THE INVESTIGATION OF PRICE-EARNINGS RATIO (P/E) AND RETURN ON STOCK

Arezo Khosravani[a], Hossein Eslami Mofid Abadi[b], and Younos Vakil Alroaia[c]

[a] *Faculty Member of Islamic Azad University, Semnan Branch, Semnan, Iran.*
a.khosravani55@yahoo.com
[b] *Young Researchers Club, Semnan Branch, Islamic Azad University, Semnan, Iran*
younos11@yahoo.com
[c] *Assistant Prof. Department of Management, Semnan Branch Islamic Azad University, Semnan, Iran,*
younos.vakil@gmail.com

Abstract

As every investor in the selection of his investment project considers two important factors, return and risk of stock and as one of the comparison indicators of stock risk of different companies is price-earnings ratio, the current study focused on two factors of return on stock and price-earnings ratio and investigated the relationship between these two variables. In this study, the price-earnings ratio and stock return were analyzed by the data of this ratio and the latest daily trading price of the companies that in the calculation of stock return is used in Farvardin of 2001 to Esfand of 2008 for 46 companies the member of sample population. By econometric tests, the validity conditions of satisfaction of regression equation in the mentioned companies were analyzed. The results of the regression indicate a positive and significant relationship between stock return and price-earnings ratio; it means that this ratio is a significant variable to explain the stock return.

Keywords: Price-earnings ratio, stock return, investment, the latest trade price

1. Introduction

The prosperity of the economy of every country is dependent upon a good planning and investment. Correct guidance of monetary flows and money to manufacturing works will result into economical growth, increasing per capita income and public welfare. Investment requires financing and two important groups responsible for investment financing are creditors and investors. The first group believes that the financial condition of companies receiving credit in on time payment of the debts is of great importance and this power is revealed by the profitability of the company. But the investors believe that the issue is more complex because in this process, the risk is more and they are looking for higher returns.

Price-earnings ratio (P/E) of each stock can be an effective factor in decision making of the investor but its analysis is different by different people. Some participants in the market are sensitive to the fluctuation of P/E ratio and try to find a suitable ratio. Normally, speculators when P/E ratio has decreasing trend, purchase the stock, because they believe that this reduction is temporary and it will be increased in future. But this view to P/E ratio is not common and depends upon the existing conditions of the company. When the investors have some expectations to a company, purchase stock and due to high demand, the price of

stock of the company will be increased and as a result, P/E ratio will be increased. In a condition that P/E ratio is at top level, the investors expect the increase in earnings in future or operation of development plans of the company and after fulfilment of the earning and statement of positive report of the earnings, P/E ratio will be decreased.

Indeed, one of most important figures for investors that can be analyzed and guide them in their decision making is P/E ratio of the companies. As P/E ratio is achieved by dividing market price by annual earnings of the company, thus the investor can calculated that when his earnings of the stock will depreciate his investment. The fluctuation of P/E ratio can be analyzed by the investors and according to the results; the investor can do his investment at the best time to achieve a good return. Thus, the clear relationship of P/E ratio with return on stock can be a good solution for investors for the future planning of the companies. Thus, the current study investigates the relationship between P/E ratio and return on stock in Tehran Stock Exchange (TSE) to clarify the information for decision making.

P/E ratio in addition to be a scale for the evaluation of the companies is used as a tool to compare the performances of capital markets of the countries but in application of this index between the countries and its analysis, the main differences regarding the private structure, inflation rate, interest rate and profitability of the companies and other macro and micro factors should be considered. In Tehran Stock Exchange, P/E ratio is used as an index beside other methods to evaluate securities. The basis of calculation of P/E ratio in TSE is achieved of dividing the total value of the market by the sum of profit after deduction of tax of the companies in TSE list. The main objective of this research is answering the question that whether P/E ratio can explains stock return. And how much is its explaining power? Indeed, the investigation of the relationship between P/E ratio and stock return can help the investors for the future planning of the companies and the stockholders in achieving more income.

2. Review of Literature

The article presented by James D.Mc Williams in 1966 was the first research regarding the P/E ratio. In this paper, Mc Williams "evaluates the usefulness of the price -earnings ratio as an analytical tool. Based upon a sample of 390 stocks over the period from 1953 through1964, the study shows that better investment performance can be obtained from a portfolio comprised of low price-earnings ratio stocks as contrasted to portfolios made up of high price-earnings ratio stocks (Mc Williams, 1966, 139). In the next stage, he selected 100 stocks with the highest return and ordered them based on P/E ratio and found that common stock with the highest return in each row was with low P/E ratio. Then he selected 100 stocks with the lowest return and ordered them based on P/E ratio and found that the loss of investment in portfolios made up of high price-earnings ratio is higher than a portfolio comprised of low price-earnings ratio (Ebadzadeh, 1999, 60).

Francis Nicholson published the results of his researches in 1968. Nicholson believed that analysis of securities could include earning, earning vision and growth rate of earning but the importance of P/E ratio and its relation with return on investment requires relation with real figures such as assets, sale and depreciation. In other words, Nicholson showed that the value of securities considerably is dependent upon some factors as earnings, earnings vision and earnings growth rate but real items such as assets, sale and depreciation affect the formation of price and return on investment (Nicholson, 1968, 73). The results of the research are: 1. portfolio comprised of low price-earnings ratio had increasing price percentage.2. Portfolio comprised of low price-depreciation ratio had increasing price percentage. 3. Portfolio comprised of low

price-sale ratio had increasing price percentage.4. Portfolio comprised of low price-book value ratio had increasing price percentage (Rahimi, 1995, 62).

Basu (1977) was the first one who investigated the empirical relationship of investment performance of common stocks in and their price-earnings ratios. For any given period under consideration, two or more portfolios consisting of securities with similar P/E ratios were formed. The risk-return relationships of these portfolios were compared and their performance was evaluated in terms of pre-specified measures (Basu, 1977, 673). In this research by comparing the lowest P/E ratio portfolio with high P/E ratio portfolio returns on risk-adjusted basis, it was shown that low P/E ratio portfolio averagely had superior returns compared to high P/E ratio portfolio. The researches of Basu rejected the semi- strong form of efficient market (Hormozi, 2001, 46).

Another research is related to William Beaver and Dale Mors studies in 1978 that by classification of common stock and creating different portfolios, investigated the behaviour of P/E ratio and justification of earnings growth and risk. The growth and earnings were measured as annual changes of earnings and risk as sensitivity of stock return to market return (William Beaver and Dale Mors, 1978, 70). Considering the 3-variable regression (P/E ratio as dependent variable and risk and the growth of the profit of independent variables of the model), they found that (R2=50%) Fifty percent of the changes of P/E ratio are determined by risk and earnings growth (Hesadi, 1998, 54).

The research carried out by Jef, Kim and Westerfild (1989) supported the results of Beaver and Mors and it showed that the effect of P/E ratio is not observed in January that some researchers mentioned. Andro Alford in1992 carried out a research in1992 on the effect of companies classification based on industry, risk and earnings growth on the validity of valuation of the company by P/E ratio. The results of the paper showed that most of the temporary differences in P/E ratio are explained by risk, earnings growth and industry. He found that industry can be a good substitute for risk components and earnings growth of P/E ratio (Aga, 2006, 7). Harry Ramchern in2002 investigated the important factors of P/E ratio in new capital markets and two factors of economic growth and credit risk as important factors of P/E ratio. And annual data of 1992-1999 of capital market (stock) of new countries and regression technique was used.21 selected markets were relate to Latin American companies, Asia, Europe and Africa that used important financial modifications to the early 1990s. The results of Ramchern supported the growth as important factors of P/E ratio difference in new markets (Ebadzadeh, 1999, 68).

Ali Rahimi (1995) in the study of "the investigation of the relationship between common stock and P/E ratio of the companies listed in TSE" found that we cannot reject the relationship between P/E ratio and stock return. In this research, only one hypothesis was studied to define the validity. This hypothesis is "stock with low P/E ratio during 1990-1994 obtained superior returns than stock with high P/E ratio. The results of his research indicated that we cannot reject the relationship between P/E ratio and stock return.

3. Research Methodologies

Research method: This research is applied in terms of purpose. Considering the data collection, this research is considered descriptive in which to test the relationship between the variables and significance of the estimated models, regression analysis was used. The research methodology is of expost facto (using the previous data). The information of P/E ratio and the return of the companies were obtained of daily, weekly

and monthly reports of stock exchange journals and Tadbirpardaz software information and Sahra databasis, Dena sahm and Pars Portfolio.

Population and sampling: To restrict the empirical analysis of the available observations, we selected some criteria. Of total population of the companies listed in Tehran Stock Exchange (TSE), some of the companies were selected for statistical analysis and they have the following research methodology:

1. The end of fiscal year of the companies should be Esfand 29.
2. The companies in the period of 2001-2008 were active continually in the stock exchange.
3. The companies are manufacturing.
4. The required information for third hypothesis is including the last traded price and daily P/E ratio of the companies. After the required investigations, 46 companies had the following conditions.

Research hypothesis: To investigate the relationship between stock return and P/E ratio, the following hypothesis was formed as: P/E ratio is a significant explanatory variable for stock return.

Price- Earnings ratio (P/E): The most important financial ratios are P/E per share. The investors mostly used P/E ratio as a tool to show the value of a company. In TSE, P/E ratio is used as an index beside other methods to evaluate securities. The calculation basis of P/E ratio in TSE is obtained by division of market total value by the total profit after deduction of estimated tax of the listed companies.

In this research, this ratio has used security stock software such as Rahavard Novin and Tadbirpardaz and the financial reports of the companies and to consider this variable, logarithm difference of this variable is used:

$$dper_{i,t} = \ln\left(\frac{per_{i,t}}{per_{i,t-1}}\right) \qquad (1)$$

Where, $per_{i,t}$ and $per_{i,t}1$ are P/E ratio of day t and the day before. To calculate, the return of a share is calculated in a financial period. (Moetameni, 2006, 27).

$$R_i = \ln\left(\frac{P_i + D_i}{P_{i-1}}\right) \qquad (2)$$

R_t is the logarithm of stock return. P_i and P_{i-1} indicate the stock price at the end and beginning of the period. D_i denotes the cash profit paid for each share during a period. According to Lakonishik and Smidth (1988), Schatzberg and Datta 91992) and Fisher,Gosnell and Lasser (1993) not considering the cash profit not paid for stock, doesn't have significant influence on return (Schatzberg and Datta 1992,203). Thus, the above equation is written as:

$$R_i = \ln\left(\frac{P_i}{P_{i-1}}\right) \times 100 \qquad (3)$$

Thus, stock return in a period is only extracted by stock value at the beginning and end of the period. In this research, the daily stock return of the companies is calculated by equation (3-11) as follows:

$$R_{di} = \ln\left(\frac{P_{i,d}}{P_{i,d-1}}\right) \times 100 \qquad (4)$$

Where $P_{i,d}$ and $P_{i,d-1}$ are the latest trading price of company i in day d and the day before.

Statistical techniques: The required statistical test and the type of statistics for data analysis at confidence level 95% are shown in the following table:

Table 1: The required statistical test and the type of applied statistics

The type of applied test	The type of statistics
Significance test of regression equation	F-statistics
Significance test of the ratios	t-statistics
Auto-correlation test of regression error	Durbin-Watson statistics
Auto correlation test of LM	F statistics and obs*R-squared statistics
Augmented Dickey Fuller (ADF) and Phillips Perron (PP) tests (stationary regression variables)	T statistics

4. Empirical Result

Data analysis: To test the above hypothesis, null hypothesis or neutral are defined as:

- Ho: P/E ratio is not a significant explanatory variable for stock return.

- H1: P/E ratio is a significant explanatory variable for stock return.

This hypothesis was first separately calculated for each company and then by combination regression technique, it was calculated for all the companies. To test the above hypothesis, linear regression technique was used and the following model presented by Mehmet Aga (2006), was studied:

$$R_{it} = c + \sum_{j=0}^{k} DPER_{i(t-j)} + \varepsilon_t \qquad (5)$$

Where, R_{it} is stock return of company i at time t, c is fixed, DPERit is logarithm difference of P/E ratio of stock i at time t and k the number of pauses and ε_t is residual. During the determination of the model for each company, the pauses for regression model of each company are selected by t-statistics, thus at first regression model with the maximum pause in this research considering schwarz bayesian criterion, is 25 in this study is estimated, then the pauses that are significant statistically at 5%, are shown in regression model of each company. In other words, to determine the considered pauses of each company in regression equations, step by step method is used, it means that the independent variable DPER entered the model with maximum pause and the effect of independent variable with different pauses on return via t statistics is evaluated. Finally, the variables that were important statistically entered the model and their effect was evaluated on stock return. Before testing the research hypothesis, as the research nature is of time series and obtained of time series data, stationary and non-stationary test for research variables dperit and Rit should be done. To do this, Augmented Dicky-Fuller Unit Root Test and Phillips Perron were used. After the estimation of regression equation, white test was used for consistency and inconsistency of variance and Durbin- Watson statistics and Serial Correlation LM Test was used to define auto-correlation between residuals.

The results of Augmented Dicky-Fuller Unit Root Test on the variables level: Unit root test as Augmented Dicky-Fuller is used for stationary test of time series. In this method, ADF statistics or the calculated t of the required variable is compared with Mackinnon critical values. If the obtained t is less than the critical values, the variable is stationary. Ho and H1 hypotheses about this test are as:

- Ho: The variable has a unit root

- H_1: The variable has not a unit root (stationary nature of the variable).

This test was done for all the companies' member of sample population separately. For example, the results of this test for Sarma Afarin are shown as:

Table 2: The results of Dicky-Fuller test on variable R_{it} of Sarma Afarin Company

		Null Hypothesis: R has a unit root	
Prob.*	t-Statistic	ᵒ	
0.0000	-8.018417	Augmented Dickey-Fuller test statistic	
	-3.464643	1% level	Test critical values:
	-2.876515	5% level	
	-2.574831	10% level	

Table 3: The results of Dicky-Fuller test on variable $DPER_{it}$ of Sarma Afarin Company

		Null Hypothesis: DCPI has a unit root	
Prob.*	t-Statistic		
0.0000	-8.341313	Augmented Dickey-Fuller test statistic	
	-3.464643	1% level	Test critical values:
	-2.876515	5% level	
	-2.574831	10% level	

The results of Augmented Dicky-Fuller test in the rest of the companies indicated that research variables are stationary, it means that in all the cases, absolute value of t- statistic of Dicky-Fuller was smaller than absolute value of 1%,5% and 10% of critical value and it shows the rejection of non-stationary hypothesis of the variable and supporting its stationary nature and support of H1 hypothesis. But due to the fact that serial correlation test are possible in these time series, we use Phillips Perron test.

Phillips Perron unit root test: This test is used to determine the stationary of a time series when serial correlation in time series is possible, it can be used. This test was done for all the companies' member of sample population. For example, the results of this test for Iran Tyre Company are as follows:

Table 4: The results of Phillips Perron test on variable R_{it} of Iran Tyre Company

		Null Hypothesis: R has a unit root	
Prob.*	Adj. t-Stat		
0.0000	-8.174579	Phillips-Perron test statistic	
	-3.464643	1% level	Test critical values:
	-2.876515	5% level	
	-2.574831	10% level	

Table 5: The results of Phillips Perron test on variable DPER$_{it}$ of Iran Tyre Company

Null Hypothesis: DCPI has a unit root		
Prob.*	Adj. t-Stat	
0.0000	-8.428538	Phillips-Perron test statistic
	-3.464643	1% level Test critical values:
	-2.876515	5% level
	-2.574831	10% level

The results of this test in the rest of companies indicated that all the research variables were stationary at 1, 5, and 10%.

The results of combination regression estimation (all the companies): As the research observations were done during 2001-2008 for 46 companies, the data are including t time series and 46 cross section data. These data are classified as panel data consisting of time series data and cross section observations. To estimate regression model, for pooled observations, pooled regression technique was sued. After the classification of the required data in reviews software, by pooled regression technique and observing classic assumptions of regression and auto-correlation of the variables, the estimated model was achieved as:

Table 6: The results of pooled regression

	Dependent Variable: R			
	Method: Pooled Least Squares			
Prob.	t-Statistic	Std. Error	Coefficient	Variable
0.0028	2.991476	7.18E-05	0.000215	C
0.0000	270.9548	0.002941	0.796894	DPER
0.0000	8.791240	0.002954	0.025971	DPER(-2)
0.0006	-3.436042	0.002398	-0.008241	DPER(-4)
0.0000	-5.495454	0.002300	-0.012640	DPER(-8)
0.0000	-7.696594	0.002365	-0.018204	DPER(-12)
7.86E-05	Mean dependent var		0.636101	R-squared
0.025260	S.D. dependent var		0.635939	Adjusted R-squared
-5.529173	Akaike info criterion		0.015241	S.E. of regression
-5.525116	Schwarz criterion		10.47613	Sum squared resid
3941.684	F-statistic		124759.2	Log likelihood
0.000000	Prob(F-statistic)		1.916619	Durbin-Watson stat

As it is shown, the coefficient of determination is 63% that indicated the high explanatory power of independent variables. The estimated signs are theoretical and all the coefficients are significant at 95%. These results show that P/E ratio can be used to explain stock return and this variable describes the changes of stock return.

5. Discussions and Conclusion

The results of regression show that for each of the stocks of the studied companies, P/E ratio is a significant variable for stock return. The coefficient of determination for most of the companies was high and except for 3 companies, the rest of them, had significant P/E ratio. These results show that during modeling stock return, P/E ratio can be used as an explanatory variable and this variable can describe the stock return. Thus, the research hypothesis is accepted. These results are in line with the results of Karan (1996), Rahimi (1995), Jef, Kim and Westerfild (1989) researches and there was a positive and significant between stock return and P/E ratio. But it is not in line with the results of Hormozi research (2001) in which there is no significant relation between two variables of stock return and P/E ratio. Today, most of the financial

analysts introduce P/E ratio as an important factors of determining the value. Indeed, they evaluate the stock price by this method with P/E ratio of other companies and predict the expected price of the next period. P/E ratio is used as a continuous method of evaluation of stock. Thus, when the company is active, its real value is dependent upon profit. P/E ratio considers tax and stock market price and relates the earnings per share to the activity of that share in the market.

References

Rahimi, Ali (1995), "The investigation of the relations between common stock return and P/E ratio of the companies listed in TSE", MA thesis of business management, Management University, Tehran University.

Hormozi, Hadi (2001), " The investigation of the systematic risk- P/E ratio relationship with common stock return of the companies listed in TSE", MA thesis of business management, Administrative sciences college, Shahid Beheshti University.

Motameni, Mani (2006), " The analysis of return fluctuations in TSE", Economic sciences MA thesis, Economic sciences and assets University, Mazandaran University.

Basu,S." The Investment performance Of common stocks in relation to their P/E Ratios ",TheJournal of Finance ,vol XXXLL,No3(1977):pp 663-682

Mc Williams,James D (1966)." Price earning and P/E ratio?" Financial Analysts Journal,pp 137-142.

Nicholson, Francis (1968)."PriceEarning Ratios in Relation To Investment Results",Financial Analysts Journal, No 7,pp 65-80.

Mehmet Aga,Berna Kocaman,2006."An Empirical Investigation of the Relationship between inflation,P/E Ratios and Stock Price Behaviours Using a New Series Called Index-20 for Istanbul Stock Exchange.

Schatezberg,G. and P.Datta(1992), "The Weekend Effect and Corporate Dividend Announcment", Journal of Financial Economics,17, pp 197-210.