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THE IMPACT OF ABNORMAL INVENTORY GROWTH ON COMPANIES' LONG-TERM STOCK RETURNS

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Abstract: *Inventory is one of the critical factors for long-term and short-term goals the companies. This research aims to investigate the influence of abnormal inventory growth on Companies' long-term stock returns. It is a library based and analytical study according to panel data analysis. The research employs financial information of 109 companies listed in the Tehran Stock Exchange during the period 2008 to 2013 (654 firm - years). Softwares SPSS 20, Eviews 7, and Minitab 16 have been used to analyze the results of research. The results in connection with the hypothesis that showed that there is a significant and direct relationship between abnormal growth of inventories and long-term stock returns.*

Keywords: *abnormal growth of inventories, long-term stock returns, panel data, stock exchange.*

INTRODUCTION

Changes in the level of inventories associate in some way with decrease or increase the company's liquidity and corporate sales (Chen *et al..*, 2005). Therefore, the rise and fall of the company's sales are somehow linked to the financial strength of companies (Cannon 2008). Investment may take different forms or to be maintained for different reasons; investment in increasing the level of corporate stock is one of the types of investments. The main reason for studying on investment is the help of its volatility in understanding the business cycle. In the definition of investment, it can be said that investment is an asset kept by investment unit to increase the economic benefits (Gaur *et al..*, 2005). Moreover, the level of investment spending can be significantly influenced by fiscal policy (Raman *et al..*, 2006). There is tendency for performance evaluation of investment in inventories in capital market because evaluating the performance of investment companies as performance evaluationof investment professionals is an important issues in the field of investment. Managers are trying to provide the company's future profitability and cash flow by investing in initiatives and projects. Hence, some managers

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attempt to invest too much in the inventory of companies that led to issues such as the reduction in the company's cash holding, which can bring agency problem and decline the company's financial ability in the different decisions (Vastag and Whybark, 2005). Stock returns and growth in inventories are influenced by various factors and in some cases unexpected factors (Hendricks and Singhal, 2003). Wakabayashi *et al.*. (2010) stated that investors show different sensitivities facing with the purchase of portfolio and they focus on providing the highest return on equity in the year under review. Abnormal growth of inventories is a critical and basic factor in relation to investment and investors' decisions (Rumyantsev and Netessine, 2007). Therefore, to determine the factors affecting the returns is of very important for both investors and financial managers. Financial market is one of the circles that can manifest incentive for investors to make investment (Fisher, 2007). Now Stock Exchange of Iran has taken this important responsibility in the country. Investment managers and portfolio managers are searching for a selection of stocks with the highest profitability and efficiency. If investment were to maintain a collection of various securities (portfolio), the risk would be lower (Demeter and Matyusz, 2011). In other words, the choice of portfolio regardless of factors affecting returns is a risk (Chen *et al.*., 2007). This article aims to fill the gap in the literature by finding whether abnormal inventory growth influences on long-term stock returns of Companies listed in the Tehran Stock Exchange.

THEORETICAL FOUNDATIONS

Financial resources are vital elements that play a key role in the establishment and the operation of their businesses. An economic activity cannot be established without financial resources. Every financial manager should optimize equity and the use of investment opportunities in order to maximize the expected return on shareholders (De Jong, 2002). In this regard, financial manager make decisions about the application, detection of company's financial structure and risk, selecting the best method of financing for earning highest expected return for stock of companies listed on the Stock Exchange. Therefore, financial managers can influence the return on the company's shares and various growth factors by choosing the best financial performance.

Efficiency and profitability of the company will be maximum in case of the optimal capital structure, optimal stock classification structure, and cost of capital of the company. This article aims to test the factors affecting former stock returns and expected stock returns for the first time in Tehran Stock experimentally. Several theories have been proposed in this regard; none of the theories can alone explain the abnormal behavior all new shares. The reasons proposed by each theory are reasonable for only some new stocks.

OPERATIONAL DEFINITIONS

Some words and terms commonly used in this study are defined as follows. Defining the technical terms provides an approach for the study and prevents different interpretations of practical terms.

Abnormal Growth of Inventory

According to research, Birge and X-Xu (2011), abnormal growth of inventory is the ratio of remarkable growth volatility to the growth rate of previous years.

Expected Return on the Stock

It is estimated production efficiency that investors expect to earn. Sharp proved in his research, which presented a model for calculation of final production cost, that market orientation due to the expected return of a portfolio is unique. It is equal to efficiency of a risk-free asset plus the relative risk of securities (β) multiple to the difference of the portfolio returns minus efficiency of risk-free assets.

Long-term Stock Returns

It is the amount of efficiency earned in ling-term. It is usually more than one year and is not influenced by short-term volatility of stock returns. In other words, it is equal to the average of return on equity over a period of more than one fiscal year (Modi and Mishra, 2011).

LITERATURE REVIEW

In a study entitled "Anticipation of earnings volatility, cost of capital, and expected returns," Hu *et al*.. (2012) examined the relationship between three variables. According to the forecasts of corporate profits based on models and indicators related to cash flow projections and estimates, they emphasized on the capital cost of large firms and examined companies from 1968 and 2008. They found that profit forecasts based on other predictions is related to cash flow forecasts and influenced by factors related to earnings forecasts. In "Volatility of stock returns and predictions of earnings management," Jackson (2010) studied the relationship between the volatility of stock returns and earnings forecasts management. He aimed to investigate change the number of stock returns around earnings forecasts. Important relationships are disclosure of expected profit by managers. Its first hypothesis studies whether there is a difference in change the number of stock returns around earnings forecasts for the firms in comparison with control firms while the results have been defined with respect to prediction profile and projections records. Then it test the companies presented their management

earnings forecast during the year to find whether they show fewer change in stock in comparison to companies doe not publish their management earnings forecast on the final declaration of dividend. Barnes (2001) examined the relationship between volatility of quarterly earnings and the market value of the company's risk. Results of this study indicate the negative correlation between the volatility of profit and market value. In a study entitled "The size of the company, return on equity and venture in companies through issuance of stock," Aming *et al.* (2012) assessed the relationship between firm size and the disclosure of the cost of capital through issuance of stock. The results showed that there is a significant negative correlation between disclosure and cost of financing from shareholders in large institutions; it is not significant for small businesses. Fadaei and Thaqafi (2007) examined models of forecasting expected return on stocks and profit volatility in investment companies listed in Tehran Stock Exchange in the period from 1999 to 2005. They compared the capability of models' prediction based on the absolute error. Spearman correlation analysis revealed that variability of sales and operating income variability influences on the absolute error of models. Models' predictability reduces by increase in variability; but company size has no effect on the absolute error of models.

Hypotheses, Model and Research Variables

The basic hypothesis of the research is whether there is a significant relationship of abnormal inventory growth and companies' long-term stock returns. Variables are classified into three groups:

Dependent variables

Long-term stock returns of firm *i* in year *t*.

Expected stock returns of firm *i* in year *t*.

Independent variable

Abnormal inventory growth of firm *i* in year *t*.

Analytical framework is generally estimated as follows:

$$AFE = \alpha_0 + \beta i * \text{Independent Variable} + \varepsilon$$

$$H_0 : \beta i = 0$$

Model is not significant.

$$H_1 : \beta i \neq 0$$

Model is significant.

Research model is adopted from Chen *et al.* (2007) and adjusted variables are taken from Wanner and Muller; the result is:

$$\text{Return}_{i,t} = \alpha_0 + \beta_1 ABI_{i,t} + \beta_2 Beta_{i,t} + \beta_3 HML_{i,t} + \beta_4 Size(MV)_{i,t} + \beta_5 ROA_{i,t} + \beta_6 Rat_{i,t} + \varepsilon_{i,t} \quad (1)$$

In this model, i represents firm (sectional units) and t indicate year. $E_{i,t}$ is the random error of firm i in year t.

DATA ANALYSIS METHOD

For data analysis and hypothesis testing, required data are collected from the audited financial statements for the target companies for a period of six years (2008-2012). After gathering the information needed for examination, research hypotheses have been investigated using correlation and regression analysis and statistical methods, panel data. First, preliminary calculations were performed by Excel software and data were prepared for analysis. Then, softwares SPSS 20, Eviews 7, and Minitab 16 have been used to conduct the final analysis.

STATISTICAL POPULATION AND STATISTICAL SAMPLES

Statistical population consisted of all companies listed in Tehran Stock Exchange. According to the official website of the Tehran Stock Exchange, all companies listed by the end of 2013 include 520 companies in 37 industry groups. Hence, all companies listed in Tehran Stock Exchange in a period of six years (from 2008 to 2013) are studied population. Criteria-Filtering Technique has been used to find a proper representative sample of the target population. In this way, the below criteria were included. If a company acquires all characteristics, it will be chosen as the sample company.

RESEARCH METHODOLOGY

This is and an applied and practical research employing real information and statistical methods to refute or reject hypotheses. Theoretically, it is positive.

Descriptive Statistics

Table 1 represents descriptive statistics of the variables after screening and removing outlier through the software SPSS 20.

According to Table 1, the average long-term return of stocks is equal to 0.5199 and the minimum and maximum amounts are 0.0002 and 3.1136, respectively. Skewness and kurtosis, which should be respectively 0 and 3 to prove normal distribution of variables, indicate that these variables have not been distributed

Table 1
Descriptive statistics of research variables

Variable	Number of observations	Mean	Standard deviation	Maximum	Minimum	Skewness	Kurtosis
Long-term stock returns	654	0.5199	0.3658	3.1136	0.0022	1.936	9.618
Abnormal inventory growth	654	0.1473	0.7506	17.4459	0.0001	20.363	448.207
Systematic risk	654	0.6328	0.3447	6.8448	0.0110	8.979	161.508
Market value	654	0.6358	0.6398	2.9980	0.0003	1.479	1.878
Firm size	654	5.9159	0.6077	8.0074	4.7761	0.718	0.578
Profitability ratios	654	0.2709	0.3574	2.9326	0.0001	3.576	16.428
Credit rating	654	0.1390	0.2548	2.5554	0.0000	4.850	30.619

normally. According to the description given in the table, the average growth of abnormal inventory sample companies during the period of investigation has been positive and equal to 0.1473. In addition, positive average systematic risk, market value, firm size and profitability are respectively 0.6328, 0.6358, 5.9159, and 0.2709. Finally, average credit rating based on the minimum and maximum has been 0.1390.

Testing Normal Distribution of Dependent Variable

Ordinary least squares method is used in this study to estimate the model parameters. This method is based on the assumption that the dependent variable is normally distributed so that abnormal distribution of the dependent variable leads to violations of the assumptions of this method for parameter estimation and does not provide accurate results. This is evaluated through the Kolmogorov-Smirnov test (K-S). In this test, the null hypothesis and the alternative hypothesis is as follows:

$$\begin{cases} H_0 : \text{Normal Distrbuton} \\ H_1 : \text{Not Normal Distribution} \end{cases}$$

If the level of statistical significance of the test is more than 0.05 (Prob> .05), H_0 hypothesis indicating the normal distribution of the variable is accepted. Table 2 represents K-S results for the variable 'long-term stock returns.'

Table 2
Results of normality of the dependent variables

Variable	*Number (N)*	*(K-S) Statistic*	*Significance level (Sig)*
Long-term stock returns	654	2.008	0.001

Since the significance level of 'long-term stock returns' is less than 0.05, H_0 hypothesis indicating the normal distribution of the variable is rejected at the significance level of 95%; hence, the variable 'long-term stock returns' is not distributed normally. Normality of the dependent variables is a prerequisite for regression models; therefore, the variable should be normalized before testing the hypothesis. This research uses Johnson Transformation Function to normalize data and analyzes them by Minitab 16. The results of the K-S test after data normalization process are presented in Table 3.

Table 3
Results of dependent variables normality after normalization process

Variable	*Number (N)*	*(K-S) Statistic*	*Significance level (Sig)*
Long-term stock returns	654	0.798	0.548

According to Table 3, since the significance levels of K-S statistics are more than 0.05 (0.548, 0.967) after data normalization. H_0 hypothesis is confirmed at the significance level of 95%. It indicates that the variable 'long-term stock returns' is distributed normally after data normalization process.

Correlation Among Research Variables

Relationship and correlation among research variables are investigated using Pearson correlation coefficient. Matrix of Pearson correlation coefficients among variables are in Table 4. According to the results of Pearson test, companies' long-term stock returns have a positive and significant correlation with abnormal inventory growth and credit rating. Abnormal inventory growth is also positively correlated with credit rating.

The results presented in the table show that systematic risk shows a negative and significant correlation with company size while profitability ratio has a significant positive correlation with the credit rating.

Hypothesis Testing

Testing the research hypothesis aims to investigate the relationship between companies' abnormal inventory growth and their long-term stock returns. The statistical hypothesis is defined as follows:

Table 4
Matrix of Pearson correlation coefficients among variables

	Long-term stock returns	Expected return on stocks	Abnormal inventory growth	Systematic Risk	Market value	Firm size	Profitability ratios
Long-term stock returns ($P-Value$)	1						
Expected return on stocks ($P-Value$)	0.031 (0.433)	1					
Abnormal inventory growth ($P-Value$)	0.275 (0.000)	0.026 (0.513)	1				
Systematic Risk ($P-Value$)	-0.013 0.748	0.051 (0.190)	0.041	1			
Market value ($P-Value$)	-0.007 (0.850)	-0.010 (0.792)	-0.043 (0.272)	-0.066 (0.091)	1		
Firm size ($P-Value$)	-0.047 (0.233)	-0.041 (0.299)	-0.049 (0.214)	-0.083 (0.033)	0.035 (0.375)	1	
Profitability ratios ($P-Value$)	0.013 (0.740)	-0.020 (0.617)	0.019 (0.632)	0.041 (0.296)	-0.024 (0.542)	0.075 (0.054)	1

H_0: There is not a significant relationship between companies' abnormal inventory growth and their long-term stock returns.

H_1: There is a significant relationship between companies' abnormal inventory growth and their long-term stock returns.

This hypothesis is estimated using the model presented in equation (1) in the form of panel data and it will be confirmed if $\hat{a}_1$ is significant at 95% significance level.

Chow test is used in order to determine whether using panel data method is useful for estimating the model; Hausman test is used to to determine which method (fixed effects or random effects) is fitted for better estimate (fixed or random detection of differences in sectional units). The results of these tests are presented in Table 5.

According to Chow test and its P-Value (0.0058), H_0 hypothesis is rejected at 95% significance level; it indicates that panel data method can be used. According to Hausman test and its P-Value that is less than 0.05 (0.0345), H_1 hypothesis is rejected at 95% significance level; thus, the model should be estimated through fixed effects model.

Table 5
Results of Chow and Hausman test for the model (1)

Test	*Number*	*Value of statistics*	*Degrees of freedom*	*P-Value*
Chow	654	3.4415	(514,103)	0.0058
Hausman	654	9.8877	6	0.0345

In addition to examining the absence of co-linearity between the independent variables in the model, tests associated with residuals normality, residual variance heteroscedasticity, independence of residuals and the absence of explicit error in model (linear model) should be performed to test the validity of the classical regression model and assumptions. Various tests can be used to examine the normality of error terms. Jarque-Bera is a test in this regard. Jarque-Bera results indicate that residues resulting from the model have a normal distribution at 95% significance level so that the probability of this test (0.1495) is larger than 0.05. Residual variance heteroscedasticity is another assumption of the classical regression. If variance were heteroscedasticit, it does not represent a unbiased linear ant it will not have minimum variance. Breusch–Pagan test is used to examine heteroskedasticity in a linear regression model. According to the level of significance, which is smaller than 0.05 (0.0367), null hypothesis stating that there is a variance heterogeneity is rejected and it can be said that the model has the problem of unequal variants. To resolve this problem in estimating, Generalized Least Squares (GLS) is used. Durbin-Watson test is used for testing detect the presence of autocorrelation (a relationship between values separated from each other by a given time lag) in the residuals. According to preliminary estimates, Durbin-Watson statistics is equal to 2.45; since it should be between 1.5 and 2.5, it can be concluded that residuals are independent of each other. Moreover, Ramsey test is used to examine whether the model contains a linear relationship and whether has been explained in terms of linearity and non-linearity relationships. As the significance of Ramsey test (0.5187) is more than 0.05, the null hypothesis about model's linearity is confirmed and the model has not a specified error. A summary of results is presented in Table 6.

Table 6
The results of testing statistical assumptions of the model (1)

Jarque-Bera statistics		*Durbin-Watson statistics*	*Breusch-Pagan statistics*		*Ramsey statistics*	
χ^2	P-value	*D*	*F*	P-value	*F*	*P*-value

According to the results of Chow and Hausman tests as well as the results of statistical assumptions of the classical regression, the research model presented in equation (1) is estimated using panel data in form of fixed effects. The results are shown in Table 7. The estimated model by Eviews 7 is as following:

$$\text{Return}_{i,t} = 0.7672 + 0.0546ABI_{i,t} - 0.0573Beta_{i,t} + 0.0012HML_{i,t} - 0.0357Size(MV)_{i,t} - 0.5788ROA_{i,t} + 1.0532Rat_{i,t} + \varepsilon_{i,t}$$

According to Table 7, the first research hypothesis showed that there is a significant relationship between companies' abnormal inventory growth and their long-term stock returns.

CONCLUSION

Since F-statistic is smaller than 0.05 (0.0000), the model is confirmed with 955 significance level. Model's coefficient determination indicates that 43.93 percent of long-term stock return is explained by research variables. The results of the variables' significance, in Table 7, show a significant relationship between companies' abnormal inventory growth and their long-term stock returns is confirmed because the probability of T-statistic for coefficient of abnormal inventory is smaller than 0.05 (0.0216). Therefore, first hypothesis is accepted with 95% confidence level; it is reasonable to argue that a significant relationship exists between companies' abnormal inventory growth and their long-term stock returns. The positive coefficient (0.0546) for this variable point at the direct relationship between companies' abnormal inventory growth and their long-term stock returns so that on unit increase in abnormal inventory growth leads to 0.0546 unit increase in long-term stock returns.

Consequently, the analyses in this stud prove that there is a significant direct relationship between companies' abnormal inventory growth and their long-term stock returns. More attention will be on the following topics in future for greater use of research results and helping in clarifying the influence of abnormal inventory growth on long-term stock returns in companies.

Table 7
Results of testing first hypothesis using fixed effects

Variable	Coefficient	T-statistic	P-Value	Relationship
Fixed component	0.7672	7.5746	0.0000	Positive
Abnormal inventory growth	0.0546	1.3037	0.0216	Positive
Systematic Risk	-0.0753	-1.3544	0.1762	Insignificant
Market value	0.0012	0.0752	0.9401	Insignificant
Firm size	-0.0357	-1.1754	0.0301	Negative
Profitability ratios	-0.5788	-1.0793	0.0000	Negative
Credit rate	1.0532	1.5272	0.0000	Positive
Determination coefficient of model				0.4393
F-statistic				3.6984
(P-value)				(0.0000)

1. A study on the impact of industry type on the relationshipsbetween abnormal inventory growth with long-term stock returns and expected stock returns.
2. The use of other control variables such as financial constraints and systemic risk in studying the impact of abnormal inventory growth on long-term normal stock returns and expected stock returns in companies.
3. A study on the impacts of macroeconomic variables such as inflation, oil prices and exchange rates on on long-term normal stock returns and expected stock returns in companies.

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