Relation between Real Effective Exchange Rate And IMKB -100 Index (Istanbul Stock Exchange)

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Abstract: Stock exchange is a market where long-term investment instruments are purchased and sold such as share certificates, bonds etc. Stock exchange market is divided into two; developed and emerging stock markets. Developed stock markets are financial markets with a great depth which display activity in industrialized countries and constitute international financial market. Emerging stock markets are the stock exchange markets with a shallow depth which display activity in developing countries. Istanbul Stock Exchange has a rather important place among these stock exchange markets.

Emergence of the new capital markets, increase in financial liberalization and expansion of flexible exchange rate regimes caused an increase in the examination of exchange rate and stock exchange market. Developing economies that gradually abolished control on exchange rate, paved the way for international investments and portfolio diversification.

Today, it's seen that savers basically directs the funds in their hands to three instruments for the purpose of investment. They are interest, foreign exchange and stock exchange market. Investors who are the savers attempts to increase their returns in the maximum rate with the portfolios they constituted from among these three instruments. When the literature is examined, it's seen that there are many studies which examined relation between interest and stock exchange market from among these financial instruments. Result from these studies is that there is a negative, that is, an inverse relation between stock exchange market indices and interest rates. And purpose of this study is to see whether or not there is any long-term relation between real efefctive exchange rate and IMKB-100 index (Istanbul Stock Exchange), if any, to determine the direction of this relation.

In this study, three-month data of real effective exchange rate (REDK) and IMKB-100 index for 1990-2005 periods have been used. Starting point of study is the year 1990. Its reason is to test presence of long term relation between real effective exchange rate (REDK) and IMKB-100 index by using long-term data that we could reach. Data sets used in study are the values of indices and were received from Central Bank Electronic Data Distribution, Republic of Turkey (EVDS). Long-term relation was examined and empirical findings were proved by using Johansen-Juselius co-integration test (JJ). As a result of examination above, it was ensued that ther was a long-term positive relation between real effective exchange rate (REDK) and IMKB-100 index (Istanbul Stock Exchange).

Keywords: Exchange rate, ISE

Introduction

Stock Exchange is a market where long term investments like stocks, bonds are bought and sold. Thanks to stock exchange the people's savings are attracted to firms as capitals. In this way, capital is expanded to the base of the society. The firms which have a achieved a certain level of size and which are registered to stock exchange meet their long term fund needs by exporting shares and bonds which have better conditions than bank loans. The diffusion of shares to the base in particular realized through stock exchange. As for debt capital, bonds more alluring than long term bank loans both in terms of interest rates and of payment and of due date. In this way, by means of stock exchange both the volume of capital markets enlarges and the long term fund request from banks relieves. In addition, stock exchange has the following important functions like providing liquidity, being an economic indicator, diffusing the property to the base, and creating source for funds.

Stock exchanges are divided into two as developed and emerging stock markets. Developed stock exchanges are financial markets of great depth which are active in developed countries and which create international financial market. Emerging stock exchanges are shallow markets which display activity in developing countries. One of the most important characteristic features of these stock markets is that they are

easily affected from many parameters and thus having unstable yields for investors. Sometimes, these stocks can perform very well, and sometimes they can cause investors loose a fortune. Istanbul Stock Exchange holds an important place among these kind of stock exchanges.

Stock exchanges function as the barometer of economic, social and politic life in all the countries of the world. Changes, developments and problems in economic, social and political life are immediately reflected in stock exchange. The changes in national economic lives and indicators and international economic data have important direct effects on stock exchange and even causes great fluctuations. International economic data affect and direct emerging stock exchanges at least as much as changes in national economies.

Real effective foreign exchange currency became common in 1970s with the introduction of floating exchange rate. As floating exchange rates became more common, the multisided changes in rate of exchange have become more important in terms of trade competitiveness. The change in the value of a currency with regard to other certain currencies is the indicator of both the change in foreign currency market and in competitive power of trade. This is the nominal effective rate. However, as the inflation rate of the countries experience is different, the nominal effective rate is inadequate in indicating trade competition power. If the value currency of the country loose is so that it can compensate for the difference between the inflation rate in a given country and the inflation rate, it means that real currency remains the same. In other words, there is no change in trade competition power, which stems from currency change. The real increase or decrease in effective currencies is used as indicators of change in foreign exchange market and competitive power. To obtain real value from nominal value, the foreign exchange rate is regulated in accordance with the difference between the inflation rate of a given country and the world.

In the first part of this study, the literature review on the studies examining the relation between foreign exchange rates and foreign exchange is provided. The second part of the study includes three main headings; methodology, purpose, method and findings. Finally, the conclusion is given.

Literature Review

With the emergence of new capital markets, and with the increase in financial liberation and flexible currency regime, the number studies into the nature of the relation between foreign exchange rate and stock exchange increased. The developing economies that are gradually lifting the control over foreign exchange have opened the way to international investments and portfolio diversity. Also, the countries that adopted a more flexible currency regime have increased the floating in foreign exchange markets.

Classical theory of economy suggests that there is a relation between stock and foreign exchange. For example; according to free currency, it is a well known fact that international competition and trade balances are affected from money movements. Besides, this situation has an important effect on the countries real outputs which determine the current and future cash flow of the firms and share prices (Dornbush and Fisher, 1980). Movements in share prices can also affect foreign exchange rate. According to monetarist model, equity capital can affect money demand and foreign exchange rate movements (Gavin,1989).

In the previous studies which mostly examined the foreign exchange and shares markets in the US have found various results. For example, Aggarwal found out that the revaluation in US dollar affected share prices positively. On the contrary, Soenen and Hennigar found a negative relation during the years 1980-1986 they took into consideration. Roll who used daily data between 1988 and 1991 found a positive relation between the two markets. On the other hand, Chow et al. who made use of monthly data in the period between 1977 and 1989 didn't find any relation between the two markets.

Apart from these studies, Bahmani-Oskooee and Sohrabian were the first to use the congregation test in their examination of the relation between the two markets. They made use of the monthly data between 1973 and 1988 and found out that there was a dual relation between the two effective foreign exchange rate and S&P 500 index in the short term. Ajayi and Mougoue who used the data of eight industrialized countries of the period between 1985 and 1991 found significant relations. To make it clear, they found that there was a negative relation in short term and a positive relation in long term and that shocks in foreign exchange rates have a negative effect on share markets. Abdalla and Murinde who studied the relation between foreign exchange rate and share market by making use of data between 1985 and 1994 four Asian countries found that there wasn't any relation in Pakistan and Korea and that there was a relation between these two markets in India and Philippines but these relations were not in the same direction. Muhammed and Rasheed who studied four southern Asian countries by using monthly data between 1994 and 2000 found no relation in Pakistan and India, whether in short or in long terms.

In a study, Phylaktis and Ravazzolo (2000) who examined the performances between foreign exchange rate and share prices between 1980 and 1998 in Pacific region countries found a positive relation between the two markets. Amare and Mohsin (2000) studied the relation between foreign exchange rate and share markets in nine Asian countries. In their study, they studied the monthly data between January, 1980 and June, 1998 by making use of co-integration technique. As result of their study, they found a long term relation only in Singapore and Philippines. Murinde and Poshakwale found a relation between share prices and exchange rates

before Euro and after Euro period in Hungary, Czech Republic and Poland. The result of this study indicated that before Euro there was a one sided relation only in Hungary and that there was s strong dual relation in Czech Republic and Poland. Gupta, Chevaliler and Sayekt who studied the relation between foreign exchange rate, share market and interest rates in Jakarta economy found a weak one sided relation between foreign exchange rate and share prices. Kim K. found a negative relation between S&P 500 index and real foreign exchange rate. Stavarek studied the relation between foreign exchange rate and stock exchange rate in four older European Union members and in four new members and in the US. According to the data obtained in this study, there was a stronger relation between foreign exchange rate and share prices in older EU members and in the US -whose capital markets are developed- compared to the new members of EU. Besides, this study proved that mostly there is a direct and one-sided relation between these two markets. Finally, in similar studies, it was concluded that real effective foreign exchange rate is more suitable than nominal effective foreign exchange rate.

Methodology

Aim

Today, saving accounts owners direct the funds they have to three main instruments for investments purposes. These are interest, foreign exchange and stock exchange. The investors try to increase their income to maximum by means of portfolio they compose of these three main instruments of investment. Funds can spare more space to one of these three instruments in accordance with circumstances in global and national economy. When the literature was reviewed, it is seen that there are many studies examining the relation between interest and stock exchange. The common result of these studies is that there is a negative- that is a reverse- relation between stock exchange rate and foreign exchange rate. The main aim of this study is to determine whether there is a long term relation between real effective foreign exchange rate and IMKB-100 index and if there exists what is the direction of this relation.

Data

In this study, three months data of real effective foreign exchange rate (REFER) and IMKB-100 index between 1990-2005. The study started in 1990. The reason to start this study so early is to test the existence of a long term relation between REFER and IMKB 100 index by making use of the oldest data available. The data set was the index values taken from the Electronic Data Distribution System of Turkish Central Bank. The econometric analysis of the study was performed by using EViews 4.1 software.

Method

After the article published by Engel and Granger, especially in the 1990, there happened important developments in time literature serial. Accordingly, many macroeconomic time serials have a trend and this situation can lead to fake regression results (artificially increased and invalid test statistics) (Charemza ve Deadman, 1997). There were many methods suggested as a solution for this. It was suggested that stochastic trend can be eliminated by taking the difference of the variables but this method can lead to the loss of valuable long term information. The solution came with the co-integration analysis suggested by Engel and Granger. According to this, even if the variables include trends, the error term which expresses the deviations in long term is fixed-that is to say its variance and mean doesn't change in time, there is a real economic causality relation between variables. In this case, the variables in the regression are called co-integrated. Co-integration analysis has become an affective method which is used in the testing of theory of economy and in the prevention of dummy regression results in the regression and modeling of the economic variables.

Thanks to co-integration analysis which was introduced to the literature in 1980s time serial econometric and in the testing of economy theory. The benefits of co-integration concept to the literature and the areas of application can be examined under the following items;

a) The removing of dummy regression results in regression analysis,[1]

b) It is used as a new and effective modeling which provides the testing of long and short term economic variables together and econometric assessment

c) It is regarded as a pre-test before econometric assessment phase and

d) Its making long terms economic relations that is the testing of economy theory

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[1] The existence of the koentegre relationship between variables at the same time also guarantees the existence of causality relationships(Engel and Granger, 1987). Researches indicate that the majority of the time series of macroeconomic contains trends (see Nelson and Plosser, 1982). Therefore, researchers who have applied researches should take this into consideration.

In this study, firstly the stable levels of the variables are to be determined (Dickey ve Fuller, 1979). If the mean and the variance of a time serial doesn't change as time goes by and the common variance between two terms is dependent on the distance between two terms but not on the terms it was calculated then it is called stable (Gujarati 1999: 713). If a Y1 time serial whose mean, variance and common variance are the same as the ones in Equality 1 is stable, these three values will be the same whenever they are measured in a given time period.

$$E(Y_1) = \mu$$
$$\text{var}(Y_1) = E(Y_1 - \mu)^2 = \sigma^2 \qquad (1)$$
$$y_1 = E\big[(Y_1 - \mu)(Y_{l+k} - \mu)\big]$$

Putting the serials into equalities without meeting stability conditions, makes some relations which are not existent in reality seem to exist (Granger and Newbold, 1979: 111-120). Accordingly, the stability tests of the serials used in this study were performed by making use of "Enlarged Dickey-Fuller" test. To implement this test, the estimations were made according to regression number (2) for each serial used in the study.

$$\Delta Y_1 = a + yTrend + pY_{t-l} + \sum_{t-l}^{k} \delta_1 \Delta Y_{t-i} + \varepsilon_1 \qquad (2)$$

In equalities, Δ shows circular difference and $\Delta Y_t = (Y_t - Y_{t-l})$. The fixed term α shows Trend time or general tendency variable and ε shows the leftover of the model. EDF test's achievement of robust results depends on estimated regression equality's being freed from auto regression problem. The removing of auto regression problem in this equality makes the first circle difference of the dependent variable "k" necessary to be included into the model as an explanatory variable for lag in term. The lag length which is expressed as "k" in the equality was determined by Akaike by using AIC (Akaike Information Criterion) method.

EDF tests whether p=0 or not in the regression estimated above. If H0 hypothesis (p=0) is rejected, it is determined that Y variable is stable at its original level, but if it is accepted it means that Y variable is not stable. Till one can find the stability of a time serial which is not stable at its original level, these procedures are repeated for the first, second and if necessary for the third term difference. By comparing the EDF-t statistics of the equalities whose lag length are determined with McKinnon (1990) critical values, it is determined whether the variable is stable at the level it was tested.

In this study, to determine the long term effect of real effective foreign exchange index on IMKB 100 index, the co-integration test developed by Johansen-Juselius (1992) was used. Johansen-Juselius (JJ) co-integration technique is composed of the unstable serial differences and the assessment of VAR (Vector Auto Regression) which includes their levels. Suppose that there are two series which are not stable at their levels (X and Y). In this case, on the condition that there is a vector including Z, X, Y series, the VAR model created for JJ assessment will be like the following equality (3);

$$\Delta Z_t = \Gamma_i \Delta Z_{t-1} + \ldots + \Gamma_{k-1} \Delta Z_{t-k+1} + \Pi \Delta Z_{t-k} + \varepsilon_t \qquad (3)$$

Here, Γi (i = l, 2, k-1) Z_t expresses the parameter matrix of the variables which express the lag of the vector's first difference; and II expresses the parameter matrix of the levels of the variables, and ε expresses the leftover values of VAR model. As ΠZ matrix include direct combinations pertaining to the levels of the variables in Z vector, it possible to get information about the long term features of the model by examining this matrix. In the determination of the lag term number in the VAR model "Akaike Information Criterion" was used. The Co-integration relations between the variables which are examined to have long term relations were assessed with the help of two test statistics. One of them was "Trace", the other was "Maximum Eigenvalue Test" statistics. The Trace test examines the rank of the Π matrix (the coefficient matrix of vector which include the level values of the variables) and tests the hypothesis H0 whether the rank of the matrix is equal or smaller than r. The maximum eigenvlaue test statistics test the H0 hypothesis which expresses that co-integrate vector is r against its alternative hypothesis which states that the vector is r+1. The critical values of both these tests are given by Johansen and Juselius. If II the rank of II matrix is zero, it is concluded that the variables composing Z matrix are not co-integrated to each other, that is, they do not cooperate in the long run. If the rank of the same matrix is at least "one", it is concluded that the two variables in Z matrix cooperate in the long run.

The long term relation between two variables which have one co-integration relation will be like in the following equality (4). The X and Y in the equality shows dependent and expressive variables, β shows the parameters of the variables and ε shows the faulty term.

$$\beta_1 X_1 + \beta_2 Y_1 + \varepsilon_1 = 0 \qquad\qquad (4)$$

Findings

As Co-integration equalities require the using of unstable series and the stable variables of error correction equalities, each data series is firstly examined for the possible level of difference stability. The unit root test results are given in Table 1 and Table 2. Table 1 and Table 2 give us the EDF results of IMKB 100 and REFEC (real effective foreign exchange currency). When the critical importance of providing stagnancy is considered, a variable can only be decided to be stagnant if it passes EDF test (Darrat, 2002). As it can be seen in Table 1 and Table 2, EDF test statistics absolute values being greater that absolute values of significance level 1%, 5% and 10% shows that the series are stagnant at 1st level. In technical terms, both IMKB 10 index and REFEC are (1). As the twp series are stagnant at 1st level, to investigate the long term relation Johansen –Julieus co-integration test can be implemented.

Table 1: EDF unit root test (İMKB)

		t-values	Prob.
EDF Test Values		-5,106309	0,0000
Critical Values	%1	-2,602794	
	%5	-1,946161	
	%10	-1,613398	

Table 2: EDF unit root tests (REDK)

		t-values	Prob.
EDF Test Values		-8,253956	0,0000
Critical Values	%1	-2,602794	
	%5	-1,946161	
	%10	-1,613398	

As the variables are stagnant at the same level, we can do co-integration test by using Johansen-Juselius methodology. As JJ co-integration test is very sensitive to the choosing of lag length, the first phase in this test is to find an appropriate lag structure. In order to find appropriate lag structure, a VAR model would be useful. If the lag time is very short the model will be deficient and if the lag time is too long then the slackness level will be decreased. For both Schwartz and Akaike information criterion the lag time for the examined VAR model is (VAR=1).

Table 3: VAR Analysis

Lag	AIC	SC
0	28.54575	28.61680
1	**25.11201***	**25.32516***
2	25.14519	25.50043
3	25.15760	25.65495
4	25.19282	25.83227
5	25.20785	25.98940
6	25.16170	26.08535
*: The Lag number according to the characters chosen		
Lag: Lag number		
AIC: Akaike Information Criterion		
SC: Schwarz Information Criteria		

As it can be seen in Table3, Schwarz and Akaike information criteria 1 lag was suggested. For the last time, Table 4 and Table 5 indicate that there is at least one long term relation between Trace Test and Max Eigenvalue, and real effective foreign Exchange value and IMKB 100 index. At this point, Trace Test value and Max Eigenvalue test being higher than critical value of 5% significance level reveal that there is a long term relation between REFEC and IMKB 100 index.

Table 4: Trace Test

	Trace Test	Critical value (0,05)	Prob.
None[*]	**21,54963**	**15,49471**	**0,0054**
At most 1	3,687484	3,841466	0,0548

Table 5: Maximum Eigenvalue Test

	Max. Eigenvalue Test	Critical value (0,05)	Prob.
None[*]	**17,86215**	**14,26460**	**0,0129**
At most 1	3,687484	3,841466	0,0548

Table 6: Normal Co-integration Coefficients

REFEC	IMKB
1,000000	**-0,001686**
Standard Deviation	(0,00029)

From the values in Table 6, it can be concluded that there is a positive long term relation between REFEC and IMKB-100 index.

Conclusion

In this study we have examined whether there is long term relation between real effective foreign exchange currency and IMKB-100 index and its way.

While examining the existence of long term relation between a real effective foreign exchange and IMKB-100 index, co-integration method was used. In the creation of our data set, the electronic data distribution system of Turkish Central Bank was used. Our data set covers the period between 1990: 01 and 2005: 04. The analysis was carried out by using three-month length data sets. "Johansen-Juselius Test" was used as Co-integration method.

The stagnancy of the variables was first tested by using EDF unit root tests and it was decided that the series are stagnant and that it was decided that "Johansen-Juselius Co-integration Test" (JJ) could be performed.

As the Johansen-Juesluis Co-integration Test is sensitive to lag length, VAR analysis was used to find appropriate length and it was seen that the lag length is (1) according to both Akaike and Schwartz.

Finally, the trace test and Maximum Eigenvalue tests were performed, and it was concluded that there is a long term relation between the two variables just as in other studies in the literature. It was seen that this is a positive relation, in other words, the increases in real effective foreign exchange currency or any decrease in real effective foreign exchange currency lead to a decrease in IMKB-100 index.

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