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Investigating the effect of adjusted DuPont ratio and its components on investor's decisions in short and long term

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CHRONICLE	ABSTRACT
	This paper investigates the effect of adjusted DuPont ratio and its components on investors' decisions in short and long term. The primary objective of this study is to find the effect of adjusted DuPont ratio and its components on herding behavior of investors in one and several year period. Hence, 85 corporations as the member of Tehran stock exchange over the period 2006-2011 are selected. In order to recognize the herding, by market index consideration, the herded β and in order to hypothesis validity SPSS software and multivariable linear regression have been used. As the results of this study indicate, the adjusted DuPont ratio and its components have more effect on investors' decisions in short term but in long the period, the effect of this ratio on herding investors' behavior are reduced. Furthermore, from the two components of adjusted DuPont ratio, profit margin has more effect on investor's decisions.

1. Introduction

DuPont analysis, a common form of financial statement analysis, decomposes return on net operating assets into two different figures including profit margin and asset turnover, which measure different constructs and, thereby, incorporate various properties (Penman & Zhang, 2003; Clement & Tse, 2005; Romano, 2009; Amir & Kama, 2012). Several studies indicate that a change in asset turnover is positively associated with future changes in earnings. Soliman (2008) explored the DuPont components and contributed to the literature along three ratios' dimensions. They reported that the information was useful as evidenced by associations between the DuPont components and stock returns as well as analyst predict revisions. However, he reported predictable future forecast errors and future abnormal returns implying that the information processing did not seem to be complete.

He also reported that the DuPont components represented an incremental and viable form of information about the operating characteristics of an organization.

Any financial analysis usually involves decomposing different variables into several components, emphasizing the structured hierarchy among ratios (Hwang & Salmon, 2006). Amir et al. (2011) distinguished between unconditional persistence and conditional persistence and argued that a variable's conditional persistence could detect the magnitude of its market reaction, helping the prediction the relative magnitude of the market reaction to a ratio based on its hierarchal level in the analysis. They examined the market reaction to the DuPont ratios and reported that, while the unconditional persistence of asset turnover (ATO) was larger than that of operating profit margin (OPM), the conditional persistence of OPM was bigger than that of ATO. Thus, they forecasted and determined that the market's reaction to OPM was bigger than that to ATO. They also decomposed OPM and ATO into their second-order components and demonstrated that the market reaction depends entirely on a component's conditional persistence.

The implementation of analyst predicts as proxies for investors' earnings expectations is commonplace in most empirical research. An implicit assumption behind their implementation is that they show analysts' private information in an unbiased manner. But Trueman (1994), demonstrated that this assumption could not be necessarily true. In fact, he explained that there is a tendency for analysts to release forecasts closer to prior earnings expectations than is appropriate, given their information. In addition, he explained that herding behavior, whereby they release could predict similar to those previously announced by other analysts, even when this was not justified by their information.

Demirer and Kutan (2006) investigated the presence of herd formation in Chinese markets based on individual firm as well as sector-level data. They investigated the behavior of return dispersions during periods of large upward and downward changes in the market index. They also distinguished between the Shanghai and Shenzhen stock exchanges at the sector-level and reported that herd formation did not exist in Chinese markets. They detected that equity return dispersions were substantially higher during periods of large changes in the aggregate market index. Nevertheless, comparing return dispersions for upside and downside movements of the market, they reported that return dispersions during extreme downside movements of the market were significantly lower than those for upside movements, implying that stock returns behaved more similarly during down markets.

According to Fairfield and Yohn (2001) provided some evidence that disaggregating return on assets into asset turnover and profit margin could not necessarily provide incremental information for predicting the change in return on assets one year ahead. According to Hirshleifer et al. (2004), when cumulative net operating income outstrips cumulative free cash flow, subsequent earnings growth appears to be weak. If investors with limited attention concentrate on accounting profitability, and neglect information about cash profitability, then net operating assets, the cumulative difference between operating income and free cash flow, could obviously measure the extent in which reporting outcomes provoke over-optimism.

Hwang and Salmon (2006) presented a new non-parametric measure of herding, beta herding, based on linear factor models and implemented it to study the nature of herd behavior in the US, UK, and South Korean stock markets. Their measure was based on the cross-sectional variation of market betas. Therefore, they considered what might be called beta herding and herding towards the market index. They reported some evidence of beta herding when the market was evolving smoothly, either rising or declining, rather than when the market was in crisis. In other words, crises seemed to lead investors to seek out fundamental value rather than herd. They tested the relationship between market wide sentiment and beta herding and reported that there were separate forces at work.

Olsen (1998) presented a comprehensive view of the origin, content, and rationale behind some behavior emerging area of study than traditional one. He discussed the traditional dominance in finance of the economic concepts of subjective expected utility and rationality. Shefrin and Statman (1994) developed a capital asset pricing theory in a market where noise traders could interact with information traders. They derived a necessary and sufficient condition for the existence of price efficiency in the presence of noise traders and investigated the effects of noise traders on price efficiency.

Tan et al. (2008) investigated herding behavior in dual-listed Chinese A-share and B-share stocks and reported some evidence of herding within both the Shanghai and Shenzhen A-share markets, which were dominated by domestic individual investors, and within both B-share markets, in which foreign institutional investors were the main participants. Herding happened in both rising and falling market conditions and herding behavior by A-share investors in the Shanghai market was more pronounced under conditions of rising markets, high trading volume, and high volatility, while no asymmetry was detected in the B-share market.

2. The proposed study

This paper investigates the effect of adjusted DuPont ratio and its components on investors' decisions in short and long term. The primary objective of this study is to find the effect of adjusted DuPont ratio and its components on herding behavior of investors in one and several year period. Hence, 85 corporations as the member of Tehran Stock Exchange over the period 2006-2011 are selected. In this investigation, only the shares of the firms selected that have similar fiscal calendars ending March with no change on their fiscal calendar and shares of holding firms were not selected and all information must be available. In order to recognize the herding, by market index consideration, the herded β and in order to hypothesis validity SPSS software and multivariable linear regression have been used. The proposed study considers the following regression model,

$$h_{mt} = \beta_0 + \beta_1 RNOA_{it} + \beta_2 \Delta NOA_{it} + \beta_3 ATO_{it} + \beta_4 OPM_{it} + \beta_5 \Delta RNOA_{it} + \beta_6 Size_{it} + \beta_7 GROWTH_{it} + \varepsilon_{it}, \qquad (1)$$

where h_{mt} represents herding behavior, $RNOA$ denotes return on net operating assets, ΔNOA denotes changes on net operating assets, ATO denotes operating assets turnover, $\Delta RNOA$ denotes changes on return on net operating assets, $Size$ represents size of the firm, GROWTH is the change in total assets in two consecutive years. The following describes details of the calculation of each formula used in Eq. (1).

$$RNOA = \frac{\text{Net profit}}{\text{Total assets}} \qquad (2)$$

$$OPM = \frac{\text{Net profit}}{\text{Net Sales}} \qquad (3)$$

$$\Delta RNOA_t = RNOA_t - RNOA_{t-1} \qquad (4)$$

$$\Delta NOA = \frac{NOA_t - NOA_{t-1}}{NOA_{t-1}} \qquad (5)$$

NOA = Total operating assets – Total operating liabilities   (6)

$Size_{it}$=Log asset   (7)

GROWTH = (Total assets of current year – Total assets of previous year)/ Total assets of previous year   (8)

$$h_{mt} = \frac{\beta_{it} - \beta_{it}^b}{\beta_{it} - 1}, \beta_{it} = \text{regular beta and } \beta_{it}^b = \text{bias beta} \tag{9}$$

There are two hypotheses associated with the proposed study of this paper as follows,

1. Adjusted DoPunt and its components influence on investors' behavior in short term.
2. Among different components of Dopunt ratio, operating ratio influences more on investors' behavior in short term.

The proposed study of this paper has implemented six different regression models and Table 1 summarizes the results of our regression analysis.

Table 1
The summary of regression analysis in six different periods

Period	Correlation	Determination coefficient	Adjusted determination coefficient	Durbin-Watson	F-value	Sig.
1	0.59	0.35	0.29	1.79	5.99	0.00
2	0.46	0.28	0.26	1.80	6.11	0.00
3	0.53	0.25	0.22	1.76	13.99	0.00
4	0.53	0.23	0.21	1.93	18.21	0.00
5	0.46	0.22	0.19	1.92	15.77	0.00
6	0.40	0.16	0.15	1.87	13.90	0.00

As we can observe from the results of Table 1, all components are statistically significant, which means the coefficients have positive effect on investors' behavior. The highest coefficient belongs to the first period and the lowest rate is associated with the last year. Next, we present details of the regression models in each period.

3. The results

In this section, we present details of our findings on applying regression model given in Eq. (1) for six different periods. Table 2 demonstrates the results of regression technique for the first year.

Table 2
The summary of regression analysis for the first year

Parameter	β	Std. dev.	Standard β	t-value	Sig.	VIF
Intercept	2.03	2.41		0.84	0.402	
RNOA	3.05	1.67	0.27	1.83	0.072	0.542
ΔNOA	-1.05	0.48	-0.27	-2.19	0.031	0.741
ATO	0.10	0.27	0.04	0.36	0.723	0.591
OPM	-1.02	2.13	-0.08	-0.48	0.042	0.131
ΔRNOA$_t$	-3.15	1.13	-0.32	-2.79	0.007	0.531
Size	-0.57	0.40	0.13	-1.41	0.161	0.051
GROWTH	4.04	1.02	0.47	3.97	0.000	0.641

As we can observe from the results of t-student values for different components of the regression analysis, some of them are not statistically significant. Therefore, the model is summarized into the following form,

$$H_{mt} = -1.05\Delta NOA_{it} - 1.02\, OPM_{it} - 3.15\Delta RNOA_{it} + 4.04 GROWTH_{it} + \varepsilon_{it}, \tag{10}$$

Similarly, we have extracted the results of regression model for other five periods and the results are summarized as follows,

2nd period	$H_{mt} = 3.99 RNOA_{it} - 1.91 OPM_{it} - 1.70\Delta RNOA_{it} - 0.68 Size_{it} + 2.85 GROWTH_{it} + \varepsilon_{it}$	(11)
3rd period	$H_{mt} = 4.73 RNOA_{it} - 1.83 OPM_{it} - 0.51 Size_{it} + 2.18 GROWTH_{it} + \varepsilon_{it}$	(12)
4th period	$H_{mt} = 3.66 RNOA_{it} - 0.87 OPM_{it} - 0.62 Size_{it} + 2.36 GROWTH_{it} + \varepsilon_{it}$	(13)
5th period	$H_{mt} = 4 RNOA_{it} - 2.09 OPM_{it} - 0.43 Size_{it} + 2.06 GROWTH_{it} + \varepsilon_{it}$	(14)
6th period	$h_{mt} = 2.93 RNOA_{it} - 0.8\Delta NOA_{it} - 1.24 OPM_{it} - 0.43 Size_{it} + 3.35 GROWTH_{it} + \varepsilon_{it}$	(15)

As we can observe from the results of the regression models, as the number of years increases the coefficient of determination reduces, which confirms the first hypothesis of the survey. In addition, the value of β for OPM is greater than the value of β for ATO and this confirms the second hypothesis of the survey.

4. Conclusion

In this paper, we have presented an empirical investigation to study the effect of adjusted DuPont ratio and its components on investors' decisions in short and long term. The primary objective of this study was to determine the effect of adjusted DuPont ratio and its components on herding behavior of investors in one and several year period on firms selected from Tehran Stock Exchange. In order to recognize the herding, by market index consideration, the herded β and in order to hypothesis validity SPSS software and multivariable linear regression have been used. As the results of this study have indicated, the adjusted DuPont ratio and its components had more impact on investors' decisions in short term but in long the period, the effect of this ratio on herding investors' behavior are reduced. Furthermore, from the two components of adjusted DuPont ratio, profit margin has more effect on investor's decisions. The results of this survey are consistent with the results reported by Amir et al. (2011) but it is inconsistent with the findings of Soliman (2004, 2008).

Acknowledgement

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