

The Effect of Macroeconomic Variables on Tehran Stock Exchange Market Return by linear regression

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Abstract: *The relationship between stock returns and macroeconomic variables has grabbed the attention of many researchers, however so far, no definitive findings have been made in this regard. This relationship creates different results due to the existence of a different economic structure from one country to another. The current study aimed at evaluation of the effect of macroeconomic variables on the Tehran Stock Exchange (TSE) returns based on data from the period 2013 to 2016. In order to test the hypotheses, GDP variables, liquidity, interest rate and exchange rate have been used as independent variables and the stock returns has been used as a dependent variable. The findings indicated that in the studied period, only GDP has a significant relationship with stock returns.*

Keywords: *Stock returns, Gross domestic product, Exchange rate, Liquidity volume, Interest rate, linear regression*

Date of Submission: 12-08-2017

Date of acceptance: 24-08-2017

I. INTRODUCTION

One of the most important sectors of the economy of each country is the capital markets, which is of great importance for anyone. Undoubtedly, investing in the stock market is an important part of the whole economy of the country, and the greatest amount of capital is traded through the stock markets across the globe. Also, the national economy is heavily affected by the stock market performance. This market is available to both professional investors and the general public as an investment tool. Financial markets, by the medium of financial institutions and specific techniques, accumulate savings of the community and provide them to entrepreneurs and those who are willing to borrow. Obviously, as the efficiency of these markets increases, the mechanism of equipping and allocating capital in the country will be more optimized and the potential economic growth and development of the economy and the subsequent society welfare will be further enhanced (Neiberg and Hikoksky, 2008).

The purpose of investing in a stock is to generate an appropriate return on investment. Investors consider a set of variables and financial and nonfinancial factors when deciding to invest in stocks. Decision makers, with knowledge of the factors affecting stock returns, can more accurately determine the behavior of stock prices and, therefore, make more correct decisions. Stock returns are affected by the returns of several types of assets, changes in economic and political conditions, the behavior of a wide range of decision makers, risks, and many unknown and unknown factors (Jafari, 2010).

The capital market indicators in each economy, as a measure, show how the economy works, and immediately reflect the effects of various policy makers' decisions on the economy of the country, even before these policies are implemented. The relationship between stock price and business cycles indices can predict the outbreak of economic affluence and stagnation (Bayati, 2005). Hence, on one hand, the researchers are always trying to help investors to invest in the appropriate investments by identifying the factors affecting stock returns and the effect of each, and on the other hand, to provide the conditions for an efficient stock exchange (John, Fanman, 1989).

In this study, it is tried to investigate the effect of selected collections of macroeconomic and external variables on various indices of stock in Tehran Stock Exchange. Hence, this article seeks to explain the impact of some macroeconomic variables on the various variables of the market, ie, the total stock price index, the cash return index and the financial price index. In this regard, the key question of this paper is that "Is there a relationship between return indicators in Tehran Stock Exchange and macroeconomic activities?"

II. THEORETICAL FRAMEWORK

One of the models for stock valuation is the current cash flow method. This model relates stock prices to expected future cash flows and interest rates. All macroeconomic factors that affect the expected cash flows or the interest rate should affect stock prices. The advantage of the current value model is that this model can be used to study long-term relationships of stock market and macroeconomic variables.

The PVM equation is as follows:

In the above formula, $E_t(0)$ is the prediction of the variable in the time t and P_t is the stock price at the time t , $E_t(d_{t+1})$ is the expected dividend gain at the end of the first year, $E_t(P_{t+1})$ is the expected price of the stock at the end of the first year, and finally $E_t r$ is the rate of interest determined by the expected market or the cost of capital.

$$P_t = \frac{E_t(d_{t+1})}{1 + E_t r} + \frac{E_t(P_{t+1})}{1 + E_t r}$$

Therefore, the stock price is subject to the payment of the stock's cash profit and the interest rate of the market. As a result, any macroeconomic variable that could affect the cash flow or the interest rate could affect the stock price (Humpe & Macmillan, 2005).

Empirical Studies

Fama (1981) examined the relationship between real stock returns and inflation for the period 1954-1977 in the American economy. The results showed a negative relationship between actual stock returns and inflation. Galtkin (1983) reviewed the relationship between inflation and stock returns for 26 countries in the post-World War II period. He examined Fischer's hypothesis and concluded that the relationship between returns and inflation was not constant over time and varies from one country to another.

Gelnour Moradoglu and Kevilism (1996), in an article, explored the relationship between the stock price index, interest rate, exchange rate (US dollar), inflation rate, volume of money, and liquidity in the Turkish economy. The results show that the stock price index has a negative correlation with the exchange rate and interest rate, and there is a significant relationship between stock price index and monetary variables.

Al-Sharkhs (2004) has examined the relationship between macroeconomic variables such as economic activity, inflation and interest rates with stock returns in Jordan. The results of the research show that there is a positive correlation between economic growth and stock returns, as well as a negative correlation between inflation rate and interest rate with stock returns. Al-Sharif (2005) showed that stock returns in the oil and gas sector show a positive reaction to rising oil prices in the UK. Christophgan et al. (2006), investigated the bilateral interactions between the stock index and a group of macroeconomic variables including exchange rate, GDP, inflation, money supply, long-term interest rates, short-term interest rates, and retail prices of petroleum. The results showed that there is a long-term relationship between the New Zealand stock price index and economic variables tested. Anokim and Toynbee (2008), who examined the effect of macroeconomic variables on the stock price index in Ghana during the period of 1999-2007, have concluded that there is a long-term relationship between the macroeconomic variables and the Ghana stock price index. Byxalvarsy (2010), in his study, examined the effect of macroeconomic variables on stock returns in Turkey. The results showed that interest rates, industrial production index, oil price and exchange rate have a positive impact on the return on Turkish stocks, however the inflation and gold prices do not have a significant impact on stock returns in the country.

Research Hypotheses

- There is a meaningful relationship between GDP and stock returns.
- There is a significant relationship between liquidity volume and stock returns.
- There is a significant relationship between exchange rate production and stock returns.
- There is a significant relationship between interest rate and stock returns.

Method

In this research, in the first stage, a cross-sectional approach was used to investigate the relationship between the stock return of the companies accepted in the Tehran Stock Exchange and GDP, liquidity, exchange rate, and interest rates. As a result, the correlation between variables is used in this research and then, if necessary, the correlations are determined through time series.

Research Variables

Based on what was reviewed in the research literature, the index of this research for the stock return on Tehran Stock Exchange is the total price index (Tepix), which is a weighted average of the stock price of all companies admitted to the Tehran Stock Exchange. The weight of each share is equivalent to the capital of the company and the calculation method is Laspiers and the base year is 1990.

The explanatory variables for explaining factors affecting the stock returns are: Gross Domestic Product (y): One of the most important variables affecting stock returns is the state of economic growth. In terms of economic prospects, it is expected, by mapping out the positive economic outlook, to have a positive impact on stock return growth. This variable is at a fixed price of 1997, which is obtained from the central bank's information portal. Volume of liquidity: The Tehran Stock Exchange is considered one of the centers for attracting and directing liquidity to the manufacturing and service sector. Therefore, with the increase in private sector liquidity, it is expected that part of these liquidity will be driven into the stock market and will have a positive impact on stock returns.

Exchange Rate: the exchange rate is a substitute for stocks. The increase in the exchange rate (weakening of the national currency) is expected to reduce demand for stocks.

Interest rate: it is the cost of using money. In this research, the rate announced by the central bank for a long-term deposit (five years) is used to measure it.

III. DATA ANALYSIS AND HYPOTHESES TESTING

The research method is correlation between variables through correlation coefficient and research methodology is post-event type (using past information). Correlation research includes research in which the relationship between research variables is investigated. The summary of the results of the F test for the significance of the coefficient of determination in the research hypotheses, is presented in Table 1:

Table 1: F test for the significance of hypotheses

hypotheses	correlation coefficient	coefficient of determination R^2	Adjusted coefficient of determination	Estimated standard deviation	Statistical changes		
					Modified coefficient	Changes in statistics	Significant statistical changes
First	0.344	0.118	0.095	2.56892	0.118	5.091	0.030
Second	0.200	0.040	0.015	2.68016	0.040	1.588	0.215
Third	0.230	0.053	0.028	2.66232	0.053	2.120	0.154
Fourth	0.098	0.010	-0.160	2.72247	0.010	0.367	0.548

As shown in Table 1, F statistics are only significant for the first hypothesis, and other hypotheses are not verified. For this purpose, only the calculation of regression coefficients for the first hypothesis is considered. As it can be seen, in the F test for the first hypothesis, the correlation coefficient was 0.344 and the coefficient of determination was 0.118 between the stock return and the GNP. To test the significance of the R^2 test, the following hypothesis is to be tested:

$$H_0 : \rho = 0$$

$$H_1 : \rho \neq 0$$

As can be seen, at 95% confidence level, the hypothesis is not confirmed and it indicates that the correlation coefficient of the model is not zero. In other words, the correlation between stock returns of companies accepted in Tehran Stock Exchange and GDP is significant. It is also observed that the correlation coefficient between GDP and stock returns is 0.344. In the table 2, the details of calculation of F statistics are shown:

Table 2: ANOVA test for the F statistics

Model	Sum of squares	Degrees of freedom	Average squares	F	Significance level
Regression	33.596	1	33.596	5.091	.0300
Errors	250.776	38	6.599		
Total	284.372	39			

Table 3 presents the calculation of regression coefficients between gross national product and stock returns of companies accepted in Tehran Stock Exchange. The results indicate that the regression between gross domestic product and stock returns of companies accepted in Tehran Stock Exchange is significant at 95% level. In other words, the fitted regression line is appropriate.

Table 3: Student test for significance of regression coefficients

Model	Non-standard coefficients		Standardized coefficients	t	Significance level
	B	Standard deviation	Beta		
Constant coefficient	13.442	4.349		3.091	0.004
GNP	-2.695	1.195	-0.344	-2.256	0.030

Regarding the calculation of regression coefficients in Table 3, the regression coefficient equation between gross national product and stock returns of companies accepted in Tehran Stock Exchange is as follows:

$$y = 13.442 - 0.344x$$

Also, t-test in Table 3 examines the following hypotheses that states whether the regression coefficient is zero for stock returns against gross national product (GNP).

$$H_0 : \beta_0 = 0$$

$$H_1 : \beta_0 \neq 0$$

Considering the significance level of the research statistics, the assumption H_1 is verified with 95% confidence level. In other words, in the above regression equation, the coefficient β is not zero. Also, the above result indicates a negative relationship between gross domestic product and stock returns of the companies in accepted in Tehran Stock Exchange.

According to the results presented in the above tables and considering the level of significance of the statistics ($\alpha = 0.05$), the results of hypotheses testing are as follows:

The first and second hypotheses: in the first hypothesis, H_1 is confirmed and in the second hypothesis, the H_0 is confirmed. Therefore, with 95% confidence, it can be concluded that there is a significant relationship between the stock returns of the companies listed in Tehran Stock Exchange and Gross Domestic Product. Also, with 95% confidence, it can be stated that there is not a significant relationship between the stock return of the companies accepted in Tehran Stock Exchange and the rate of other variables.

IV. CONCLUSION AND SUGGESTIONS

The current study aimed at evaluation of the effect of macroeconomic variables on stock returns in Iran during the period of 2013-2016. Estimates with four indicators for macroeconomic variables (gross domestic product, liquidity, interest rate, and exchange rate) show that the economic situation measured by the true GDP index is the key variable affecting stock returns. In addition, the findings show that there is no significant relationship between other macroeconomic variables including liquidity, interest rate, exchange rate and stock returns.

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*Hassan Chaharmahali "The Effect of Macroeconomic Variables on Tehran Stock Exchange Market Return by linear regression." International Journal of Business and Management Invention(IJBMI), vol. 6, no. 8, 2017, pp. 56-59.