Investigate the Relationship Between Exchange Rate and Stock Price Index of Companies Listed on the Tehran Stock Exchange

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Abstract: Stock exchange as one of the main pillars of the capital in the country capable of mobilizing stagnant savings towards, economic growth and development, therefore authorities and capital markets are also interested to follow capital market and stock exchange dynamics and contribute to the economic growth path. In developing countries such as Iran, relationship between exchange rate volatility and stock price index is considered as a critical issue and not unexpected that the country due to lack of developed financial markets are more vulnerable to financial crises. In this study, given the importance of the market economy, the relationship between exchange rate volatility and stock price index using Granger causality tests in companies listed in Tehran Stock Exchange in the period from 2010 to October 2014. Results of this study showed a-sided and significant effect of the exchange rate changes on stock prices of companies listed in Tehran Stock Exchange index.

INTRODUCTION

Stock exchange is one of the most important financial markets. In all advanced countries, stock boom and bust shows ups and downs of national economic. The degree of development and prosperity of the capital market has potential role in collecting small and huge savings and in the national economy and guiding them toward long-term economic activity and is of importance in the economic development of a country.

Financial markets by providing securities trading for firms and institutions in one hand provide facilitate and financial resources needed by the clients and in the other hand good provide yields for resources providers. Hence, is considered as one of strong leverage in country to accelerate the industrial development, especially in developing countries.

Stock exchange acted like a channel to conduct the resource and is able to conduct resources towards activities under the conditions of production. Since, the current situation in Iran, the government aims to control the liquidity of the stock boom and also the behavior of investors in the booming stock market is the most important factor, this issue is important from the viewpoint of investors.

Financial theory, learn the investor that invest is a combination of risk and return. This means that tradable risk and return on the market will be more efficient decision-making principles. The attention of investors to the risk and return of investments such as supply and demand economics for pricing goods.

Efficiency and risk factors in estimating the shares of each firm include many factors such as performance, dividends, stock prices in other countries, GDP dividends, changes in exchange rates, interest rates and (Agrawal *et al.*, 2010)

Since, the company listed on the stock exchange mainly are manufacturing firms and price of raw materials is effective in determining the price of finished products and raw material prices, the exchange rate will be influenced. The government dependence on oil revenues on the one hand and changes in the price of exported and imported goods in the dollar rate volatility on the other hand affect the profitability of companies.

Now a days financial markets, among other markets have a significant role in creating growth and economic development in the country. Financial markets consist of money market and capital market. Capital market through influencing the process of financing and investment in all sectors of industrial, affect agricultural and service sectors and could eventually yield on total economic output.

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In fact, it can be said that the stock exchange is one of the most efficient institutions in order to improve economic performance. These institutions plays an important role to attract and mobilize resources through optimal allocation of capital and for the purpose of economic development. Despite the importance of this institution in any country's economy, due to the large volatility in stock price and risks of investing in this market, stock exchange failed to share in financing and attracting savings.

Therefore, understanding the factors affecting stock price volatility and risks aggravating factors in this market and investment is very important. Boom and bust stock exchange can be caused by number of factors in the economy. One of the factors affecting the stock prices of companies listed on the stock exchange is the exchange rate. Securities market and the foreign exchange market is always a sensitive sectors of the financial market.

These markets are influenced by volatility in the economy and business cycles and economic changes are reflected immediately. At the same time, the turmoil in one or both markets create concern among policymakers in markets.

Stock price index shows the general trend of the capital market. In fact, the trend is degree of success of capital market. Due to the extreme volatility which exchange rate has experienced in the past few years, stock prices of various companies by the importer or exporter of goods are faced with changes and strong volatility. In the meantime, some stock companies that have been exporting abroad faced to high profitability and a sharp rise in stock prices and vice versa hence assessment of companies that have better performance in the face of increasing or decreasing their exchange rate, can help investors to make better decisions and more reliable. Also, existence research conducted in the country, mainly in the years before the economic stability the country has enjoyed almost constant, review and compare the results with the circumstances that the country experienced inflation has almost extreme conditions have doubled the value of this research.

According to the mentioned items and importance of the relationship between changes in exchange rates and stock returns and stock prices, researchers in this study are looking for answers to the question of whether is there any relationship between changes in exchange rates and stock price index at Tehran Stock Exchange companies?

Research hypotheses:
- The main hypothesis shows a significant relationship between changes in exchange rates and stock price index of companies listed on the Tehran Stock Exchange

- Sub hypothesis 1: stock price change of Tehran Stock Exchange listed companies affect the exchange rate
- Sub hypothesis 2: exchange rate changes affect the stock prices of companies listed in Tehran Stock Exchange index

About study of the relationship between exchange rate changes and prices or stock returns, several studies have been done inside and outside the country, all of which indicate the relationship between changes in exchange rates and stock returns or the price. Each of these studies separately are focused on stock prices or stock returns also used regression methods or time series analysis in the field of methodology.

Koch and Saparvschnkv examined sensitivity of stock returns in the form of individual and portfolio for Horizontal finance company at Japan to unexpected changes of market returns, interest rates and exchange rates from 14 Jenner 1986-December 29, 1992 using a GARCH model.

Horizontal Finance Corporation at Japan is an economic organization have a large impact on the health and development of the Japanese economy and most of Japan's major financial institutions are members Horizontal. Results of their study show that returns at Japanese companies often shows negative reaction to interest but are trivial compared to the changes in exchange rates.

Yucel in Turkey, examined the impact of exchange rate volatility on the value of the company. The sample consisted of 152 securities companies listed in Istanbul between January 2000 and October 2002. First, the sensitivity of the each companies in the sample have been examined against exchange rate volatility. Then companies have divided into two export and non-export groups and evaluated each group's sensitivity to exchange rate volatility. They concluded that the coefficient of variation for the total sample and exporter companies is larger than the coefficient of variation for non-exporting companies but the coefficient of variation for all companies is negative.

Hartman the studied relationship between volatility and stock returns on a monthly basis with a focus on interventions between 2005-1991 Japanese monetary authorities in Japan in foreign exchange markets. They found that Japanese monetary authority intervention violates the law of market efficiency and using investment in order to improve their performance in predicting stock returns.

In this study, using GARCH model to estimate the relationship between exchange rate and stock returns and concluded that changes in exchange rates has no impact on stock returns.

Kasman (2003) examined the impact of three factors: changes in stock indexes, interest rate volatility and exchange rate on commercial banks listed on the Istanbul stock exchange and founded that all three factors have had a significant impact on the return on banks but the impact of market volatility index have been more than two other factors.

Namdari in his treatise, studied the causal relationship between stock price index and exchange rates in Tehran free market using integration techniques and error correction mechanism and Granger causality tests. The results show that the causality of stock price index at Tehran Stock Exchange on the exchange rate on the open market is only in the long term but no causal relationship between exchange rate and stock prices in the period under review are not visible.

Zare and Rezaie in a study examined the effect of currency markets, coins and gold on stock market index. In this study using a vector error correction model with quarterly data from 1995-2003 concluded housing price index and the coins price index is related to stock prices positively and relationship between exchange rate and stock price index is significant and negative.

Najarzadeh in a study examined the relationship between exchange rate shocks and inflation with real stock returns in Tehran Stock Exchange for the period 2003-2006 using VAR model. Their results reflect the negative impact of exchange rate shocks and inflation on the index of stock prices in the long term and their positive effect in the short term.

Barzani examined short-term and long-term relationships between macroeconomic variables with the value of the stock market for the period 1995 and 2005 using VAR model, Johansen co-integration test and vector error correction.

Their results suggest that stock-market value is related to government expenditure and tax money directly and to the exchange rate inversely in the long-term. Study of short-term relationships using vector error correction model showed that short-term volatility is associated with long-term equilibrium value.

Heidari studied the relationship between real exchange rate uncertainty and the stock price index of Tehran Stock Exchange for the period 1994-2009 using Bounds test. Their results show that the exchange rate in the long-term and short-term is related negatively to stock price index. But exchange rate uncertainty in the short term was not significantly correlated with stock price index.

Nahidi and Nikbakht examined the impact of the instability of the real exchange rate on dividends and stock price index at Tehran Stock Exchange, using monthly data over the period 2005-2007. Research results indicate a positive relationship between the instability of the real exchange rate and dividends index and stock price.

MATERIALS AND METHODS

This is an applied study in term of purpose and descriptive correlational nature of the subject based on econometric techniques. Research method is correlation which first, variables simultaneously in a selected group of society definite or indefinite articles are measured by a valid and reliable measure, then pattern of change in each variable by variable or variables are analyzed.

If the changes pattern of variable is beyond chance of other variables, first variable has correlation or cross-correlation with other variables. In correlation, the main purpose is to determine whether there is a relationship between two or more variables and what the context of relationship is.

In this method, a causal link is not identified but its purpose is to determine which variable to another variable which is relatively positive or negative sync; now a day correlation such as correlation wide and diverse range of simple to complex, hierarchical and chain (Sumakher *et al.*, 2009).

In general, methodology of this study is to investigate the events (based on past information). Also in terms of data collection, study is correlation and causal comparative to determine the exact variables and test the hypothesis using Granger causality.

Preconditions for using Granger causality must be taken this test, two essential preconditions are normal distribution of data variables and stationary of variables. because the research can be considered in time, is considered as survey.

Society and statistical sample: Since, the financial statements of companies listed on the Tehran Stock Exchange are audited and access them through the library exchange and databases available, therefore statistical society of this research includes firms listed in the Tehran Stock Exchange.

Because of the extent of statistical society size and its unique challenges and also some inconsistency between members of the community in relation to the data for this study, this relationship is governed under different conditions (including synchronization relationship, despite the time lag, the type of company in terms of the nature and type of activity). Samples in this research are fifty companies.

Research domain: Each research should include a known domain in which researchers have sufficient mastery of the subject and be able to generalize the results of the sample to the community. This study, like other research in the following ranges.

Subject domain research: This study only examined the relationship between changes in exchange rates and stock market changes in companies that have been accepted in Tehran Stock Exchange.

Location of study: The study examined all companies listed on the capital market of Iran.

Research time domain: In this study, the relationship between exchange rate volatility and stock price index in the period from 2010-October 2014 are examined annually.

Statistical tests: Tests used to analyze the study are as follows.

Granger causality test: If the relationship between the two variables is unknown in term of theoretical model to examine the effect of the relationship and variable which is another effect of Granger causality tests are used.

Accordingly, given that the relationship between exchange rates and stock prices in various results of this research with a variety of interpretations Granger chose to judgment about it. To apply Granger causality, some preconditions should be observed; two essential preconditions are normal distribution of data variables and stationary of variables test.

Jock-bra test: In Jock-bra test, null hypothesis is non-normal distribution and if this assumption is rejected. (i.e., p-value test is <0.05.) Normal distribution of data will be examined to confirm.

Unit root test Dickey-Fuller: Now a days, time series used to determine the reliability of a process. Unit root test is based on the premise that when self-explanatory in a first-order process such as the 3-1, $\rho = 1$, there is a unit root non-stationary process:

$$y_t = \rho y_{t-1} + u_t \qquad (1)$$

Test Dickey-Fuller made it possible to hypothesis $\rho = 1$ when tested in a series and if the latter hypothesis H_0 is concluded that the time series is stationary.

The lack of autocorrelation: Since in regression models assume that the error terms are independent from one

period to the next but in many cases, the error terms are correlated in different periods. In such cases, autocorrelation or serial autocorrelation is observed. Autocorrelation error terms commonly observed in time series.

In a regression model to check that their error terms are correlated or not, tests have been developed. Among these most used test, Durbin-Watson test is used. Durbin-Watson test: this test is based on the auto model lines. This model is as follows:

$$\mathcal{E}_t = \rho \mathcal{E}_{t-1} + u_t \quad -1 \leq \rho \leq 1$$

Where:
ρ = Autocorrelation parameter
u_t = Independent variable assuming $(0, \sigma^2)$ $N < u_t$

In this model, when ρ is positive, autocorrelation is positive and when ρ is negative, there is a negative autocorrelation. In the case of $\rho = 0$ autocorrelation does not exist. Hence, Durbin-Watson test hypotheses include:

- H_0: $\rho = 0$
- H_1: $\rho \neq 0$

T-test: T-test is used for small samples. T distribution is in many ways similar to the normal distribution as the sample size to reach 30 almost normal distribution becomes one.

In the present study to evaluate the significance of coefficients, correlation coefficients and regression models were used in this test. Accordingly, if a significance level of <0.05 is calculated, then calculated values are statistically significant in 95% confidence level.

RESULTS AND DISCUSSION

Descriptive analysis of data: This describes the features of intuitive data. Accordingly, Table 1 express descriptive statistics.

As can be seen, the standard deviation of the exchange rate is lower than the the standard deviation of stock returns. This feature indicates that the stock return volatility than the exchange rate volatility during the period has been selected. This feature data can also be seen in Fig. 1. The normal test variable distribution of stock returns.

- H_0: daily data index stock returns are not normally distributed
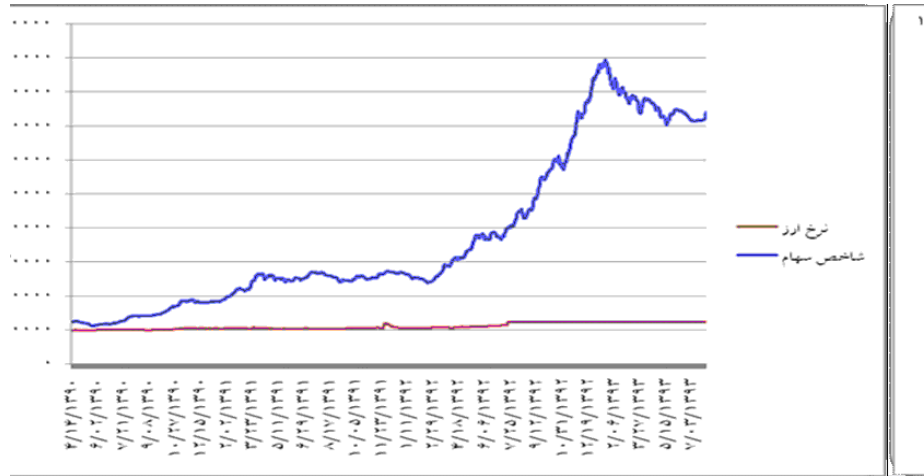- H_1: index data daily stock returns are normally distributed

Fig. 1: Amount of daily changes in exchange rates and stock prices

Table 1: Specification describes data

Observation	Kurtosis	Skewness	Standard deviance	Min.	Max.	Mode	Average	Variables
1204	0.554801	0.51357	899.972	9834	12260	10566.5	11001.37	Currency value
1204	2.264251	0.865087	23259.37	11178.5	89500.6	26277.05	37232.03	Stock return

Table 2: Variable test results normal distribution of stock returns

Rejection of normality	Jack-bra test	Kurtosis	Skewness	Variable
0.0000	177.3307	2.264251	0.865087	Stock return

Table 3: Results normal distribution of variable exchange rate

Rejection of normality	Jack-bra test	Kurtosis	Skewness	Variable
0.0000	157.7048	1.5548	0.51357	Currency value

Table 4: Results of unit root test Dickey-Fuller

Steady situation	Rejection of unit root	Dickey-fuller	Variable
Not steady	-0.7837	-2.622861	Stock return

Table 5: Unit root test results Dickey-Fuller

Steady situation	Rejection of unit root	Dickey-fuller	Variable
Nama	0.3477	-2.461049	Currency

As shown in Table 2, the chance of rejection of the normal distribution of stock returns is under 0.05, so H_0 is rejected and H_1 is approved. Normal distribution of exchange rate variable:

- H_0: data of daily exchange rates is not normally distributed.
- H_1: data of daily exchange rates are normally distributed

Table 3 shows the results of the test as follows.

Reliability test variables: Unit root test Dickey-Fuller (the stationary unit root stock index). According to the above principles are as follows:

- H_0: daily data of stock return has unit root and are not steady
- H_1: daily data of stock return has no unit root and are steady

As is clear from Table 4, the absolute value of statistics Dickey-Fuller for stock index variable level is less than the critical value 3.419552. So, there is a unit root in stock index variable. This result because it is clear that

they are likely to reject the unit root is not for <0.05. So, H_0 in the above tests is confirmed and H_1 be rejected. Unit Root Test-Dickey Fuller (Central Bank exchange rate situation stationary unit root). It can be stated that:

- H_0: data daily exchange rates of the Central Bank has a unit root level and not steady
- H_1: data daily exchange rates of the Central Bank has a unit root and are steady

The unit root test results Dickey-Fuller test that can be seen in Table 5. As is clear from Table 5, the absolute value of statistics Dickey-Fuller for the exchange rate at the level of the variable is less than the critical value 3.413552. So, unit root hypothesis seems to be confirmed in the exchange rate index variable. This result because it is clear that they are likely to reject the unit root for less than 0.05 is not. So, the hypotheses H_0 confirmed and H_1 in the above test is rejected. In order to evaluate hypotheses have been a single differencing variable steady; restrictions on regression on them there will be in the form of Granger causality test results are shown in Table 6.

Table 6: Unit root test results for the first difference of variables

Steady situation	Rejection of unit root	Dickey-fuller unit root	Variables
Steady	0.0000	-24.43488	First score difference stock return
Steady	0.0000	-33.00194	First score difference currency value

Table 7: Granger causality test results

Rejection of null	F statistic	Null hypothesis	Tested model hypothesis
0.1831	1.70003	Stock price changing is not the reason of currency changing	Model 3-3

Table 8: Granger causality test results

Rejection of null hypothesis	F statistic	Null hypothesis
0.0000	9.58654	Currency is not reason to change stock price

Table 9: Estimation results of regression

Independen variables	Dependent variable (stock price)		
	Coefficient	t-statistic	Rejection of significant
Currency value	-0.102003	-2.383030	0.0348
MA(1)	1.001085	1931.58	0.0000
AR(1)	0.0333024	5.799832	0.0000

$R^2 = 0.9999$; Durbin-Watson = 1.970416

Test subsidiary hypothesis 1: Subsidiary hypothesis 1 stock price change affect exchange rate in companies listed Tehran Stock Exchange. Subsidiary hypothesis 1 states that:

- H_0: stock price changes have no effect on stock exchange in the company's listed in Tehran Stock Exchange
- H_1: Stock price changes have effect on stock exchange in the company's listed in Tehran stock exchange Granger causality test results are shown in Table 7

Table 7 shows the F statistic for the model obtained 3-3, 1.700003 number that is likely to reject the null hypothesis test subsidiary hypothesis 1 is 0.1831. So, test the null hypothesis is accepted and it is concluded that the subsidiary hypothesis 1 companies stock price index changes due to changes. In exchange rates is a stock exchange will be rejected in 95% confidence level.

According to the results of a one-way Granger causality test between the exchange rate and stock price index have been confirmed.

Test subsidiary hypothesis 2: Subsidiary hypothesis 2 exchange rate changes on stock prices of companies listed in Tehran Stock Exchange index has an effect. According to the second subsidiary hypothesis as follows:

- H_0: changes in exchange rates on the company's stock price change does not affect the stock market
- H_1: exchange rate changes on stock market changes affect companies stock exchange

Granger causality test results are shown in Table 8. As shown in Table 8, F statistic obtained 9.58654 number 0.0000 is likely to reject the null hypothesis. So, test the null hypothesis is rejected and it is concluded that the

second subsidiary hypothesis of exchange rate changes due Granger stock price change is now the stock exchange in confidence interval 95% is acceptable.

The main hypothesis testing: If the relationship between the two variables is unknown theoretical model to examine the effect of the relationship and variable which is another effect of Granger causality tests are used. Accordingly, with regard to the relationship between exchange rate and stock price index has been interpreted in different studies with different results, this research Granger chose to judgment about it.

Granger causality test to verify assumptions with respect to the above tests, testing the main hypothesis to investigate the relationship between exchange rate and stock price index of companies listed on the stock exchange of Tehran. To perform this test, regression model whose results can be seen in Table 9.

As you can see, the model estimation results indicate that after using ARMA (1, 1) autocorrelation is not a problem. Durbin-Watson statistic for the number is 1.5-2.5.

Also, significance test to test the hypothesis by comparing the exchange rate coefficient t statistic with the critical value has been used. Accordingly main hypothesis testing was introduced as follows: t-test the null hypothesis states that the factor model is different from zero, if the assumption is rejected, the significant factor is confirmed:

- H_0: changes in exchange rates don't have negative impact on stock returns index of Tehran Stock Exchange
- H_1: changes in exchange rates have a negative impact on stock returns in Tehran stock

As shown in Table 9, the possibility of rejecting significance of exchange rate coefficient is less than error

level f 0.05; so the null hypothesis (H_0) is rejected and the alternative hypothesis that the significant negative impact of exchange rate on stock price index is confirmed.

CONCLUSION

In general it can be said exchange rate is a measure of value against the national currency of one country against the currencies of other countries, reflect the economic situation of the country in economic conditions compared to other countries. Exchange rates shows the level of a country's competitiveness in global markets.

In an open economy, the exchange rate due to its interaction with other economic variables is a key variable which is influenced by the domestic and foreign economic policies. One of the important issues in the field of exchange rates, especially in underdeveloped countries or developing topic of discussion was and the is issue of exchange rate volatility and its impact on the performance of macroeconomic variables and the different sectors.

Among the major economic sectors affected from exchange rate volatility is stock market which in turn initiate studies and extensive research in the field of analysis. Changes in exchange rates can have two different effects on stock prices.

On the one hand, exchange rate appreciation (the demand side) leads to an increase in corporate earnings of exporters of goods and as a result, share prices and on the other hand (after release) leads to a decrease in profits and reduction of intermediate inputs importing company's stock price. Stock buyers in addition to the dividend, pay attention to changes in the company's intrinsic value.

According to classical economic theory, there is correlation between stock market performance and behavior of the exchange rate. For example, the conduction current models of the exchange rate, suggests that currency volatility will affect the trade balance and subsequently on the production of a country in turn, present and future cash flow of the company and stock price.

Based on the monetary model of exchange rate, the demand for money may be changes in exchange rates. Relations of both market capitalization can be explained by economic activities. Economic activities affect the price and stock returns. The results of this study suggest that a one-way relationship between the exchange rate and stock price index have been confirmed.

So that, it can be said that exchange rate changes have been confirmed on stock price index of Tehran Stock Exchange during the period under review. Also, according to the results of hypothesis, changes in exchange rates have a negative impact on the stock price index. So, results of this this study revealed that the above theory are confirmed.

RECOMMENDATIONS

Exchange rate is a key factor in economic models and since this variable has significant effect on the financial and real sectors of the economy, the policy recommendations needs for this variable sensitivity and attention to specific. According to the results of hypothesis testing research recommendations are as follows.

Considering the fact that one of the tasks involved in determining stock prices of companies listed on the Stock Exchange is a stock and the price should reflect all the factors affecting the stock. Therefore, we must pay attention to all economic factors including currency volatility and price for the stock pricing. Therefore, it is suggested pricing of corporate stock prices and real exchange rate volatility.

Investors in the stock market as well as investors aware of foreign exchange changes and price on the short-term and long-term stock price and sudden changes in the price index and evaluation criteria of profitability and stock selection.

Considering that in Tehran Stock Exchange share prices some industries like automotive groups and contractors of the exchange rate are injured and conversely some other industries such as petrochemical and mining exchange rate in their favor. Accordingly, it is expected that the increase or decrease in the exchange rate have different effects on different industries, therefore it is suggested, volatility in the real exchange rate and stock prices which focuses on industry groups rather than the stock price as other research work has been studied.

Prevent the policies that cause further volatility in market and create uncertainty, provided the growth of the stock market and the price index.

Lack of a long term strategy in the foreign exchange market and the use of cross-sectional and sometimes conflicting policies in addition, exchange rate uncertainty only result in confusion for economic activity and disruption in the capital markets. So, monetary authorities and foreign exchange should take these findings into account in its monetary and foreign exchange policies and to pay attention the consequences of instability in the foreign exchange market and its transfer to the capital markets necessary.

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