

Assessment of Relationship Between Market Anomalies and Investors' Decisions: Evidence from Tehran Stock Exchange

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Abstract: This study aimed to assess the relationship between market anomalies and investors' decisions. To this end, using correlation and regression analyses, the impact of market anomalies indices in a prevailing approach, the stock price to earnings (P/E) ratio, operating cash flow to price ratio and accruals to investors' decisions ratio were assessed and measured in six hypotheses based on two criteria of investment in workforce and investment in capital assets. The results obtained from testing the hypotheses by investigating 75 companies listed in Tehran Stock Exchange during 2009-2013 revealed that there was no relationship between P/E ratio and accruals indices with investing in the workforce; but presence of a relationship between operating cash flow to price ratio and investment in workforce was confirmed. Also, the association between two indices of stock price to earnings ratio and operating cash flow to price ratio with investments in capital assets was confirmed. However, no significant relationship was found between accruals and investment in capital assets.

Keywords: Market Anomalies, Investors' Decisions, Tehran Stock Exchange

1. Introduction

One of the most important and most extensive studies of financial markets is to describe the behavior of stock returns. Different models are used to explain the behavior of stock returns, such as Capital Asset Pricing Model (CAPM) or the three-factor Fama model and other models that are developed based on recent advancements in the financial literature. The results of last two decades research in U.S. and Japan indicated the inefficacy of CAPM to predict stock returns, and the findings suggest that variables such as size, E/P ratio, cash flows to price ratio, operating cash flow to price ratio, the ratio of book value to the market value of equity, accruals and its components can anticipate the stock returns better than pricing CAPM. The mentioned items are known as market anomalies. In 1992, an article was published that had gathered together most of the previous empirical research. Fama and French tested the variables of size, financial

leverage, book value to market value ratio and the beta in across-sectional study. They compared the explanatory power of these variables in a cross-sectional regression (during 1963-1992). Based on the results, they provided their three-factor model and indicated that size and the ratio of book value to market value are two risk factors ignored in capital assets pricing model. In general, these cases in the financial literature are in fact market anomalies of experimental studies results, which are not in accordance with developed theories assets pricing. These anomalies represent the market in efficiency or violation of the used pricing model. The investors' objective is to profit from their investment. Thus, while buying stocks, they are always looking for shares with maximum return and profitability in the future. Therefore, the investors have always been in need for information that they can benefit from and use in their strategic decision makings and in prediction of future performance of companies' stocks. Hence, the aim of this study is to evaluate the importance of attitude towards market anomalies in explaining investors'

behavior in Tehran Stock Exchange.

2. The Literature Review

Fairfield *et al.* (2013) introduced the growth implication regarding anomalies of accruals. Based on growth effect, increased accruals such as the inventory represents the company's use of investment opportunities and the growth ahead. These companies are looking for capacity development in the early years of their growth and development, and will not probably achieve the planned and desired return and profit in the early years. Consequently, return on assets reduces during the initial periods of operation; thus, the growth and development of each company influences its future return. Unfamiliarity with this subject makes the investors imagine that growing firms with high accruals will earn large profits; in other words, the market overreacts to the growth of any company, and the securities of these companies are valued in an incorrect approach, which is followed by accruals anomalies.

Evidence provided by Kothari *et al.* (2006) suggests that generated additional returns are linked to identify and create accruals in previous period. They stated that companies which have identified many optional accruals over the past four years will earn positive excess returns in the current year, but in the coming years, the process of gaining return will be reversed. The model provided by Kothari *et al.* (2006) suggests that investors robustly react to information related to the identification and creation of optional accruals in the previous periods.

Chan *et al.* (2006) concluded that only optional components of accruals and specific components of current accruals, such as receivable accounts and inventories will predict the future returns. Kevin *et al.* (2008) investigated the relationship between earnings quality and investment in capital assets during 1998-2005. The research results showed that companies with lower earning quality hardly allocate their resources to capital assets and have a lower rate of return on assets.

Gong *et al.* (2009) examined the relationship between profit forecast error and accruals from another angle of view. The mentioned studies on reported accruals after the management forecasts on return provide the evidence suggesting these accruals are manipulated to reduce the earnings forecast error. Gong *et al.* (2009). Studied the relationship between the current year accruals and the management's forecast of the future year earnings from another angle of view. They argued that in an uncertain operating environment, the management estimates of the future business of company which are not complete, and since the flawed management's estimates affect the process of creating accruals and the anticipation of future profits as well, they assume that when accruals are relatively high/low, the management earnings forecasts contain more optimism/pessimism. The experimental results obtained from this study confirm positive correlation between profit prediction error and accruals.

Mashayekhi *et al.* (2010), in their research, studied the explanatory power of unusual accruals in relation with behavior of stock return and impact of profit and systematic risk of the companies. The study results with examining a sample consisting of 69 companies listed in Tehran Stock Exchange during 2001-2007 suggested that PCF / P ratio does not contain the explanatory power of total accruals (unusual) for future annual returns and notified future returns. Therefore, the accruals anomaly is not a sign of value – growth anomaly.

Akhavibabi. (2015) showed that there was a positive and significant relationship between earnings per share and stock returns. In addition, it was demonstrated that credit and solvency risks had negative and significant effects on the relationship between earnings and returns. Therefore, according to these findings, it is argued that the companies accepted in stock exchange pay special attention to these risk factors during initial evaluations for buying a share.

Mashayekhi *et al.* (2010) studied the accruals anomalies, the accruals effect on stock returns, anomalies of capital expenditures, the impact of capital expenditures on stock returns and stock performance improvement by the simultaneous using of both anomalies in Iran's capital market. This was tested by examining the performance of portfolios formed on capital expenditures and accruals by using three different scales of the return from a sample of 480 companies listed in Tehran Stock Exchange during 2002-2008, the results indicated that there are capital expenditures anomaly and accruals anomaly in Iran's capital market and are distinct from each other, although these anomalies may be linked in various ways. The results indicated that after controlling three Fama - French risk factors, the investors will earn higher returns by simultaneous using of two anomalies instead of using only one anomaly.

Dolar. (2013) showed that in autocorrelation function (which is a base of the ARIMA and GARCH models) and the spectrum are transforms of each other, and therefore they are mathematically equivalent in ways of describing a stationary stochastic process.

3. Research Hypotheses

The main hypothesis: There is a relationship between market anomalies and the investors' decisions.

Sub-hypothesis 1.1: There is a relationship between the ratio of stock price to earnings and investment in the workforce.

Sub-hypothesis 1.2: There is a relationship between the ratio of operating cash flow to price and investment in the workforce.

Sub-hypothesis 1.3: There is a relationship between accruals and investment in the workforce.

Sub-hypothesis 1.4: There is a relationship between the ratio of stock price to earnings and investment in capital assets.

Sub-hypothesis 1.5: There is a relationship between the ratio of operating cash flow to price and investment in capital assets.

Sub-hypothesis 1.6: There is a relationship between accruals and investment in capital assets.

4. Data & Research Methodology

This was an applied research regarding and a correlation analysis and regression one regarding methodology. The study population included all listed companies in Tehran Stock Exchange since 2009 to the end of 2013, which meet the following criteria:

- (1) The firm's fiscal year-end necessarily needs to be on March.
- (2) The firm should not have any changes in fiscal year during the study period.
- (3) The firm's trading symbol should not have been transferred into the informal exchange board.
- (4) The firm's trading symbol should be active and should have been transacted at least once a year.
- (5) The firm's financial information should be available during the study period.

The companies that have not provided the information required calculating the research variables were systematically excluded from the research community, and finally 75 companies were selected as the research population for a 5-year period. Thus, the final sample size included 375 year-company that was used as data to test the hypotheses.

4.1. Research Variables, Operational Definitions and Variables Calculating Method

4.1.1. Dependent Variable

The investors' decisions are measured by two indicators:

$$Y_{lt} = (EMP_t - EMP_{t-1}) / (E_t - E_{t-1}) \quad (1)$$

According to equation (1), EMP_t is defined as investment in workforce, which is calculated from the ratio of payable remuneration to sales.

E_t : Current year earnings

$$Y_{ct} = (CAPX_t - CAPX_{t-1}) / (E_t - E_{t-1}) \quad (2)$$

According to equation (2), $CAPX_t$ is defined as investment in capital assets that are equal to amount of purchased tangible and intangible fixed assets and long-term investments, and E_t was explained in the previous model.

4.1.2. Accruals (Independent Variable)

Total accruals (TACC) are composed of three separate categories of current-year or working capital (WC) accruals, non-current operating accruals (NCO) and financial accruals (FIN). Total accruals, similar to the research conducted by Richardson et al. (2005), are measured through the following equation:

$$TACC = \Delta WC + \Delta NCO + \Delta FIN \quad (3)$$

The components of total accruals are calculated as follows:
 $\Delta WC = \text{Change in current operating liabilities} - \text{Change in current operating assets}$

$\text{Change in current operating assets} = (\text{Current investments} + \text{Cashes}) - \text{Current assets}$

$\text{Change in current operating liabilities} = \text{Short-term borrowings} - \text{Current liabilities}$

$\Delta NCO = \text{Change in operating non-current liabilities} - \text{Change in non-current operating assets}$

$\text{Change in non-current operating assets} = \text{Non-current assets} - \text{Non-current investments}$

$\text{Change in non-current operating liabilities} = \text{Non-current liabilities} - \text{Long-term borrowings}$

$\Delta FIN = \text{Change in financial assets} - \text{Change in financial liabilities}$

$\text{Change in financial assets} = \text{Non-current investments} + \text{Current investments} + \text{Cashes}$

$\text{Change in financial debts} = \text{Short-term borrowings} - \text{Long-term borrowings}$

4.1.3. P / E (Independent Variable)

It reflects market expectations of growth status prospect of the company's future profitability that the ratio is calculated from the current price of the company's shares in the market divided by the anticipated net income per share.

4.1.4. CFO / P (Independent Variable)

It includes the incoming and outgoing cash flows resulting from main and ongoing revenue-generating operational activities of the business unit and those cash flows that naturally cannot be related directly to other classes of cash flows as cash flow. In this study, the operating cash flow is measured by an indirect method as follows:

$$\text{Operating cash flow} = \text{Operating profit} - (+) \text{Changes in current assets} + (-) \text{Changes in current liabilities} + (-) \text{Depreciation} \quad (4)$$

4.2. Research Model

$$Y_{lt} = \alpha_0 + \alpha_1 TACC_{i,t} + \alpha_2 P/E_{i,t} + \alpha_3 CFO/P_{i,t} + \epsilon_0 \quad (5)$$

$$Y_{ct} = \alpha_0 + \alpha_1 TACC_{i,t} + \alpha_2 P/E_{i,t} + \alpha_3 CFO/P_{i,t} + \epsilon_0 \quad (6)$$

Where:

Y_{ct} : Investment in capital assets

Y_{lt} : investment in workforce

TACC: Total accruals (Cash flow from operating activities - operating net profit after taxing)

P / E: Price per share to earnings ratio

CFO / P: Cash flow to price per share ratio

ϵ_0 : Error element or the unknown component

5. Research Findings

After data preparation in Excel software, the models analysis and estimation and the research hypothesis testing were performed using SPSS17 software.

5.1. Data Descriptive Statistics

Table 1. Descriptive statistics for research variables.

Variable	Symbol	Number of observations	Mean	Maximum	Minimum	Standard Deviation	Skewness
Investment in workforce	YLt	375	-0.152	9.60	-7.13	1.08	1.09
Investment in capital assets	YCt	375	-23.88	-2.36	-34.39	3.21	0.12
Operating cash flow to price ratio	CFO/P	375	-50.52	376.7	-5338.8	679.78	-2.18
Accruals	TACC	375	54.15	368.84	1.04	55.18	2.49
Stock price to earnings ratio	P/E	375	163.79	327.44	0.49	292.14	5.82

Testing the research hypotheses was performed based on 375 year –company data in the whole period. Given the descriptive statistic, the above indices can be divided into central index, dispersion and other indices. The central index is the mean index, while the dispersion index is the standard deviation index, and other indices include skewness, minimum and maximum indices.

5.2. Testing Data Normality

To examine the normality of variables and the residuals, Kolmogorov - Smirnov test was used. If the probability value related to this test is greater than 0.05, with 95% of confidence, normal distribution of the variables can be confirmed, and conversely, the results of this test in Table 2 show that the research variables are normally distributed. As can be seen in the table below, the probability value of each of the dependent variables is greater than 0.05. Thus, the data can be tested through parametric test.

Table 2. Kolmogorov - Smirnov test for all the variables.

Variables	YC	YL	TACC	CFO/P	P/E
Z Kolmogorov - Smirnov	1.099	2.725	1.427	1.433	1.284
Significance level	0.179	0.0000	0.058	0.057	0.077

5.3. The Results of Research Hypotheses Testing

The main hypothesis: There is a relationship between market anomalies and the investors' decisions.

Sub-hypothesis 1.1: There is a relationship between the ratio of stock price to earnings and investment in the workforce.

Table 3. Results of sub-hypothesis 1-1 testing.

Regression equation	YLt = -0.104- 0.045 P/E _t + ε ₀		
statistics	Significance level	(t)Test	coefficients
constant	0.111	-1.569	-0.104
Stock price to earnings ratio	0.294	-1.015	-0.045
F statistic	1.104		
Significance level	0.294		
Durbin–Watson	2.111		
Correlation coefficient	0.045		
Coefficient of Determination	0.002		

According to the results of hypothesis 1-1 testing given in Table (3), the significance level of statistic F is equal to 0.294, which indicates that the regression has no explanatory power in all the companies. Thus, the hypothesis will be rejected. Also, considering that the Durbin Watson statistic is between 1.5 and

2.5, it can be concluded that there is no self-correlation problem between the variables.

Sub-hypothesis 1.2: There is a relationship between the ratio of operating cash flow to price and investment in the workforce.

Table 4. Results of sub-hypothesis 1-2 testing.

	YLt = -0.104- 0.045 P/E _t + ε ₀		
statistics	Significance level	(t)Test	coefficients
constant	0.000	-131.27	-24.63
Stock price to earnings ratio	0.000	5.764	0.240
F statistic	33.224		
Significance level	0.000		
Durbin–Watson	1.525		
Correlation coefficient	0.240		
Coefficient of Determination	0.058		

According to the results of hypothesis 1-2 testing given in Table (4), the significance level of statistic F is equal to 0.000, which indicates that the regression is significant in general. In the next stage, given that the significant level of operating cash flow to price ratio is less than 5%, thus, we can say that there is a significant relationship between operating cash flow to price ratio and investment in the workforce. Moreover, the determination coefficient, which firstly shows the explanatory power of the model, and secondly, reveals that what percentage of variability of the dependent variable is explained by independent variables, is equal to 0.058. This reflects that 5.8% of investment in the workforce can be explained by operating cash flow to price ratio. Thus, the above hypothesis is confirmed, and finally, considering that the Durbin Watson statistic is between 1.5 and 2.5, it can be concluded that there is no self-correlation problem between the variables.

Sub-hypothesis 1.3: There is a relationship between accruals and investment in the workforce.

Table 5. Results of sub-hypothesis 1-3 testing.

Regression equation	YLt = -0.143- 0.027 P/E + ε		
statistics	Significance level	(t)Test	coefficients
constant	0.123	-1.546	-0.143
Stock price to earnings ratio	0.656	-0.446	-0.027
test F	1.104		
Significance level	0.294		
Durbin–Watson	2.111		
Correlation coefficient	0.045		
Coefficient of Determination	0.002		

According to the results of hypothesis 1-3 testing given in Table (5), the significance level of statistic F is equal to 0.656, which indicates that the regression has no explanatory power in all the companies. Thus, the hypothesis will be rejected. Also, considering that the Durbin Watson statistic is between 1.5 and 2.5, it can be concluded that there is no self-correlation problem between the variables.

Sub-hypothesis 1.4: There is a relationship between the ratio of stock price to earnings and investment in capital assets.

Table 6. Results of sub-hypothesis 1-4 testing.

Regression equation	Y _{Ct} = -0.203+ 0.082 CFO/P + ε		
statistics	Significance level	(t)Test	coefficients
constant	0.000	-3.798	-0.203
Stock price to earnings ratio	0.055	1.921	0.082
test F	3.690		
Significance level	0.045		
Durbin-Watson	2.126		
Correlation coefficient	0.082		
Coefficient of Determination	0.007		

According to the results of hypothesis 1-4 testing given in Table (6), the significance level of statistic F is equal to 0.045, which indicates that the regression is significant in general. In the next stage, given that the significant level of stock price to earnings ratio is less than 5%, thus, we can say that there is a significant relationship between stock price to earnings ratio and investment in capital assets, and the above hypothesis is confirmed. Finally, considering that the Durbin Watson statistic is between 1.5 and 2.5, it can be concluded that there is no self-correlation problem between the variables.

Sub-hypothesis 1.5: There is a relationship between the ratio of operating cash flow to price and investment in capital assets.

Table 7. Results of sub-hypothesis 1-5 testing.

Regression equation	Y _{Ct} = -0.172+ 0.073 CFO/P + ε0		
statistics	Significance level	(t)Test	coefficients
constant	0.021	-2.325	-0.172
Stock price to earnings ratio	0.227	1.211	0.073
test F	1.468		
Significance level	0.027		
Durbin-Watson	2.281		
Correlation coefficient	0.073		
Coefficient of Determination	0.005		

According to the results of hypothesis 1-5 testing given in Table (7), the significance level of statistic F is equal to 0.027, which indicates that the regression is significant in general. In the next stage, given that the significant level of operating cash flow to price ratio is less than 5%, thus, we can say that there is a significant relationship between operating cash flow to price ratio and investment in capital assets, and the above hypothesis is confirmed. Finally, considering that the Durbin Watson statistic is between 1.5 and 2.5, it can be concluded that there is no self-correlation problem between the variables.

Sub-hypothesis 1.6: There is a relationship between accruals and investment in capital assets.

Table 8. Results of sub-hypothesis 1-6 testing.

Regression equation	Y _{Ct} = -0.274+ 0.113 CFO/P + ε0		
statistics	Significance level	(t)Test	coefficients
constant	0.001	-3.229	-0.274
Stock price to earnings ratio	0.062	7.871	0.113
test F	3.502		
Significance level	0.062		
Durbin-Watson	1.962		
Correlation coefficient	0.113		
Coefficient of Determination	0.013		

According to the results of hypothesis 1-6 testing given in Table (8), the significance level of statistic F is equal to 0.062, which indicates that the regression has not explanatory power. Thus, we can say that there is a significant relationship between accruals and investment in capital assets. Then, the above hypothesis will be rejected. Also, considering that the Durbin Watson statistic is between 1.5 and 2.5, it can be concluded that there is no self-correlation problem between the variables.

6. Results and Discussion

The main objective of this study was to assess the relationship between market anomalies and the investors' decisions. The market anomalies indices include the stock price to earnings ratio, the ratio of operating cash flow to price and accruals, which were tested and evaluated separately. The Test results indicated that there is no significant relationship between the two indices of stock price to earnings ratio and accruals with investment in the workforce at total level of the statistical sample; however, there is a significant relationship between operating cash flow to price ratio and investment in the workforce at total level of the statistical sample. Also, the results show that there is a significant relationship between the two Indices stock price to earnings ratio and the operating cash flow to price with investment in capital assets at the total sample level; however, there is no significant relationship between accruals and investment in capital assets at the whole sample. The results obtained in this study correspond to the documents cited in the study.

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