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Does the Sources of Earnings Matter to Equity Investors?

[Effects of profit margin and asset turnover on market returns]

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Abstract

This thesis brings a new analysis about investors interest towards operational source of earnings and how well past components of operational earnings can forecast future change in operational earnings. I approached operational earnings through Dupont analysis, where return on net operating assets is decomposed into profit margin and asset turnover.

I found consistent with prior research that change in asset turnover is significant to forecast future change on return on net operating assets. Current year market returns were affected by past change in asset turnover and past change in profit margin. Current year market returns are also affected by information about future level of asset turnover. Market return test show that investors interest reach down to sources of earnings not just the last layer of money that they receive.

Keywords financial statement analysis, Dupont analysis, market returns

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1 Introduction

This paper examinates how equity investors use financial statement information in equity valuation. My focus is operational sources of earnings information. I look operational source of earnings through Dupont analysis, where return on net operating assets (RNOA) is decomposed into product of two sources, profit margin (PM) and asset turnover (ATO). Primary motivation is to test do investors interest reach down to profit margin and asset turnover when valuing stocks. Or do they simply value earnings that company produces them. And also, is this act rational compered what past PM and ATO can tell about future operating earnings development. Question arises understanding about market participants interest towards firms' operations, equity valuation and how well firms can sustain they current earnings generating ability.

Firstly, I studied Dupont components forecasting ability over future change of RNOA. These regressions give basis on how much investors should care about past year profit margin and asset turnover which are announced in current year. I found that change in asset turnover have forecasting ability over future change of RNOA. In the market return tests I found that change in past ATO and past change in PM have significant effect on current year market returns. Finally, I studied how market participants reflect future level of Dupont components. I discovered that future level of ATO has significant impact to current year market returns.

Dupont analysis is a well-known method to decompose companies' operating earnings and it is presented in many textbooks, for example by (Palepu et al., 2019). Operating earnings is measured by return on net operating assets and it is calculated by (operating income / net operating assets). Profit margin measures company's ability to generate operating income from its revenue (operating income / revenue). Asset turnover measures company's ability to generate revenue from its net operating assets (revenue / net operating assets).

Firstly (Fairfield & Yohn, 2001) studied Dupont components forecasting ability over future change of RNOA. They found that level of these components are insufficient to

forecast future change. Instead, they discovered that change in ATO is significant to forecast future change in RNOA. Later (Penman & Zang, 2002) concluded similar findings about change in ATO forecasting ability. (Soliman, 2008) examinate Dupont components forecasting ability and how market participants react to them. He concluded similar findings about change in ATO forecasting ability than previously mentioned researchers. Secondly Soliman found that past level of PM has significant impact on current year returns. Also, past change in ATO remains significant to current year returns. After that he found that current year market returns also reflect information about future level on ATO.

After the introduction the thesis structure is following. In the second chapter I talk more about the theoretical framework where this study is connected to and review more deeply previous studies contributions. The third chapter discusses the data, variable measurements and regression definitions. In the fourth chapter I present and discuss the regression results. In the final fifth chapter I conclude results and discuss implications and limitations of the study.

2 Theoretical framework and literature review

2.1 Theoretical framework

Theoretical framework that links Dupont analysis into equity valuation is the residual income valuation framework. Residual income valuation is algebraically equivalent to dividend discount model. Firstly (Ohlson, 1995) showed theoretical connection between residual income model and dividend discount model and later (Feltham & Ohlson, 1995) showed empirical result on behalf of this model.

I present the residual income model same way as (Soliman, 2008):

$$P_t = B_t + \sum_{i=1}^{\infty} \frac{E_t[(ROE_{t+i} - r_e)B_{t+i-1}]}{(1+r_e)^i}$$

Where P_t is present market value of equity, B_t is present book value of equity, B_{t+i-1} is past book value of equity, ROE is accounting return on equity and r_e = market cost of equity. $E_t[(ROE_{t+i} - r_e)B_{t+i-1}]$ is expected value of abnormal earnings. Abnormal earnings are the amount that company can produce beyond market required rate of return.

The classic return on equity (net income / equity) decomposition (Palepu et al., 2019) is the following:

$$ROE = \frac{Net\ income}{Sales} \times \frac{Sales}{Assets} \times \frac{Assets}{Equity}$$

(Nissim & Penman, 2001) show algebraically how RNOA can be decomposed into PM and ATO (RNOA = PM × ATO). Return on net operating assets is product of operating components without financing activities. I use RNOA is because I want investigate PM and ATO effect without leverage disturbance. Nissim and Penman decomposition show how Dupont components link to equity valuation. Change in PM × ATO will lead change in RNOA / ROE and so forth change in value of the company. This framework gives a reason why information about PM and ATO should be relevant to equity investors in the first place.

2.2 Literature review

(Fairfield & Yohn 2001) examinate Dupont components forecasting ability to future change of RNOA. They find that level of RNOA has negative association with $\Delta RNOA_{t+1}$. They argue that this could occur because RNOA is mean reverting. Companies cannot persist their return on net operating assets. This argument is based on (Nissim & Penman, 2001) study, where they examinate Dupont components time-series properties. Fairfield and Yohn find that levels of asset turnover and profit margin do not have forecasting ability over $\Delta RNOA_{t+1}$. On the other hand, they find that changes in asset turnover do have forecasting ability over change in RNOA a one year ahead. They argue that the reason behind this is that level of ratios describes more firm's operational strategy and industry membership. Changes in ATO provide information about where a company is heading in terms of efficiency. Also increase in ΔNOA_t will forecast negative change

in future RNOA. Which means that if company increases its net operating assets in year t, it will not lead to corresponding increase in operating income in year t+1.

(Soliman, 2008) pointed that one reason why ΔATO_t could forecast $\Delta RNOA_{t+1}$ better than ΔPM_t is that PM and ATO have different time-series properties. (Nissim & Penman, 2001) found that profit margin has similar time-series properties as RNOA. ATO showed more persistent results. (Fairfield & Yohn, 2001) also argue that PM weak forecasting ability could occur because accounting conservatism makes it less predictive variable. Positive changes in profit margin could be result of increased profitability or a reduction in accounting conservatism.

(Penman & Zhang, 2002) also find that RNOA is mean reverting since it has negative coefficient towards $\Delta RNOA_{t+1}$. They find also that ΔPM_t has no effect but ΔATO_t is statistically significant towards $\Delta RNOA_{t+1}$. Penman and Zhang study also contribute to what PM and ATO increase, or decrease will show more persistent earnings in the future. They noticed that if PM increases but ATO decreases, this kind of earnings are not persistent. They argue that in this scenario a company reduces its expenses to make PM increase but at the same time they cut procedures that would increase their revenue in the future. This type of procedure prevents earnings from growing in future. They showed that if increases in efficiency (ATO) is happened by subtracting NOA, this is positively associated with $\Delta RNOA_{t+1}$. Which implies that this type of increase in efficiency will last. In addition, paper makes a small contribution to how Dupont components can predict future stock returns. In their analysis all the variables were insignificant after t+1 year returns. ΔPM_t was more incremental to t+1 returns than ΔATO_t. $RNOA_t$ and $\Delta RNOA_t$ were both insignificant. Growth in NOA and accruals were negatively associated with future stock returns.

(Soliman, 2008) studied Dupont components' forecasting ability to $\Delta RNOA_{t+1}$ and effect on market returns. Soliman finds that level of PM_t and ATO_t has no forecasting ability over $\Delta RNOA_{t+1}$. Change in ATO_t was significant and positive and change in profit margin was positive but statistically insignificant towards $\Delta RNOA_{t+1}$. $RNOA_t$ and $\Delta RNOA_t$ where negatively associated with future change in RNOA, which strengthens the claim about mean reverting. Soliman pointed out based on Nissim and Penman work,

that both variables in PM are flow variables. ATO consists of flow and stock variable. Definition of PM makes it more volatile and less persistent compared to ATO.

(Soliman, 2008) advocates that profit margins are more transitory than asset turnover rates based on (Romer, 1986) work. Romer stated that profit margins are based on knowledge that is easier to imitate by competitors. Soliman elaborated Romer's thoughts and explains that high profit margin companies usually have strong brand and so forth good pricing power. Knowledge about brand's attractiveness is something that competitors imitate each other. Soliman pointed out that large profit margins usually tempt new entrants and harden the competition between companies. Harder competition makes persistence of high profit margin more challenging. On the other hand, efficient use of assets and production process is harder to imitate and makes ATO more persistent source of earnings. Soliman states that increases in ATO indicate firm's ability to generate sales for given investment more efficiently and this type of profitability is more likely to persist. Economical occurrence, changes in firm operations are more likely to be behind changes in ATO. Also, In Soliman study ΔNOA_t were negatively associated with future RNOA growth. Accruals were negatively associated with future changes in RNOA, which enhances (Richardson et al., 2005) findings about accruals negative association with future earnings.

When (Soliman, 2008) studied past Dupont components effects on stock returns, he finds that level of PM and ATO are positive and significant. Also ΔATO_t was positive and significant explanatory variable for market returns. $RNOA_t$ and $\Delta RNOA_t$ were both positive and significant. Next Soliman studied how market participants reflect future information of RNOA, PM and ATO. First, he looked just $RNOA_{t+1}$ effect on current stock return and find it significant. After decomposing $RNOA_{t+1}$ to PM_{t+1} and ATO_{t+1}, $RNOA_{t+1}$ becomes insignificant and ATO_{t+1} remains significant. Soliman also studied in short-term how market participants react to announcement effect on PM and ATO. He finds that change in ATO was significant but change in PM or RNOA were not. Based on Soliman's research Dupont components contain relevant information to investors when they value stocks, not just final surface of earnings.

3 Data and Methods

The data I use is from Compustat - Capital IQ and CRSP. Financial statement numbers are from Compustat, and stock returns are from CRSP. Data includes companies from NYSE, NYSE American Composite and Nasdaq US. indexes. Time horizon that I have used is between years 2000-2021. All firms-year observations that have sic-code between 6000-6999 have been deleted. Those are financing companies and so the decomposition is not meaningful. Reduction is consistent with (Fairfield & Yohn 2001) and (Soliman, 2008) work. Firm-year observations that have insufficient financial statement or stock return data have been deleted. Overall, I am left with 29092 firm-year observations. Observations are winsorized at the 1 percent and 99 percent levels to better replicate previous studies (Soliman, 2008). There has been a little dispersion in previous studies about keeping negative operating income or NOA values. Based on point of view my research question I decided to keep the negative values. My study focuses on do investors care about source of earnings in all situations.

3.1 Variable definitions

There has been a little differences how previous studies have defined these variables. I have approached these measurements closely in the same way as (Soliman, 2008) to get better respondence is the phenomenon changed in newer data. In these variables year t means in current year published number that tells about past year performance. Notation $t + 1$ means that number is published into future but tells about current year performance.

NOA **(**net operating assets). Operating assets – operating liabilities. Operating assets = total assets – cash and short-term investments. Operating liabilities = total assets – long term debt – debt in current liabilities – common/ordinary equity – non-controlling interest – preferred stock. $\Delta NOA_t = (NOA_t - NOA_{t-1})/NOA_{t-1}$

Operating income = earnings before interest and taxes (EBIT)

Sales = Total sales reduced by cash discounts, trade discounts, and returned sales and allowances for which credit is given to customers.

RNOA (return on net operating assets) = Operating income /$(NOA_t + NOA_{t-1})/2$. I use average net operating assets the same way as (Soliman, 2008) since it give a truer representation a company's economic situation over the fiscal year than beginning or ending value. $\Delta RNOA_t = (RNOA_t - RNOA_{t-1})/RNOA_{t-1}$. $\Delta RNOA_{t+1} = (RNOA_{t+1} - RNOA_t)/RNOA_t$

PM (profit margin) = Operating income / Sales. $\Delta PM_t = (PM_t - PM_{t-1})/PM_{t-1}$

ATO (asset turnover) = Sales / $(NOA_t + NOA_{t-1})/2$). $\Delta ATO_t = (ATO_t - ATO_{t-1})/ATO_{t-1}$

EARN (eps) = earnings per share before extraordinary items. $\Delta EARN_t = (EPS_t - EPS_{t-1})/EPS_{t-1}$

R_t = yearly holding period return including dividends

Accruals definitions

WC (working capital) = Current operating assets – current operating liabilities. Current operating assets = current assets – cash and short-term investments. Current operating liabilities = Current liabilities – debt in current liabilities. $\Delta WC_t = (WC_t - WC_{t-1})/WC_{t-1}$

NCO (net noncurrent operating assets) = Non-current operating assets – non-current operating liabilities. Non-current operating assets = total assets – current assets – investment and advances. Non-current operating liabilities = total liabilities – long term debt – current liabilities. $\Delta NCO_t = (NCO_t - NCO_{t-1})/NCO_{t-1}$

FIN (net financial assets) = Financial assets – financial liabilities. Financial assets = permanent investments + short term investments. Financial liabilities = long term debt + debt in current liabilities + preferred stock. $\Delta FIN_t = (FIN_t - FIN_{t-1})/FIN_{t-1}$

3.2 Regressions

Regressions that I have constructed closely replicate (Soliman, 2008) work. First, I test Dupont components effect to future change in RNOA. Secondly, I test past Dupont components effect on current year returns. Thirdly I test do future levels of these

components have an effect to current year returns. Market return regression are long-window regressions which show how PM and ATO shape yearly return, not the precise announcement effect.

I have estimated all regressions separately for each year sample to avoid cross-sectional correlation in the residuals (Fama & MacBeth, 1973). Total amount regressions is 22 in years between 2000-2021. Then I constructed Fama-Macbeth t-statistics as follows:

$$\frac{\bar{\beta}}{\sigma_{\hat{\beta}}/\sqrt{n}}$$

Where $\bar{\beta}$ is the average of annual coefficient and $\sigma_{\hat{\beta}}$ is standard deviation of annual coefficient and n number of annual regressions. This same methodology is also being used by (Penman & Zhang, 2002) and (Soliman, 2008).

Regressions of future change in RNOA on Dupont components

These regressions measure how well components of RNOA predicts future change on it. Companies' annual reports are typically released a three month after a year change (Alford et al., 1994) and those numbers describe how company performed in the past year. So, these regressions give basis how much these past numbers that are released in current year should affect current year returns. I use $\Delta RNOA_{t+1}$ as a left-hand side variable because change in RNOA will give more information where the company is heading in terms of operating earnings. (Fairfield and Yohn, 2001), (Penman and Zang, 2002) and (Soliman, 2008) also use $\Delta RNOA_{t+1}$ as a left-hand variable.

Model 1: $\Delta RNOA_{t+1} = \hat{\alpha} + \widehat{\beta_1} RNOA_t + \widehat{\beta_2} PM_t + \widehat{\beta_3} ATO_t + \widehat{\beta_4} \Delta RNOA_t + \widehat{\beta_5} \Delta NOA_t + \widehat{\varepsilon_t}$. In model 1 I examinate do levels of PM and ATO have explanatory power to $\Delta RNOA_{t+1}$ while controlling $RNOA_t$, $\Delta RNOA_t$ and ΔNOA_t. $RNOA_t$ and $\Delta RNOA_t$ make sure that possible explanatory information by PM_t and ATO_t is not caused by $RNOA_t$ and $\Delta RNOA_t$. I also control ΔNOA_t because (Sunder, 1980), (Ou, 1984), and (Abarbanell & Bushee, 1997), show that capital expenditures have a negative association with future earnings changes. Including ΔNOA_t also better replicates earlier mentioned studies.

Model 2: $\Delta RNOA_{t+1} = \hat{\alpha} + \widehat{\beta_1} RNOA_t + \widehat{\beta_2} PM_t + \widehat{\beta_3} ATO_t + \widehat{\beta_4} \Delta RNOA_t + \widehat{\beta_5} \Delta NOA_t + \widehat{\beta_6} \Delta WC_t + \widehat{\beta_7} \Delta NCO_t + \widehat{\beta_8} \Delta FIN_t + \widehat{\varepsilon_t}$. The second regression is the same in other respects except I include accruals as control variables. (Congressional Research Service, 2014) explain that accruals are revenues or expenses that have realized but payment is not yet happened. The regression's accrual definition is from (Richardson et al., 2005) paper where they quantify accruals as $(\Delta WC_t + \Delta NCO_t + \Delta FIN_t)$. They showed that accruals have negative effect on future earnings. By adding accruals, I try to better distinguish PM_t and ATO_t explanatory force. Addition of accruals is also consistent with (Soliman, 2008) paper.

Model 3: $\Delta RNOA_{t+1} = \hat{\alpha} + \widehat{\beta_1} RNOA_t + \widehat{\beta_2} \Delta PM_t + \widehat{\beta_3} \Delta ATO_t + \widehat{\beta_4} \Delta RNOA_t + \widehat{\beta_5} \Delta NOA_t + \widehat{\varepsilon_t}$. In the third model I examinate ΔPM_t and ΔATO_t while controlling same variables as in model 1. (Fairfield & Yohn, 2001) advocate that changes in these ratios tell better what has happened to company's profitability more than levels of PM and ATO.

Model 4: $\Delta RNOA_{t+1} = \hat{\alpha} + \widehat{\beta_1} RNOA_t + \widehat{\beta_2} \Delta PM_t + \widehat{\beta_3} \Delta ATO_t + \widehat{\beta_4} \Delta RNOA_t + \widehat{\beta_5} \Delta NOA_t + + \widehat{\beta_6} \Delta WC_t + \widehat{\beta_7} \Delta NCO_t + \widehat{\beta_8} \Delta FIN_t + \widehat{\varepsilon_t}$. The final model is the same as model 3 except it includes changes in accruals also as control variables.

Regressions of market returns on current Dupont components

These regressions measure do investors care about operational sources of earnings. The results what I get from previous regressions give idea how much current year returns should be affected by past PM and ATO. If Dupont components do not have forecasting ability, investors should give them less attention because they do not tell how operating earnings are going to develop in that current year. With stronger forecasting ability, effect on current market returns should be stronger since now investors have an idea how RNOA will develop in current year.

Model 1: $R_t = \hat{\alpha} + \widehat{\beta_1} EARN_t + \widehat{\beta_2} \Delta EARN_t + \widehat{\varepsilon_t}$. In the first regression I examinate the earnings per share and change in earnings per share effect to market returns. This represents the baseline regression, which examinate that do earnings contain relevant information to market participants.

Model 2: $R_t = \hat{\alpha} + \widehat{\beta_1} EARN_t + \widehat{\beta_2} \Delta EARN_t + \widehat{\beta_3} RNOA_t + \widehat{\beta_4} \Delta RNOA_t + \hat{\varepsilon_t}$. In the second model I add $RNOA_t$ and $\Delta RNOA_t$ to see if market participants respond to return on operating assets or it changes. In this regression I investigate that do operational profit metrics matter after controlling EPS. EPS more directly informs how much money investor could earn per share and that is why it could be more significant.

Model 3: $R_t = \hat{\alpha} + \widehat{\beta_1} EARN_t + \widehat{\beta_2} \Delta EARN_t + \widehat{\beta_3} RNOA_t + \widehat{\beta_4} \Delta RNOA_t + \widehat{\beta_5} PM_t + \widehat{\beta_6} ATO_t$. In the third regression I add PM_t and ATO_t to see does level of these ratios explain stock returns. The regression try to distinguish is it relevant to investors how a company produces it RNOA. If it is irrelevant then the control variables should capture all the information.

Model 4: $R_t = \hat{\alpha} + \widehat{\beta_1} EARN_t + \widehat{\beta_2} \Delta EARN_t + \widehat{\beta_3} RNOA_t + \widehat{\beta_4} \Delta RNOA_t + \widehat{\beta_5} PM_t + \widehat{\beta_6} ATO_t + \widehat{\beta_7} \Delta PM_t + \widehat{\beta_8} \Delta ATO_t$. In model 4 I add ΔPM_t and ΔATO_t and investigate do past changes in profit margin or asset turnover have an impact on market returns.

Regressions of market returns on future Dupont components

These regressions investigate that do market participants reflect future levels of profit margin and asset turnover. These regressions are important because future values gather information what has happened in that current year. Information that is published during a year and affect company's RNOA, PM or ATO is not going to show a current year of those numbers, because they present past year performance. Future Dupont components regressions combined with previous ones give a more complete picture do investors use information about source of earnings. In my models I include also $EARN_{t+1}$ variable. Soliman (2008) did not include this variable, but I think this version better helps to distinguish operational earnings and its components effectiveness to current returns.

Model 1: $R_t = \hat{\alpha} + \widehat{\beta_1} EARN_t + \widehat{\beta_2} \Delta EARN_t + \widehat{\beta_3} RNOA_t + \widehat{\beta_4} \Delta RNOA_t + \widehat{\beta_5} PM_t + \widehat{\beta_6} ATO_t + \widehat{\beta_7} \Delta PM_t + \widehat{\beta_8} \Delta ATO_t + \widehat{\beta_9} EARN_{t+1} + \hat{\varepsilon_t}$. In the first model I measure does investors generally reflect earnings information that it released in the future while controlling these past factors.

Model 2: $R_t = \hat{\alpha} + \widehat{\beta_1} EARN_t + \widehat{\beta_2} \Delta EARN_t + \widehat{\beta_3} RNOA_t + \widehat{\beta_4} \Delta RNOA_t + \widehat{\beta_5} PM_t + \widehat{\beta_6} ATO_t + \widehat{\beta_7} \Delta PM_t + \widehat{\beta_8} \Delta ATO_t + \widehat{\beta_9} EARN_{t+1} + \widehat{\beta_{10}} RNOA_{t+1} + \widehat{\varepsilon_t}$. In the second model I measure does investors reflect RNOA information that will be released in the future, while controlling future earnings and the past variables.

Model 3: $R_t = \hat{\alpha} + \widehat{\beta_1} EARN_t + \widehat{\beta_2} \Delta EARN_t + \widehat{\beta_3} RNOA_t + \widehat{\beta_4} \Delta RNOA_t + \widehat{\beta_5} PM_t + \widehat{\beta_6} ATO_t + \widehat{\beta_7} \Delta PM_t + \widehat{\beta_8} \Delta ATO_t + \widehat{\beta_9} EARN_{t+1} + \widehat{\beta_{10}} RNOA_{t+1} + \widehat{\beta_{11}} PM_{t+1} + \widehat{\beta_{12}} ATO_{t+1} + \widehat{\varepsilon_t}$. . In the third model I decompose RNOA to see is future released information about PM and ATO relevant to market participants. At the same time, I control future earnings per share, future RNOA and the past variables.

4 Results

4.1 Descriptive statistics and correlations

Descriptive statistics and correlations shed light on regression results and give understanding what basis forecasting and relation with market returns has been constructed.

TABLE 1

Descriptive Statistics

	Average	Std. Dev	25%	Median	75%
NOA_t	4706.199	12789.774	73.211	554.517	2718.842
$RNOA_t$	0.094	1.514	0.038	0.120	0.233
PM_t	-0.553	3.636	0.012	0.078	0.150
ATO_t	1.943	3.245	0.742	1.457	2.505
R_t	0.143	0.556	-0.179	0.074	0.340
$EARN_t$	1.100	2.789	-0.190	0.810	2.140

The sample comprises 29092 firm-year observations from years 2000-2021. Numbers are winsorized at the 1 percent and 99 percent levels. One difference here compared to previous studies is negative average of PM and a large standard error, which are distorted by some outlier values even after winsorizing. In other aspects if compared to (Nissim & Penman 2001) study where the negative values are included results are in the same category. Smaller sample and relative larger number of negative values makes RNOA and ATO averages a little bit smaller.

TABLE 2

Pearson Correlations

	$\Delta RNOA_{t+1}$	$\Delta RNOA_t$	$RNOA_t$	PM_t	ΔPM_t	ATO_t	ΔATO_t	$EARN_t$	$\Delta EARN_t$	R_t
$\Delta RNOA_{t+1}$	1	-0.043	-0.074	0.002	-0.027	0.016	0.036	-0.065	-0.040	0.053
$\Delta RNOA$		1	0.296	0.029	0.724	-0.038	-0.009	0.134	0.348	0.171
$RNOA_t$			1	0.029	0.063	-0.167	-0.304	0.098	0.054	0.046
PM_t				1	0.202	0.097	-0.022	0.204	0.063	0.054
ΔPM_t					1	0.038	0.095	0.198	0.415	0.176
ATO_t						1	0.387	0.060	0.030	0.032
ΔATO_t							1	-0.013	0.064	0.069
$EARN_t$								1	0.333	0.129
$\Delta EARN_t$									1	0.186
R_t										1

In the correlation matrix levels and change of ATO are positively correlated with $\Delta RNOA_{t+1}$. PM and change of PM correlation relationship with $\Delta RNOA_{t+1}$ is weaker or negative. All variables are positively correlated with market returns. Levels of PM and ATO are slightly positively correlated with each other, which differs (Nissim and

Penman, 2001) and (Soliman, 2008) studies where level of PM and ATO were negatively correlated.

4.2 Regressions of future change in RNOA on Dupont components

TABLE 3

Time-series means and t-statistics in parenthesis for coefficients from annual cross-sectional regressions of future change in RNOA on the Dupont components

MODEL 1: $\Delta RNOA_{t+1} = \hat{\alpha} + \widehat{\beta_1} RNOA_t + \widehat{\beta_2} PM_t + \widehat{\beta_3} ATO_t + \widehat{\beta_4} \Delta RNOA_t + \widehat{\beta_5} \Delta NOA_t + \hat{\varepsilon_t}$

MODEL 2: $\Delta RNOA_{t+1} = \hat{\alpha} + \widehat{\beta_1} RNOA_t + \widehat{\beta_2} PM_t + \widehat{\beta_3} ATO_t + \widehat{\beta_4} \Delta RNOA_t + \widehat{\beta_5} \Delta NOA_t + \widehat{\beta_6} \Delta WC_t + \widehat{\beta_7} \Delta NCO_t + \widehat{\beta_8} \Delta FIN_t + \hat{\varepsilon_t}$

MODEL 3: $\Delta RNOA_{t+1} = \hat{\alpha} + \widehat{\beta_1} RNOA_t + \widehat{\beta_2} \Delta PM_t + \widehat{\beta_3} \Delta ATO_t + \widehat{\beta_4} \Delta RNOA_t + \widehat{\beta_5} \Delta NOA_t + \hat{\varepsilon_t}$

MODEL 4: $\Delta RNOA_{t+1} = \hat{\alpha} + \widehat{\beta_1} RNOA_t + \widehat{\beta_2} \Delta PM_t + \widehat{\beta_3} \Delta ATO_t + \widehat{\beta_4} \Delta RNOA_t + \widehat{\beta_5} \Delta NOA_t + \widehat{\beta_6} \Delta WC_t + \widehat{\beta_7} \Delta NCO_t + \widehat{\beta_8} \Delta FIN_t + \hat{\varepsilon_t}$

RHS-Variables	MODEL 1	MODEL 2	MODEL 3	MODEL 4
α	0.112	0.109	0.115	0.114
	(1.94)	(1.87)	(2.24)	(2.18)
$RNOA_t$	-0.093	-0.093	-0.083	-0.083
	(-6.17)	(-6.42)	(-6.08)	(-6.32)
PM_t	0.008	0.009		
	(1.61)	(1.65)		
ATO_t	0.007	0.008		
	(1.17)	(1.30)		
$\Delta RNOA_t$	-0.021	-0.021	-0.020	-0.020
	(-2.41)	(-2.41)	(-1.48)	(-1.45)
ΔNOA_t	-0.082	-0.079	-0.073	-0.070
	(-4.61)	(-3.61)	(-3.96)	(-3.02)
ΔPM_t			-0.004	-0.003
			(-0.31)	(-0.21)
ΔATO_t			0.075	0.076
			(2.47)	(2.56)
ΔWC_t		-0.001		-0.001
		(-0.17)		(-0.21)
ΔNCO_t		-0.014		-0.016
		(-0.74)		(-0.78)

ΔFIN_t		-0.005		-0.005
		(-0.85)		(-0.81)
$Adjusted\ R^2$	0.70 %	0.70%	0.73%	0.73 %

My results show that level of PM and ATO are insignificant and ΔATO_t is significant and positive to forecast $\Delta RNOA_{t+1}$ at 5% critical level. ΔATO_t p-value is 1.36% and 1.05% in model 4 and 5 respectively. Negative $RNOA_t$ and $\Delta RNOA_t$ confirms statement about mean reverting RNOA. Also, if a company expand its NOA, it cannot grow its operating income in same relation, where the negative ΔNOA_t indicates. Primary findings about level of PM and ATO insignificancy and ΔATO_t significancy is consistent with (Fairfield & Yohn, 2001) and (Soliman, 2008) work. I have concluded their arguments about the independent variables' dispersion in the literature review section.

Accrual controls are negative and insignificant through all four models. This differs from previous studies, since (Soliman, 2008) find them significant and negative. Probably the change in NOA fades out the accruals effect, since Soliman regressed those separately. In my research adjusted R^2 values are lower level than in prior research. In Soliman's research they were approximately 17%. One possible reason why explainable part is smaller is that negative values decrease the forecasting ability since variables variances increases. If example company increases it efficiency, but produce negative operating profit, this increases noise and make forecasting more challenging. Overall, there is a lot of variation in $\Delta RNOA_{t+1}$ that cannot be explain with past development. Change that happen in current year is mostly influenced by current year economic factors, not the past events. Although investments or divestments in operational efficiency seem to forecast better how operating earnings will develop in future than profit margin. To conclude I cannot reject that ΔATO_t, $RNOA_t$, $\Delta RNOA_t$ or ΔNOA_t has no statistically significant forecasting ability over $\Delta RNOA_{t+1}$, but the economic significance is very small.

4.3 Regressions of market returns on current Dupont components

TABLE 4

Time-series means and t-statistics in parenthesis for coefficients from annual cross-sectional regressions of yearly holding period return on the Dupont components

MODEL 1: $R_t = \hat{\alpha} + \widehat{\beta_1} EARN_t + \widehat{\beta_2} \Delta EARN_t$

MODEL 2: $R_t = \hat{\alpha} + \widehat{\beta_1} EARN_t + \widehat{\beta_2} \Delta EARN_t + \widehat{\beta_3} RNOA_t + \widehat{\beta_4} \Delta RNOA_t$

MODEL 3: $R_t = \hat{\alpha} + \widehat{\beta_1} EARN_t + \widehat{\beta_2} \Delta EARN_t + \widehat{\beta_3} RNOA_t + \widehat{\beta_4} \Delta RNOA_t + \widehat{\beta_5} PM_t + \widehat{\beta_6} ATO_t$

MODEL 4: $R_t = \hat{\alpha} + \widehat{\beta_1} EARN_t + \widehat{\beta_2} \Delta EARN_t + \widehat{\beta_3} RNOA_t + \widehat{\beta_4} \Delta RNOA_t + \widehat{\beta_5} PM_t + \widehat{\beta_6} ATO_t + \widehat{\beta_7} \Delta PM_t + \widehat{\beta_8} \Delta ATO_t$

RHS-Variables	MODEL 1	MODEL 2	MODEL 3	MODEL 4
$\hat{\alpha}$	0.124	0.122	0.118	0.124
	(2.49)	(2.43)	(2.36)	(2.47)
$EARN_t$	0.016	0.015	0.014	0.014
	(2.60)	(2.53)	(2.37)	(2.45)
$\Delta EARN_t$	0.029	0.022	0.022	0.020
	(10.96)	(10.67)	(10.37)	(10.11)
$RNOA_t$		0.002	0.003	0.015
		(0.58)	(0.80)	(2.93)
$\Delta RNOA_t$		0.030	0.030	0.015
		(8.88)	(9.15)	(2.89)
PM_t			0.006	0.005
			(2.53)	(1.96)
ATO_t			0.004	-0.001
			(2.41)	(-0.37)
ΔPM_t				0.017
				(3.64)
ΔATO_t				0.078
				(5.76)
$Adjusted\ R^2$	3.97 %	5.21 %	5.35%	5.79 %

I my analysis PM_t and ATO_t are statistically significant and positive at the 5% critical level while controlling $EARN_t$, $\Delta EARN_t$, $RNOA_t$ and $\Delta RNOA_t$. Their p-values are 1.2% and 1.6% respectively. In the final model ΔPM_t and ΔATO_t are statistically significant and positive at the 1% and 0.1% critical level respectively while controlling previously

mentioned and levels of PM and ATO. In the final model level of ATO changes completely insignificant and level of PM less significant. Overall, it seems that investors interest reach down towards source of earnings, not just in the surface level. Investors value positively if a company have made improvements in profit margin or asset turnover. $EARN_t$, $\Delta EARN_t$ and $\Delta RNOA_t$ stayed statistically significant and positive through all four models. Level of $RNOA_t$ statistically significance has more dispersion. Results are mostly in line with (Soliman, 2008) study. $\Delta EARN_t$ component is statistically most significant to current year returns. This is logical since it represents closest the money that investor will get. $\Delta RNOA_t$ becomes less significant when its components are added in the final model. This could imply that investors interest is more towards what caused change in RNOA than RNOA itself. (Soliman, 2008) also observed the same finding.

In the previous tests I find that if $\Delta RNOA_t$ has grown in the past year, it is likely going to decrease in the next year. So, now when investor gets the information in year t that $\Delta RNOA_t$ has been positive in year t-1, the return is likely to develop in a positive way, even it is more likely that $\Delta RNOA_t$ going to decrease in that year. Also, in previous regressions I find that that level of PM and ATO do not have forecasting ability how operating earnings will develop in the future. Current year returns were affected by past PM and ATO even though those cannot tell about this year development. It is probable that investors compare these numbers to previous annual report and so forth level of numbers could reflect the change information about the past. The final regression controls this possibility by adding ΔPM_t and ΔATO_t. Previous regressions show that ΔATO_t has statistical significance to forecast $\Delta RNOA_{t+1}$ and ΔPM_t has not. Now both these variables have statistically significant impact on current year returns. This shows that investors keep information about past development of PM and ATO relevant, not just the final earnings. Investors act towards change in ATO is more rationally, since it has some forecasting ability about current year development. Other possibility why investors could also find ΔPM_t relevant, is that they adjust their long-term growth scenarios of RNOA with PM. As residual income valuation model presented that stock price today is sum of discounted future abnormal earnings. So, even if ΔPM_t cannot predict next year change, it does not automatically mean that it should be completely irrelevant to market participants.

Adjusted R^2 are approximately half what (Soliman, 2008) found. In Soliman's study adjusted R^2 variables jumps about 5% to 12% when $RNOA_t$ and $\Delta RNOA_t$ are added. In my study this increase is more moderate. Dupont components contribution to explanatory power is quite minor as was in Soliman's paper. Including negative values could be one factor that explains this phenomenon. If a company makes a loss that would make ATO and PM less relevant, because cash flow that generates to investors will be anyhow negative. Overall current returns are affected past RNOA, and its components even too strongly since the forecasting ability is economically low. Unexplainable part is large as it should, since those are just numbers in the past.

4.4 Regressions of market returns on future Dupont components

TABLE 5

Time-series means and t-statistics in parenthesis for coefficients from annual cross-sectional regressions of yearly holding period return on future Dupont components

MODEL 1: $R_t = \hat{\alpha} + \widehat{\beta_1} EARN_t + \widehat{\beta_2}\Delta EARN_t + \widehat{\beta_3} RNOA_t + \widehat{\beta_4}\Delta RNOA_t + \widehat{\beta_5} PM_t + \widehat{\beta_6} ATO_t + \widehat{\beta_7}\Delta PM_t + \widehat{\beta_8}\Delta ATO_t + \widehat{\beta_9} EARN_{t+1} + \widehat{\varepsilon_t}$

MODEL 2: $R_t = \hat{\alpha} + \widehat{\beta_1} EARN_t + \widehat{\beta_2}\Delta EARN_t + \widehat{\beta_3} RNOA_t + \widehat{\beta_4}\Delta RNOA_t + \widehat{\beta_5} PM_t + \widehat{\beta_6} ATO_t + \widehat{\beta_7}\Delta PM_t + \widehat{\beta_8}\Delta ATO_t + \widehat{\beta_9} EARN_{t+1} + \widehat{\beta_{10}} RNOA_{t+1} + \widehat{\varepsilon_t}$

MODEL 3: $R_t = \hat{\alpha} + \widehat{\beta_1} EARN_t + \widehat{\beta_2}\Delta EARN_t + \widehat{\beta_3} RNOA_t + \widehat{\beta_4}\Delta RNOA_t + \widehat{\beta_5} PM_t + \widehat{\beta_6} ATO_t + \widehat{\beta_7}\Delta PM_t + \widehat{\beta_8}\Delta ATO_t + \widehat{\beta_9} EARN_{t+1} + \widehat{\beta_{10}} RNOA_{t+1} + \widehat{\beta_{11}} PM_{t+1} + \widehat{\beta_{12}} ATO_{t+1} + \widehat{\varepsilon_t}$

RHS-Variables	MODEL 1	MODEL 2	MODEL 3
$\hat{\alpha}$	0.118	0.118	0.109
	(2.38)	(2.37)	(2.24)
$EARN_t$	-0.003	-0.003	-0.003
	(-0.55)	(-0.52)	(-0.49)
$\Delta EARN_t$	0.022	0.022	0.022
	(10.13)	(10.13)	(10.09)
$RNOA_t$	0.014	0.010	0.009
	(2.66)	(1.93)	(1.50)
$\Delta RNOA_t$	0.015	0.016	0.015
	(2.82)	(2.91)	(2.72)

PM_t	0.004	0.004	0.007
	(1.63)	(1.54)	(1.74)
ATO_t	-0.001	-0.001	-0.006
	(-0.38)	(-0.53)	(-2.58)
ΔPM_t	0.016	0.016	0.016
	(3.43)	(3.39)	(3.43)
ΔATO_t	0.075	0.074	0.081
	(5.79)	(5.78)	(6.06)
$EARN_{t+1}$	0.024	0.024	0.023
	(7.05)	(6.93)	(6.90)
$RNOA_{t+1}$		0.011	0.013
		(2.84)	(3.64)
PM_{t+1}			-0.003
			(-1.03)
ATO_{t+1}			0.009
			(5.34)
$Adjusted\ R^2$	6.90 %	6.90 %	7.06 %

I found that future RNOA is significant and positive at 5% critical level with p-values 4.5% and 0.03% after controlling future earnings per share and past values. Also, in the final model future level of ATO stays significant and positive at 0.1% critical level unlike future level of PM. This finding is somewhat consistent with Soliman's work. He finds that $RNOA_{t+1}$ moved to insignificant when its components are included and future ATO was positive and significant unlike future PM.

Future levels of these numbers report what has happened in that current year. Investors seem to anticipate future numbers based on information that is published during the year and so forth future level numbers explain current returns. Information about company's investments in better efficiency (ATO), is relevant to investors and they valued it positively. Not just how earnings per share or RNOA are going to change in that year. $\Delta EARN_t$, $\Delta RNOA_t$, ΔATO_t and ΔPM_t also stays significant and positive. This implies that current year returns are affected what has happened in the past, but they also reflect the future. Interesting is that ΔPM_t stays significant and positive but PM_{t+1} is not. Investors value positively past years increase in PM but improvements in PM during the year do not show positively in PM_{t+1}. My adjusted R^2 are approximately half what was in Soliman's paper. Again, including negative values could have some decreasing effect.

Overall, there is a lot of variation in current year returns that cannot be explain past or current development of operating earnings or its components.

5 Discussion and conclusions

In this bachelor's thesis, I examinate do operational sources of earnings matter to equity investors through Dupont analysis. My findings about ΔATO_t forecasting ability are consistent (Fairfield & Yohn, 2001), (Penman & Zang, 2001) and (Soliman, 2008) studies. Stock return tests are mostly in line with Soliman's work. I found ΔPM_t and ΔATO_t are statistically significant and positive to current year returns. Future level of ATO were also statistically significant and positive to current year returns. Adjusted R^2 levels are lower levels than in previous studies.

All in all, my research show that operative source of earnings matters to equity investors, not just the final layer of money that they receive. Investors seem to value positively past years increasements in PM and ATO even they economic impact in the current year operating income development is faint. Investors act toward changes in ATO seems more rational since investments in better efficiency showed more forecasting ability towards $\Delta RNOA_{t+1}$. Investors also seem to reflect future value of ATO. Improvements in efficiency during the year shows up positive ATO_{t+1} coefficient in next year announcement.

This thesis has two practical implications. Firstly, it supports previous studies that operating earnings generated by investing in efficiency is more likely to persist and investors recognize this. Companies should also pay attention to operational efficiency, not just strong brand and pricing power. Secondly investors should give less attention to past PM changes since the future development is probably going to be different. Limitation that future research should acknowledge is industry variation in PM and ATO. (Bennett, 1966) showed how PM and ATO vary through industries. A proposition to future research is to investigate PM and ATO forecasting ability and market returns relationship in specific industries. By analyzing the whole market, industry specific ATO

and PM effects fade out into the mass. Second limitation is to acknowledge PM and ATO announcement effect. Short-window tests would measure more precisely investors' reaction to PM and ATO announcement.

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