t + r_8 EM-UP_t + r_9 EM-DN_t + \xi_{t+1}$$
- $$UP-RESTATE_t = r_0 + r_1 PABNAC_t + r_2 MTB_t + r_3 MVE_t + r_4 \Delta ATO_t + r_5 \Delta PM_t + r_6 RNOA_t + r_7 \Delta RNOA_t + r_8 NOA_t + r_9 \Delta NOA_t + r_{10} EM-UP_t + r_{11} EM-DN_t + \xi_{t+1}$$

Equation 2

$$MBE_t = r_0 + r_1 PABNAC_t + r_2 MTB_t + r_3 MVE_t + r_4 \Delta ATO_t + r_5 \Delta PM_t + r_6 RNOA_t + r_7 \Delta RNOA_t + r_8 NOA_t + r_9 \Delta NOA_t + r_{10} EM-UP_t + r_{11} EM-DN_t + \xi_{t+1}$$

Equation 3

$$DN-RESTATE_t = r_0 + r_1 PABNAC_t + r_2 MTB_t + r_3 MVE_t + r_4 \Delta ATO_t + r_5 \Delta PM_t + r_6 RNOA_t + r_7 \Delta RNOA_t + r_8 NOA_t + r_9 \Delta NOA_t + r_{10} EM-UP_t + r_{11} EM-DN_t + \xi_{t+1}$$

Equation 4

$$\Delta RNOA_{t+1} = r_0 + r_1 \Delta ATO_t + r_2 \Delta PM_t + r_3 RNOA_t + r_4 \Delta RNOA_t + r_5 NOA_t + r_6 \Delta NOA_t + r_7 PABNAC_t + r_8 EM-UP_t + r_9 EM-DN_t + \xi_{t+1}$$