

Impact of Real Exchange Rate Uncertainty on the Stock Index of Tehran Stock Exchange

Marjan Damankeshideh¹, Mahdi Shanasaei²

Assistant Professor of Economics, Islamic Azad University, Central Tehran Branch,
Post graduated from Department of planning of Economic systems, Islamic Azad University, Central
Tehran Branch, Tehran, Iran,

ABSTRACT

Changes in the exchange system in the past decade have caused the concept of the exchange rate became as a key factor, especially in developing countries. The reason of these changes being highly important is their effect on the value of the national currency. Changes in the value of the national currency while being affected by domestic economic policies of each country are also under influence of any economic and political events in the international arena. By considering the necessity of the relation between stock markets and exchange markets, numerous studies have been conducted in recent years, each of them using a specific method to examine these relations. One of the most important variables in the exchange market rate is the uncertainty. Uncertainty in exchange rate fluctuations will create a sense of uncertainty toward market conditions, so that the lack of confidence can have a significant effect on the activity in the stock market. Hence in regard to the importance of knowing the degree of uncertainty in exchange rate in the present study first we employed EGARCH model to estimate the extent of this variable, and then we entered the variables of the proposed model as independent variables influencing Index Tehran Stock Exchange, including GDP, real exchange rate, real exchange rate uncertainty, actual cash and investment in the housing sector. According to the conducted investigation, the majority of pattern variable was abnormal, so we used the GMM estimator to estimate the Tehran Stock Exchange. The result of this assessment established that the effect of all variables except GDP on the Tehran Stock Index was negative. Consequently, the exchange rate uncertainty like other variables on the stock index of Tehran Stock Exchange has a negative and meaningful effect and is in accordance consistent with our expectations with respect to our current situation.

KEYWORDS: uncertainty of exchange rates, stock indexes, models ARCH, GARCH and GMM

JEL CLASSIFICATION : D51, R53, C51

INTRODUCTION

One of the most important economic issues of the all countries, especially developing countries, is the problem of uncertainty concerning with macroeconomic variables. Among the variables that their fluctuations are very important in the economy are economic growth, inflation, exchange rates, and stock indexes. The reason of these variables being highly important is the effects that their changes and fluctuations could have on the trading and non-trading activities. One of the most important variables is the exchange rate. A large fluctuation in the exchange rate is a feature of many developing countries. These changes make an uncertainty condition in decision making in the private sector. The reason of the uncertainty that it make difficult to anticipate profits resulting from the trading and non-trading sectors, as well as the cost of new capital goods due to the impact on the imports. In fact the stability and consistency in the rate of exchange creates confidence in the domestic economic environment and causes investors to make easily decisions. In recent years because of the shortage of suitable investments, we have faced a tremendous amount of liquidity that their owners due to lack of knowledge have been confused to invest in the necessary and efficiency sectors consequently it caused the loss of assets that could be used as an engine of the economy. One of the safest parts that the financial resources can be directed towards it is the capital market. This market could make the capital to economic opportunities from various aspects if it can function properly and suitably. Its effect can be seen in the processes of financing and investing in the different economic sections. This efficient approach cause to encourage depositor to invest in this sector and so it can have a positive effect on the macroeconomic variables that economic growth is one of these variables. In contrast in the case of bad performance of this market all parts of the economy will be affected by it and occurred the same disorder in their trend. One of the most important factors that affect the decisions of investors who in hopes of earning more profits enter their assets in the market is the index of stock price that is affected

*Corresponding Author: Mahdi Shanasaei, Post graduated from Department of planning of Economic systems, Islamic Azad University, Central Tehran Branch, Tehran, Iran, Email: m.shenasaei@yahoo.com

by several internal and external factors. Internal factors effecting on the stock index ,are included in the earnings per share of stock index EPS , The divided profits per share PPS The price earnings ratio P / E Increase in capital, stocks splits and other internal factors that put reinforces or destroying impacts on the stock index. The second part of the external factors influencing the stock index is foreign factors. These factors include variables that are out of the firms management control influence on the stock price. These factors can be divided in economic factors, including macro and micro factors, political factors, cultural and behavioral factors. Each of these factors is divided in subsections. The macroeconomic factors, including central bank monetary policy, macroeconomic policy for pricing the products, and microeconomic factors, including exchange rates, tax, the central bank tightened policy and the inflation. In this study, we investigated the relationship between the exchange rates as one of the most important macroeconomic indicators with the total stock index. Why we choose this is the effect that the changes of the exchange rate can have impact on the price of the goods. It is the raw materials required in producing them to be imported from other countries. Another consequence of exchange rate changes is the effect on prices of the exported goods. These effects could have considerable impact on the profits of firms producing activities. the result is true for firms that their production are produced using raw materials of domestic and the firms that in the production process need the primary equipment which is required to import from abroad. Consequently, it is necessary to consider and plan on this matter by the authorities more than before.

Relation between the Stock and Exchange

As mentioned above, the exchange rate in developing countries is considered one of the most influential economic variables. With regard to companies and institutions in these countries mainly import from developed countries to meet their needs, so can change of the exchange rate is one of the important factors affecting the exchange and settlement of debt. Increasing the exchange rate on the one hand will increase the extent of foreign debt, and on the other hand, will increase the finished cost of production and imported goods and services provided by these companies. We observe the fact that increasing the company's debt will cause the shortage of liquidity. Then the shortage of liquidity of enterprises has a negative effect on profit distribution, returns and stock price index as well as the increase of the finished cost of products. Consequently, these will cause to reduce the company's margins, reduce costs and return on equity, and consequently reduce the stock index. There different justifications about the positive and negative effects between stock index and exchange rate referring to some of them as follows:

- When the exchange rate increases (decreases the value of domestic currency), this causes foreign investors to maintain their assets (shares purchased by them) in the relevant currency and equity increased demand for this .Their demands for stock will increase ,in return it associate the existence of a positive relationship between exchange and price index of the stock.
- In macroeconomic level of increasing exchange rate (depreciation) increased the exported industry and in contrary to decrease imported industry because of which their effect on production and revenue. This increase of income of investors should be regarded as an indicator of economic development and make them to tend to invest, so the stock price increases.
- If the exchange rate increases, or in other words the local currency against foreign currencies is cheap, it will reduce the imports but will increase the exports. Domestic production is protected and the domestic prices due to increasing demand will be increased. Under such inflaming circumstances, the possibility of profitability for investors will be increased, the necessary liquidity will inject into the stock market and finance for more productive activities are carried out by the stock market.
- With increasing the Exchange rate, foreign purchasing power will increase and they in seeking profit will tend to buy the stock and securities products. The absorption of foreign capital to finance the production processes are carried out through the exchange rate channel.

Background Research

Atsuyuki, in his study for a ten years period from 1985 to 1995 showed that the relationship between the exchange rate and the Tokyo stock market is positive and significant. Rolseth by studying the data of weekly stock returns and exchange rates of four Swedish companies in the industry, all of which were related to forest activities, showed that the exchange rate during December 1993 to December 1995 have a negative impact on the stock returns of the firm. Adjil and Mvgo (1996) studied short-term and long-term relationship between stock price index and the exchange rate in eight developed countries. They found that an increase in stock price leads to a decrease in the value of money in America and England. Desislava , with the hypothesis that there is a relationship between the exchange rate and the U.S. capital markets and this relationship, when the stock price is considered as an independent variable, is positive, and when the exchange rate regarded as independent variables is negative, their investigation began. He claimed depreciation; reduced stock market performance will be

less than depreciation. The study period was from June 1990 to August 2004, and at the end of the study, hypothesis was accepted. Hartmann and colleagues showed that during the period 1973 to 2006 there is a non-linear relationship between the stock market and exchange rates in countries USA, Italy, Germany and France. Hyde by studying the correlation between exchange rates and interest rates and stock returns in four countries: France, Germany, Italy and England during the years 1973 to 2004 found that the exchange rate effect on the stock returns of the four is positive and significant. Shew, with the aim to analyze the relationship between the Singapore capital market and exchange rate during the period 1990 to 2006, began his research. He at first, using the method structure breaking divide the period under investigation into two periods of economic crisis, Asia to Sept. 11, 2001, and from 2001 to 2006, and in the end came to the conclusion that during the period 1990 to 2006 between the stock markets of Singapore and the exchange rate was no statistically significant relationship. Agassi et al in their study on the effect of exchange rate volatility on the capital market in Ghana and by using the model EGARCH Concluded that long-term fluctuation in the exchange rate has a negative impact on the capital market in Ghana. Taghavi (1382) studied Effects of exchange rate changes in free market and the flow of future cash on the market value of companies share listed on the Tehran Stock Exchange. In this research, the relationship between fluctuating of exchange rate in informal market or free market and the fluctuating factors on the share price of listed companies in Tehran Stock Exchange is evaluated with emphasis on factors related to liquidity. In this study, the data of some macroeconomic variables, including the U.S. dollar on the free market exchange rate, selling rate of gold eighteen-carats fine rate and the average total price of market effective factors for the period 1380-1377 was on a daily basis. The analysis, based on multiple regression models, econometric models, cumulative moving average model, the explanatory model (ARIMA) And coefficient of variation (R^2) Analysis was performed using the mechanism. The results show the average effect of exchange rate fluctuations in free market on the factors relating to the liquidity in three variables as the number of buyers, the number of traded companies and times of purchasing and its effect on the others is low. Moreover, the liquidity effect as the average stock price in relation to the number of variables as the number of buyers and times of purchasing relatively is high and is low. Qalibaf ASL (1381) studied the relationship between stock returns and exchange rates in the Tehran Stock Exchange. In this study, the variable of stock (due to changes in stock price index of company's share), the percentage change in the exchange rate and stock return of the market index, for six months, during the period 1380-1375 has been used. Based on these results, the percentage changes in the exchange rate have a negative effect on stock returns. In addition, the percentage change in the exchange rate during a time lag has a positive influence on the returns of company's share.

Estimation Model

Research question in this paper examines the impact of exchange rate uncertainty on stock index of Iran. Towards this goal in the first stock index would have to be estimated. For this purpose, it is first necessary to identify the variables affecting the stock index. studying of more than 50 articles, national and international research projects these variables were identified and results from these studies was that the stocks index is affected by variables such as real money (money + quasi-money), GDP (GDP) Investment in the housing sector and uncertainty in the exchange rate. To check the model and the reliability of the established results estimates immediately after identifying the variables their static should be examined.

Results from review of static variables, using generalized Dickey Fuller test suggests that all the variables were static in surface and all the variables entered in the model after first differentiating were static, after evaluating of static of the variable of the real exchange rate, it is required to find the suitable rank for ARIMA model by employing The autocorrelation and partial autocorrelation function. Our reason for applying this method is that we later use it to estimate the degree of uncertainty. In this part of the present study using Acaea K. Schwartz ARIMA criterion the suitable rank for the result of these calculations indicate that the exchange rate were identified is related to 4 previous period and its residual expression with one period lag. Here the point to note is that the model residual estimated must be free of autocorrelation. Any autocorrelation in the disturbance components, indicating the existence of a systematic trend in the Y_t series that the Estimated model of ARIMA do not possess the ability to explain it. Therefore, to examine this issue Bryush Godfrey test is used. If after the estimating ARIMA model the variance of the disturbance term is not constant, the estimated coefficients of the model no longer are reliable. In this case, ARCH test has been used to evaluate the conditional heteroscedasticity and here in below the results from Bryush Godfrey test ARCH Is given

Table 1 - Test Bryush - Godfrey test and ARCH test

Levels.	Statistics - F	Test
0.644	0.4423	Bryvsh - Godfrey
0.0205	5.59	ARCH

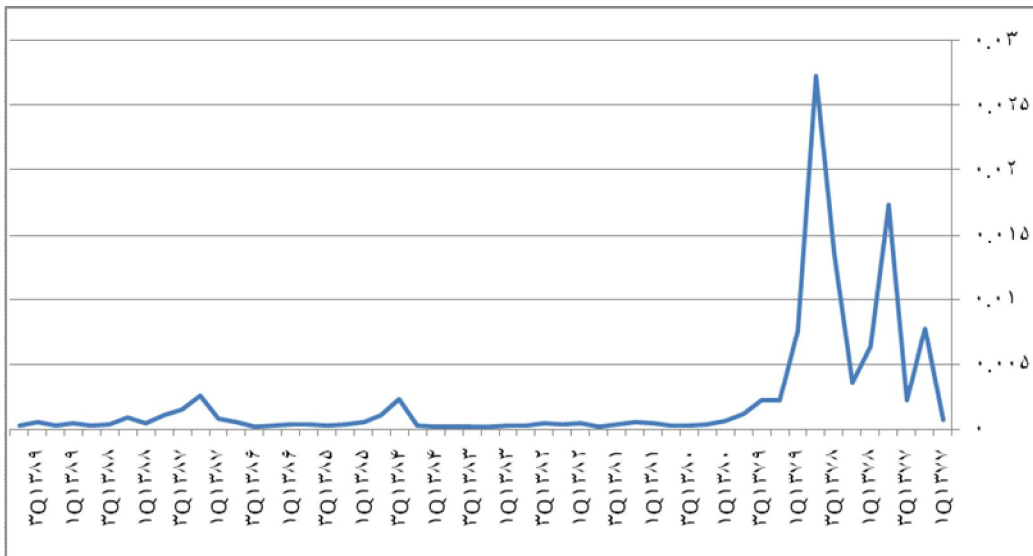
Source: Findings

According to the results obtained from the above table, the estimated model is no autocorrelation. Nevertheless, there is the problem of conditional hetroscedasticity. This case occurs in the time series that are associated with high volatility and followed by periods of small changes that it should be estimated by employing the EGARCH model and the uncertainty is measured. The following table shows the results of the model EGARCH .

Table 2 - Estimation Model For exchange

Htmal	Statistics - t	Coefficient	Variable
0.0	3.50-	0.02-	C
0.04	1.96	0.4023	AR(4)
0.0	3.53	0.4129	MA(1)
Variance Equation			
0.00	3.22-	2.55-	C
0.00	3.45	0.7	RESID ²
0.02	2.27	0.38	GARCH
0.26	\bar{R}^2	0.28	R ²
0.0	Prob(F – statstic)	2.58	Durbin – Watson

According to the results of conducted studies which is shown in the following Table as a process, it can be seen the exchange rate have a significant uncertainty in some years. These figures related to the years between 1381-1379. After extraction the uncertainty it is necessary to enter it into a structural pattern in the form of time series and as an independent variable in a structural model and then the model will be estimated.



Since the independent variable is presented in the right side of the model as a lag, so for estimation of this model no longer can use of OLS estimator. Consequently, in such circumstances, it is necessary to use a two-step estimation method 2sls Or the GMM. 2sls generalized method Was presented by Anderson & Hsiao had a problem, and the problem was that because of the difficulty in selecting the tools it leads to calculate a large variance for coefficients and finally cause the estimation not be statistically significant. To solve this problem GMM proposed By Orlando and Bond (1991). Estimation Method of GMM because of selecting the correct tool and applying a weighting matrix can be regarded as a powerful estimator in the case of heteroscedasticity of variance to

condition the variance and autocorrelation of unknown. In this model the lag of an independent variable in the equation is presented in the right side of the equation are also entered in the model in order to make possible the reparametrisation of the model. In such circumstances, if the the auto regression model can be achieved with a distributed lag of a richer parametrising of the model, to increase the reliability of the results in our model, the model coefficients re estimated as a dynamic process by employing GMM.GMM models on one hand, because do not the need to accurate data distribution of error terms and its foundation is based on the assumption that the disturbance terms of equations are non-correlated to the collection of instrumental variables ,and on the other hand because of the correlation between error terms and explaining variables in the model the fixed effects has a higher credit .

Introducing variables influencing the model:

As we said before we studied many researches to identify variables affecting the stocks index. Results from these studies was to identify the following variables as variables affecting the stocks index

- GDP in 1376 constant prices
- The real exchange rate
- Uncertainty in the real exchange rate
- Liquidity
- Private sector investment in housing and construction
- Index Tehran Stock Exchange

To estimate the proposed model we used the seasonal variables over the period 1377:1-1389:4, concerning the above the above considered variables, the theoretical model is suggested as follows:

$$LOG(Index) = \beta_0 + \beta_1 LOG(GDP) + \beta_2 LOG(RER) + \beta_3 LOG(CRER) + \beta_4 LOG(M_2) + \beta_5 LOG(Invest) + \beta_6 LOG(Index(-1)) + \varepsilon_i$$

Before estimating the model using generalized method of moments at first on the statistical properties of each of the variables to be examined in this way can be realized an accurate recognition of them.

Statistical properties of the model variables (1389:4 - 1377:1)

Probalitiy	Std.Dev.	Median	Mean	
0.0	0.0	0.0	0.0	CRER
0.0	1668.26	3610.29	3960.54	GDP
0.52	4828.29	9355.92	8047.02	INDEX
0.0	295.16	420.41	519071	INEV
0.0	4494.55	6153.81	7748.80	M ₂
0.15	3907.2	8788.39	9552.44	RER

As can be seen in most of the pattern variables according to test Jark – Bara have a normal distribution and statistical inference is based on normal distribution faced a problem consequently the generalized-moments method can solve the problem.

According to Engel Granger test for co aggregative variables, static test patterns using the generalized Dickey Fuller test conduct a statically test

Co aggregative test pattern variables

Possibility	Test
0.00	Dickey Fuller generalized - residual error model clauses

Source: Findings

Based on the results it was indicated that the residual computed by estimation of the model is static. Thus instead of employing the subtracting variables the very variables can be used.

In the final section, we have discussed the main estimation of model computed by GMM,that the results in the table can be observed.

$$LOG(Index) = \beta_0 + \beta_1 LOG(GDP) + \beta_2 LOG(RER) + \beta_3 LOG(CRER) + \beta_4 LOG(M_2) + \beta_5 LOG(Invest) + \beta_6 LOG(Index(-1)) + \varepsilon_i$$

The estimated results of the model

Possibility	Statistics - t	Coefficient	Variable
0.06	1.87	1.51	β_0
0.0	5.44	0.29	β_1
0.02	2.25-	0.1-	β_2
0.0	5 -	0.03-	β_3
0.0	4.58-	0.23-	β_4
0.0	3.06-	0.05-	β_5
0.0	108.93	0.9	β_6
0.98	R^2	0.98	\overline{R}^2
0.1	$J - statistic$	1.3	Durbin – Watson

Model estimation results indicate a positive effect of GDP growth

Variable (β) on the rise in the stock price index. This means that the economic growth through the channel of increasing demand for goods and services produced by active companies in stock, cause to rising the profit margin consequently rise in stock prices. More speed economic growth indicates a better economic condition, more purchasing opportunity of company, consequently more profitability. With increasing the profitability of companies it is expected that the value of stocks and expected profit of them also increase. Increasing the exchange rate on one hand could lead to increase the profit of exported companies, consequently, increase their stocks price, and on the other hand lead to decrease the profit of imported intermediary goods and decrease their stock price. The result of the model suggesting a negative effect on the real exchange rate (β) on the index of the stock prices in Iran but in addition to the negative effect of increasing the exchange rate through increasing the cost of imported capital and intermediary goods the exchange market in Iran as a substitute market in portfolio of investments has played a role and its temporal profitability cause the attractiveness of this market and transferring the wandering capital from the stock market. The stock market has been wandering. Exchange rate uncertainty (β_2) has a significant negative impact on the overall index of Tehran Stock Exchange, which in fact the main hypothesis of this research is proven. In fact, the increasing uncertainty of production costs that are often depended in imports will increase and hence will reduce the amount of profitability under the uncertainty condition.

In regard with the level of liquidity (β_4), the results indicated negative relation between the level of liquidity and price stocks index in Iran. These results also confirmed that the increasing effect of liquidity on inflaming in long term cause to increase the final costs of goods and services supplied by companies operating in stock market, consequently cause to decrease the margins of profit and attractiveness of the stock market housing section in Iran economic due to high profitability, it is an attractive market for private section and can operate as a substitute market in private section investment portfolio. The result of model estimating confirmed negative effect of increasing private section investment in construction (β_5) on the price stocks index in Iran. Thus whenever because of government policies or on the conditions, the attractiveness of this section will be decreased, the freed sources from housing will be absorbed in other markets that in present condition of stock market have been a better options.

Conclusions

The exchange system in an international level over the years been faced with a lot of difficulties and this volatility has had a huge impact on the economic structure. Each of these systems shows in a way the exchange rate of the different economy. Exchange rate in many years has had sever volatility of collapsing of Briton woods system, these volatility cause to make uncertainty condition for private section investors because the difficulty in forecasting profitability of trading and non-trading sections. All its effect on the imports section, where are effected by rate uncertainty, it effect on this section. Among the most important parts is the capital market. Since capital market in developing countries like Iran supplied the main part of its requirement through imports from developed countries, thus changes in exchange rate is one of important and effecting factors in exchange and settlement. Increasing exchange rate from one hand cause to increase the measure of foreign debt, and on the other hand cause

to increase the final pricing of imported productions and services by these company. Since increasing the company's debt cause shortage of liquidity and enterprises lack of liquidity has a negative effect on income distribution, returns and stock price index and the increase in finished cost of products, reducing the company's margins, reduce price and return of stocks, and consequently lead to a reduction in the stock index.

By considering the importance of the relationship between the exchange rates with stock index in this study, the relationship between the GMM models was examined. In this model, the stock index as the dependent variable applied in the relevant model, variables as GDP, real exchange rate, exchange rate uncertainty, liquidity, housing section, stock indices were identified as variables affecting the independent effect of these variables was a meaningful effect and suitable with our expectation. The most important variables that form the hypothesis of this research were the exchange rate uncertainty. Effect of exchange rate uncertainty on stock indices, according to the results of the GMM model, was a negative relationship consistent with the researcher expects. The reason for this negative relation is that how more is uncertainty in exchange rate, the cost of production will increase. The reason for this increase is that main part of production costs has a sever dependency to imports section and since the imports of goods as primary material of domestic production process is subjected to providing the currency of country from where the required goods of production are imported. Consequently exchange rate volatility will have very effect on purchasing power of capital firms and this put its effect on the production process and finally the investment of applicant of this section so it springs to the mind the necessity of planning and considering the problem of exchange rate by authorities and policy makers. Our Suggestions:

1. with regard to the importance of the phenomenon of uncertainty in exchange rate in developing countries. For future studies is recommended that researchers using of panel data technique and other methods of calculating the index of exchange rates, such as variance of changes of exchange rate, studies the effects of uncertainty in exchange rate on financial market in the countries.
2. it is suggested that in future studies to use the effects of uncertainty indices Like variance, the percentage of changes of one variable, variable standard error, which is estimated from equation of first order, auto regression and average of the percentage of changes of one variable to study the effects of uncertainty of exchange rate on capital market and the results compare with uncertainty index resulted from GARCH model.

RESOURCES

- Adjasi, C. Harvey, S, and Agyapong, D. (2008). "Effect of Exchange Rate Volatility on the Ghana Stock Exchange", *African Journal of Accounting, Economics, Finance and Banking Research*, Vol. 3.No. 3.
- Atsuyuk, N.(1995). "Dynamic Relations Between Macroeconomic Variables and the Japanese Stock Market", *Journal of Financial Research*
- Aydemir, O. Demirhan, E .(2009). "The Relationship between Stock Prices and Exchange Rates Evidence from Turkey" ,*International Research Journal of Finance and Economics*, ISSN 1450-2887 Issue 23. Basic econometrics, V1&2, Gujarati, D
- Chi, J, Tripe, D, Young M.(2008). "Do exchange Rates Affect the Stock Performance of Australian Banks?", www.papers.ssrn.com/sol3/papers.cfm?abstract_id=965599.
- Desislava, D.(2005)."The Relationship between Exchange Rates and Stock Prices: Studied in a Multivariate Mode", *Journal of Issues in Political Economy*, Vol. 14.
- Econometrics Time Series*, Walter Enders, Traslated, Dr Sadeghpour, M Enders, W.(2004). *Applied Econometric Time Series*, University of Alabama.
- Fashari, M 1387(2009)"the effects of instability of real rate of exchange on production: case study, Iran. M.A thesis in economics, Tabriz University, Social Science Faculty.
- Gamal, B. Said, E.(2004). "Volatility Modeling and Forecasting of the Egyptian Stock Market Index using ARCH Models", www.papers.ssrn.com/sol3/papers.cfm?id=631887.
- Guerin, JL, Revil, AL (2006), " E xchange rate volatility and growgth", University of Amiens, pp.1-15
- Hartmann, D. Pierdzioch, C .(2007). "Nonlinear Links between Stock Returns and Exchange Rate Movements", MPRA Paper, No. 558, posted 07.

- Hyde, Stuart.(2007). " The response of industry stock returns to market, exchange rate and interest rate risks", *Managerial Finance*, Vol. 33 No. 9, pp. 693-709
- Kim , K.(2003). "Dollar Exchange Rate and Stock Price: evidence from Multivariate Cointegration and error Correction model", *Review of Financial Economics*, No. 13 , 301–313.
- Mojarad,M,1383(2005)"Stability of exchange market and its mutual effects on monet and capital markets " *Collected essays 13th annual conference of monetary and exchange policies*.Tehran Monetary and Banking Institute of Central Bank of Islamic Republic of Iran
- Rolseth, Lars.(1996). "Adjusting Stock Market Values to Exchange Rate Exposure: The Case of ASTRA, SCA and STORA.*Working Papers in Economics no 6, Department of Economics, G ö t eborg University.*
- Shew, Jeffrey Allen.(2008)." Causality Relationship between Foreign Exchange Rates and Stock Market Close: Evidence in Singapore", *Bryant Economic Research Paper Vol. 1. No. 11th*
- Taghavi, M,Biabany,S(2001)"the effects of exchange rate of free market and the flow of future liquidity on the value of the shares of company accepted in Tehran Stock Exchange",*Economic enqueries*,No.4