Dynamic relationship between fluctuations of exchange rate and stock index listed companies in Tehran Stock Exchange

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Abstract: Stock Exchange as one of the most elements of the capital market in the country is able to Flowing and equips of stagnant savings in the country and pushing them towards production, moves towards growth, accelerates the economic development. In this study, given the importance of the market in the economy, we study the dynamics of the relationship between exchange rate fluctuations and stock market index Tehran Stock Exchange. In this study, quarterly data from 1376 to 1392 Tehran Stock Price Index (TEPIX) and market exchange rate will be used. This study for the extraction of exchange rate fluctuations and the stock index, will studied GARCH model. The Johansen cointegration test for the analysis checks long-term relationship between the fluctuations of stock indices and exchange rate fluctuations. The results show that there is long-term relationship between exchange rate and stock prices.

Introduction

Financial markets are one of the major markets and the effect on the economy of any country that plays major role in the collecting of savings available in the national economy and leading them to productive activities and investment and, ultimately, growth of economic. The stock market as well as a center for collecting savings and liquidity of the private sector, is a critical component of the financial markets that provides applicants both facilities and resources needed and provides the good efficiency for providers these resources. In any country, stock price index is the most important tool identification the country's stock market that changes in this index, the situation of the economic activities in the market and Depending on the development degree of economic activity in the Stock Exchange of any country it shows. So the change in the stock price and the factors affecting it in the capital market is a major issue that always is considered by the financial community and economy.

Research literature

The impact of the foreign exchange market on the stock market

The effect of exchange rate on the stock market is considered in different routes:

A) Composition of currency assets and liabilities from factors are that should be considered. If the exchange rate increases and the amount of foreign currency assets of the company is greater than its foreign debt, Earnings from currency conversion actually increase earnings per share and increase the company's share price. Also, if the currency liabilities are greater than currency assets, losses arising from the currency conversion actually decrease earnings per share and the stock price of these companies is reduced. B) foreign investors are not willing to invest in assets , which may reducing of its value would be cause the loss of returns on investment. For example, the depreciation of the dollar will cause that investors avoid from keeping of assets such as shares in America. If foreign investors sell shares.

B) kept in America, the price per share is reduced .C) the effect of exchange rates depending on whether the company is more importing or exporting, has external unit or not, as well as to exchange rate fluctuations has the covering behavior or not, is different. Big importer may suffer heavy costs.

C) due to a weak domestic currency, resulting in a lower share price, have a lower income. Multinational corporations located in the United States when the United States' currency is weakened, will have higher income. D) At the macroeconomic level, the weakening currency devaluation may increase the value of export industries, decrease the value of import industries and its effect on domestic production may be positive. Increased production as an indicator of the booming economy is seen by investors and stock prices tend to increase. Since there are reasons for both positive and negative effects, the overall effect of exchange rate on stock prices is unclear. E) Based on the theory of purchasing power parity (ppp) changes in exchange rates through the relative general price level is determined between the two countries. This relationship with the assumption that amount goods of basket is fixed always will exist. Therefore, the only way to change the price of a basket of market is change of commodity price. As a result, changes in

the price level reflect inflation. Therefore, changes in the rate of inflation based on the theory of purchasing power parity, will lead to changes in exchange rates.

Stock market impact on the currency market

A) Changes in the stock prices of the two paths of wealth and people's expectations have impact on the exchange rate: Decline in stock prices will reduce wealth of investors that invested in the stock market. Thus, the income from them is low. By reducing Income of investors, their demands for money

B) due to decreasing purchasing power (transaction demand) as well as reduction in financial exchanges in the market will decline. Decline in money demand means lower interest rates and the outflow of capital from the country. With the increase in demand for foreign currency, the exchange rate increases; thus, is possible a negative impact on the stock price exchange rate.

B) Also market boom (rising stock prices relative to long-term trend or expected) stock will make attractive for investors. These investors are separable into two categories: first group, foreign investors are that with stock boom, their capital transfer to the goal country. By transferring capital into the country, the supply of foreign currency increases and decreases exchange rate. Thus, according to a result of the foregoing, there is a negative relationship between stock prices and exchange rates. The second group, domestic investors are who invest in foreign exchange parallel markets and with capital market development their capital will transfer to this market. When the outflow of capital from exchange form, the supply of foreign Currency increases and decreases exchange rate. This path refers to the existence of a negative relationship between these two variables. Due to the above issues, the effect of the stock market on the exchange rate seems to be vague.

Foreign Studies

Historically the relationship between exchange rate and stock price index was among the controversial topics of controversy among researchers. Mahmoud and Dynya (2007) focuses on the relationship between stock prices and macroeconomic variables in six countries in Asia and the Pacific - Malaysia, Korea, Thailand, Hong Kong, Japan and Australia during January 1993 to December 2002 , Stated that the evidence that only in Hong Kong there are relation between the exchange rate and stock prices. However, Muller and Vrspvr (2007) in the same period of time as well as are surveyed the relationship between stock returns and exchange rate fluctuations in 3634 Asian companies from Hong Kong, Indonesia, Korea, Malaysia, the Philippines, Singapore, Thai, and the results showed the effectiveness of 25% on the United States dollar fluctuations.

Past researches investigated the effect of exchange rate fluctuations on stock returns in the form of simultaneous equations and flashback. Typically, the available evidence suggests that the effect of exchange rate changes at the same time has a significant impact on stock returns (Hay and Angie, 1998). However, the findings of Barreto and Bodnar (1994) suggest that the United States dollar exchange rate fluctuations with a short delay time could justify the stock returns of companies. This means that we must consider the effect of time lag on explore this relationship. For them it is possible, reaction to time lag of market towards changes in exchange rates mainly is due to the delayed disclosure of financial information to the public is that evidence of market inefficiency.

Jvryvn (1990 and 1991) in their study could not find significant relationship between exchange rates and the value of companies in the United States in the same time relation but this relationship was confirmed by applying flashback. Also Amihood (1994) in a study of the export 32 company in United States by applying a six-month time intervals this relationship has approved. Makar and Hoffman (2000), by applying one, two and three month time intervals could confirm this relationship.

He and Angie (1998), examined this relationship both as the same time and with time intervals in 171 Japanese multinational companies during the years 1979 to 1993 and Ducasse and et al (2003) examined with a larger sample of this relationship in 1079 company on the Tokyo stock during the years 1975, 1995. And the results of the research showed that the relationship between exchange rate volatility and stock returns is a same time relation.

El Masry (2003) examined the effect of exchange rate fluctuations on the value simultaneous and the time interval of Great Britain non-financial companies in 1981 and 2001. Compared to previous research, new findings show that the **Internal studies** more numbers of companies in Great Britain are exposing fluctuations of exchange rates simultaneous. In addition, there is evidence of exposure to fluctuations with time interval of the exchange rate, which is in line with the findings of previous studies. After reviewing the literature, we find that the previous studies mainly focused on industrial and developed countries like the United States, Japan and Europe, but extensive research in newly industrialized and developing countries has not been done. Due to the rapid economic growth in Asia, international companies and engaged in export activities may experience more volatile exchange rate relative to other industrial economies (Pan et al., 2007) and Frankel et al., 1996).

Yu and forbidding in 2009 investigated the effects of the exchange rate in New Taiwan Dollar Against the Japanese yen (JPY / NTD), its effect on stock prices in Japan and Taiwan and to find causal relationships in long-term balance and asymmetrical.

Namdari (1383) in his thesis examined the causal relationship between stock price index and the exchange rate on the open market in Tehran and the results showed that the causality of the stock price index at Tehran Stock Exchange in market exchange rate is established only in the long term. But causal relationship between the exchange rate and stock prices in the period under study was not observed.

Karim Mustafa Zadeh (1385) examined the long-term relationship between stock price index of Tehran Stock Exchange and the macroeconomic variables during 1369 to 1381. Results showed a significant positive impact of liquidity and the significant negative impact of the exchange rate and real interest rates of bank on stock price index.

Abbasid and others in another study (1387) investigated the relationship between variables such as exchange rates, trade balance, inflation, currency and interest rate with price index of Tehran Stock Exchange. They applied methods of co-integration and error correction models and momentum response functions and variance analysis. Bita Mashayekhi and et al in an article (1389) investigated impact of macroeconomic variables on the relationship between fundamental variables extracted from the financial statements and stock performance of listed companies in Tehran Stock Exchange during the years 1373 to 1384. The results show that the variables of the stock price index, GDP with the base price of non-oil, gross domestic spending, revenues, oil, inflation and GDP have a significant effect on the relationship And variables of the number of shares transferred to public sector , deficit (surplus) budget, the export of crude oil, the informal market rate of exchange, the Gini coefficient, income tax, unemployment rate, current account balance and interest on one-year investment work no have effect on this relationship.

Research hypotheses

H1: Between stock price index and exchange rate fluctuations of Tehran Stock Exchange long-term relationship exists.

Research Methodology

In terms of aim, this study is an applied research, because it can be used in the process of using information so this research is an applied research. In terms of the way of doing work is of the type of descriptive research that examines the correlation between the variables and In terms of dimension time is of type of investigations after events associated (using past information).

Methods and data collection tool

In this study, for collecting theoretical discussions was used library method (books and articles in Persian and English), scientific-research articles taken from official web sites and documents and taking notes from various sources in Persian and

Latin. Market share price index data of Tehran Stock Exchange (TOPIX) has taken from the official website of the Department of Statistics Tehran Stock Exchange. Market exchange rate data is taken from the website of the Central Bank. Analysis method data of the time series will be statistical methods and econometrics of time series according to the purpose of the research and analytical software and Excel and Eviews 8.

Research variables

In this study for the extraction of exchange rate fluctuations and total stock index, GARCH model will be studied. Hansen and Gieg accumulation test is used to analyze the long time relationship between fluctuations of the stock index and fluctuations of the exchange rate. Arch family method for the calculation of fluctuations both variables is used. Based on Information of Akaike, Schwarz and set "R" was selected best model for fluctuations both variables. In addition a prerequisite for cointegration analysis, "unit root tests" apply. For this purpose test the famous Phillips Perron (1988) is used. Then ,analysis of this long-term relationship reviewed by using Johansen's method (1988). For investigate the variables affecting the fluctuations index of Tehran Stock Exchange (TSE) used from following regression model. In this regard, we show exchange rate fluctuations with "EX" and the fluctuations of the stock index with "TE" and then the equation can be as follows:

$$EX_t = \alpha + \beta EX_{t-1} + \ldots + \beta_p EX_{t-p} + \delta TE_{t-1} + \ldots \delta_p TE_{t-p} + \upsilon_t \ldots (1)$$

$$TE_t = \alpha + \beta TE_{t-1} + \ldots \ldots + \beta_p TE_{t-p} + \delta EX_{t-1} + \ldots \delta_p EX_{t-p} + \upsilon_t \ldots (2)$$

In this study to determine the exchange rate fluctuations for analyze data used GARCH econometric models and EVIEWS economic data

analysis software. For data analysis, SPSS and Excel regression model was used.

Statistical Society

The population of this research is total years that the price index at Tehran Stock Exchange (index) and market exchange rate is considered. Statistical sample in the study is of seasonal data for a period of 16 years and is in the period from April 1376 to March 1392. In choice of the subjects tried which the data will be updated terms of time. The sample size is 64.

Analysis of the data

Macroeconomic variables during the period 1376-1392 are examined. Table 1-4 shows descriptive statistics of variables used in the mix model.

Table 1-4: Descriptive statistics

Minimum	Maximum	Standard deviation	Middle	Average	Variables
2224/0-	4558/0	1251/0	0507/0	0721/0	**Stock indices**
000/1755	00/24950	782/5223	500/9103	871/8392	**Exchange rate**

The results of descriptive statistics of variables with respect to the above figures indicate 22/22659 and 1653/0 values for the average stock index and currency rate. Also, middle of these variables is respectively 0507/0 and 500/9103. Average stock index indicate that for every 100 Rials invested almost 7 Rials of debt has been created that reflects the return on equity is relatively low.

Correlation between variables in the model

To determine the type and size of the relationship between explanatory variables, including control variables and independent variables, Pearson correlation coefficients were calculated and shown in Table 2-4 as follows:

Table 2-4: The correlation coefficient between variables

Exchange rate	Stock indices	Variables
	0000/1	**Stock indices**
0000/1	23499/0	**Exchange rate**

As you can see, the correlation between the exchange rate variable with positive stock index is which indicates there is a direct relationship between them. Afterdescribing the data and investigate their reliability, correlation relation between variables was examined. We define dependent intensity each other two variables as "correlation". Correlation analysis is a statistical tool to determine the type and degree of relationship of a quantity variable with another quantity variable. In general, the correlation coefficient changes between -1 to 1 and the relationship between the two variables can be positive or negative.

Check the reliability of Research variables

Before estimate parameters of the model, the reliability of the Dickey-Fuller test variables was evaluated. Results quantity of reliability test of research variables in the table (3-4) is as follows:

Table 3-4: reliability test

significance level	Dickey-Fuller test statistics	Variables
0000/0	7379/5-	**Stock indices**
0236/0	2162/3-	**Exchange rate**

As you can see the research variables are stable at a level of confidence of 95 percent. Parameters can be estimated without the worry of being false. The significance of the two variables is less than 05/0. As a result research variables are (stable) steady. So null hypothesis based on having a unit root the variables be rejected.

Co-integration test

To estimate the long-term relationship between variables in the framework of pattern (VAR), first is checked optimal interval of the pattern variables. One of the effects of improper selection of an interruption pattern is creating correlation in sentences of wastes and this selection also affect on normal distribution of pattern waste sentences.

Determine Flashback VAR model

SC	AIC	LOGL	Flashback
9475/16	5858/16	4045/454-	**0**
6793/16*	1368/16	8312/436-	**1**
7051/16	9818/15*	4913/427-	**2**

According to the test results to determine the optimal lag model (VAR) in the table above and criteria Schwartz, the first lag for this pattern is selected as the optimal lag. Johansen test At this stage using of test data and the special maximum amount, vectors of cointegration between pattern variables is checked. The specific values maximum test reviews existence the cointegration r vector against existence the cointegration r + 1 vector.

The results of tests to determine numbers of cointegration vectors

possibility of statistics	Critical value of confidence level of 95%	test statistic	Test result	
			Hypothesis contrast	Null hypothesis
0001/0	4947/15	6261/32	$r \geq 1$	r=0
0005/0	8414/3	9787/11	$r \geq 2$	$r \leq 1$

The results of the test the maximum amount of for determining cointegration vectors

possibility of statistics	Critical value of confidence level of 95%	test statistic	Test result	
			Hypothesis contrast	Null hypothesis
0043/0	2646/14	6473/20	$r = 1$	r=0
0005/0	8414/3	9787/11	$r = 2$	$r \leq 1$

With respect to the two variables in the model and test results and test the maximum amount of special, existence maximum of two co-integration relationships will be accepted. In other words, research hypothesis stating that between exchange rate fluctuations and stock index of companies listed on the Stock Exchange long-term relationship exists, are confirmed because possibility of statistics for each variable is less than 05/0.

Discussion

Hypothesis: between fluctuation of exchange rate and stock index of companies listed on the stock exchange there is a long-term relationship.

To estimate the long-term relationship the Studied variables within the framework of model (VAR), first lag optimal of the model variables are considered. Schwartz criteria in the smaller samples of 120 data, is a more appropriate criterion compared to Akaike criterion in the selection of lag. Therefore, in this study, Schwarz criterion to determine the optimal lag was used. According to the test results to determine the optimal lag model (VAR) criterion Schwartz, the first lag for this model was selected as optimal lag. With test statistics and the maximum eigenvalues checked out Co-integration vectors between model variables. The existence of two co-integration relationship will be accepted. In other words, the research hypothesis based on long-term relationship between exchange rate fluctuations and stock index of companies listed on the Stock Exchange is confirmed. With respect to the two variables in the model and test results and the maximum specific values test, because possibility of statistics it for two variables is less than 5%. This result suggests that exchange rate appreciation in the long term due to the increased profitability of export industries, leads to boom in stock market. According to theoretical basis of exchange rates (devaluation) imports decreases due to become more expensive, and exports increases due to higher demand of foreigners. In this condition by increasing the competitiveness of domestic firms, profits is increased, and then the stock price will increase. These results confirm the results obtained from the study of the Abbasids and others (1387) show the results of their study, there is a long-term equilibrium relationship between the stock index and the macro-economic variables and Yao and Vih also (2008) show that with error correcting model is proved the long-term relationship between exchange rate and stock prices in the two countries. This also do not match with results of the study of Zaow (2010), But in this article examines the relationship between dynamics of the foreign exchange and stock markets in China, using monthly data from January 1991 to June 2009, The results suggest that long-term relationship between effective exchange rate and stock prices there isn't.

Conclusion

In this study, for estimating the time series related to stock index also GARCH model and studying the relationship between stock indices and exchange rate used Johansson co-integration model. Dickey-Fuller test generalized also is used to test the reliability of variables. Quarterly results 1376 to 1392 data show that there is long-term relationship between exchange rate and stock prices. This result suggests that increasing exchange rate in the long term due to the increased profitability of export industries, will cause increase boom stock market. The results show that in Iran there is a long-term relationship between stock market price index, exchange rate. In the analysis of a direct relationship between exchange rate and stock market price index can be said companies that are in the Stock Exchange and increase exchange rate, have more competitive power in exports and then by increasing revenues due to exports of goods and services, will have a better situation. In this case, the an increase in exchange rate and the improvement of income increases the demand for the companies' shares and thus Stock Exchange index faces with increasing.

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