THE ANALYSIS OF INTEREST RATE AND EXCHANGE RATE INFLUENCE'S ON STOCK MARKET. MEDIUM RUN EVIDENCE FROM ROMANIA

EMILIA UNGUREANU, FELIX-CONSTANTIN BURCEA, DANIELA PÎRVU
UNIVESRITY OF PITESTI, STRADA NEGRU VODA NR. 42, 110072, PITESTI,, ROMANIA
emiliaungureanu@yahoo.com, felixburcea@yahoo.com, ddanapirvu@yahoo.com

Abstract:
Starting from the conclusions that have resulted from the analysis of similar empirical studies on stock markets in other countries, in this paper, we proposed to analyze the influence of interbank interest rate and the exchange rate on the stock market in Romania, represented by the composite index Bet-C.
The analysis is made on medium run, the considered period being between 2005 (when was the denomination of Romanian currency (ROL)) and 2010.
We used both quantitative methods for data modeling and establish interdependencies between the analyzed variables, and also qualitative methods in order to explain as better the obtained results.

Key words: *stock market, Bet-C composite index, exchange rate, interbank interest rate*

JEL classification: *C10, E40, G17*

Introduction

The approach for the analysis presented in this article has left from studying some reference works from the current international economic literature.

In order to achieve this analysis, we used the fallowing variables:

- the composite index Bet-C;
- exchange rate euro/leu;
- monthly interbank interest rate Robor 1 M.

The analysis is achieved on a period of 6 years, between January 2005 and December 2010, and the frequency of the observations is monthly.

Descriptive statistics

As fallows we will present the descriptive statistics of each indicator used in this analysis.

1) Composite index Bet-C.

„BET-C" represents the name of the index „Bucharest Exchange Trading Composite" Index. BET-C was launched on April 16 1998 with a starting value of 1.000 points, being the second index developed by BVB. The BET-C index is a composite index and reflects overall evolution of all companies listed at BVB, the regulated segment market, category I and II, with the exception of the Financial Investment Companies.

Bet-C index is a price index weighted with market capitalization of all its component companies. Similar to other indices methodology developed by BVB, the Bet-C index methodology reflects the evolution of stock prices traded on the main market section ("Regular").

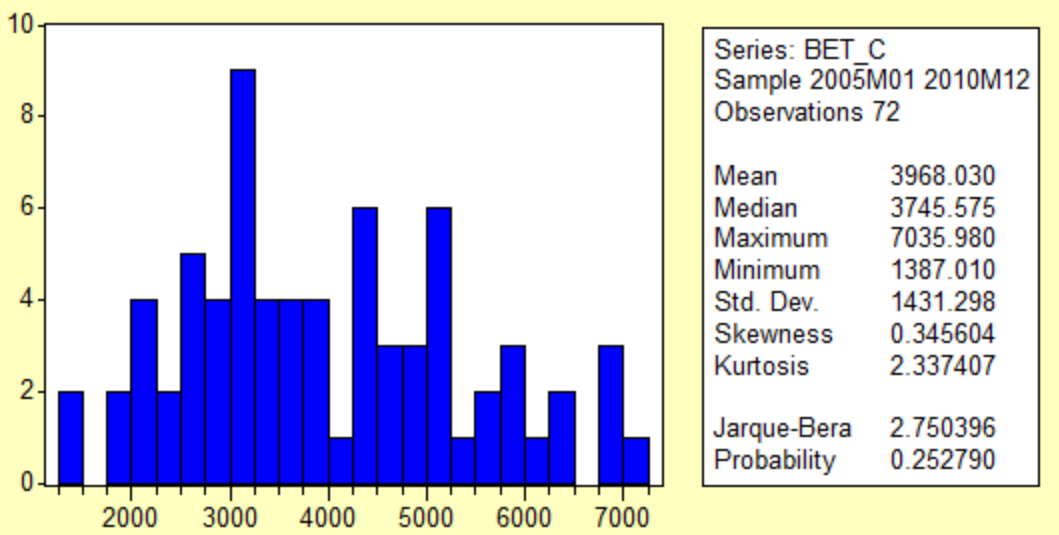
Regarding corporate events that have a significant impact on the market price of the shares included in the Bet-C index basket (such as: splits, consolidations, capital increases, etc.), will be proceed at periodic and operational adjustment of the index, so

that to be assured the continuity of the Bet-C index values in order to avoid the artificial influence of the index as consequence of these events. There will not be made adjustments over the Bet-C index in case of granting dividends by companies included in the Bet-C index components.

We have considered as representative this index for our analysis because it reflects the stock price evolution listed in Category I and II, excluding the Financial Investment Companies (that is why this index is more representative for the real economy).

In figure 1 you can observe the Histogram of our first analyzed variable.

Figure 1. Bet-C variable Histogram



Source: Authors own manipulations in E-Views 6

During the period under review, the composite index Bet-C have had an average of 3745 units, but varying very much as it can be observed in the histogram (between 1387,01 and 7035,98)- this thing show us the sensitivity of this index and confirm us the fact that the stock market is an important barometer of the economy, in particular also for the Romanian economy.

The histogram shows us a positive skewness, meaning a deviation to the left.

2) The exchange rate Euro/Ron

The exchange rate has a particular importance in an open economy, leaving very much its footprint especially on the developing economies, such as the case of Romania.

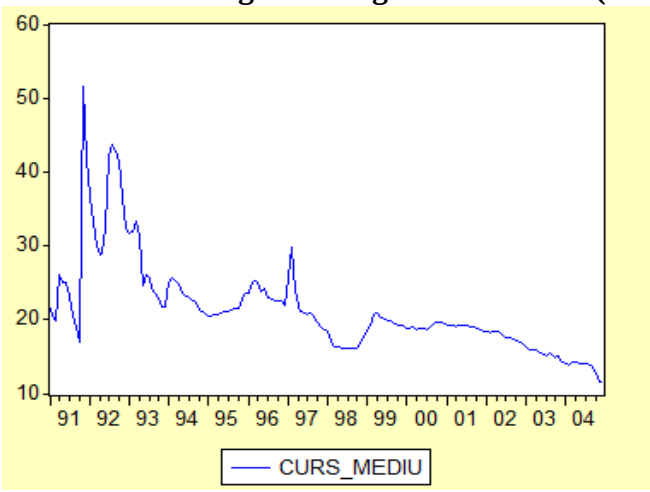
One of the reason for which I choose the period 2005-2010 was that at the beginning of 2005 was made the denomination, and the Romanian economy was subscribed in a marathon for recovering disparities compared with European Union, and therefore wished to adhere to this structure beginning with the year 2007.

In order to bring the analysis in the 2005 period we have decided to present the situation of the average real exchange rate Euro/Rol in the period 1991-2004. The data where processed from the Interactive Statistics of BNR.

In the period 1991-2004 (before the LEU being denominated), the exchange rate had important fluctuations, influencing both exports, and also the population's credits. The Leu exchange rate has suffered various speculative attacks, these one leaving small traces because of the interventionist policy of the National Bank of Romania.

But at the end of the year of 2004, the exchange rate was relatively stable, as we can notice from the following figure.

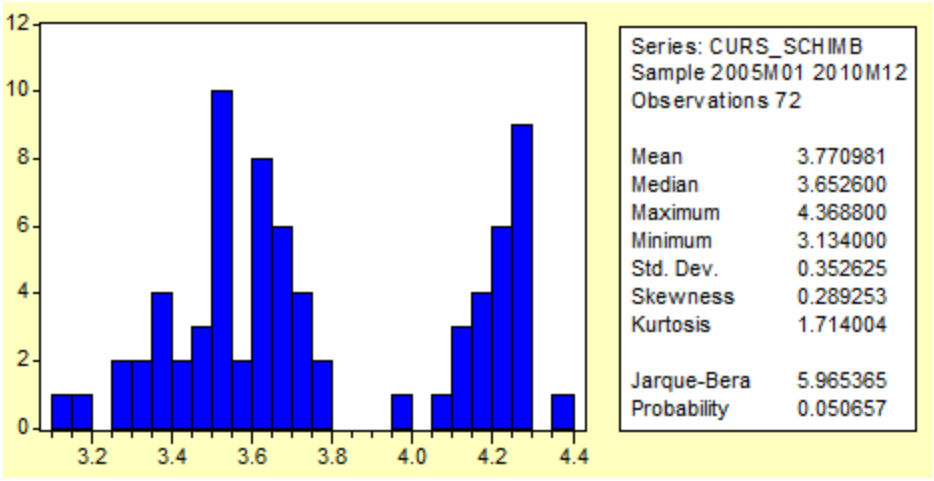
Figure 2. Evolution of average exchange rate euro/rol (1991-2004)



Source: Authors own manipulations in E-Views 6

As fallows we will present the Histogram of the second presented variable, meaning the exchange rate Euro/Ron (called as fallows curs_schimb). The frequency of the variable is monthly, the analyzed period being 2005-2010. The data where processed from the interactive statistics of BNR.

Figura 3. Histogram of the exchange rate variable (curs_schimb)



Source: Authors own manipulations in E-Views 6

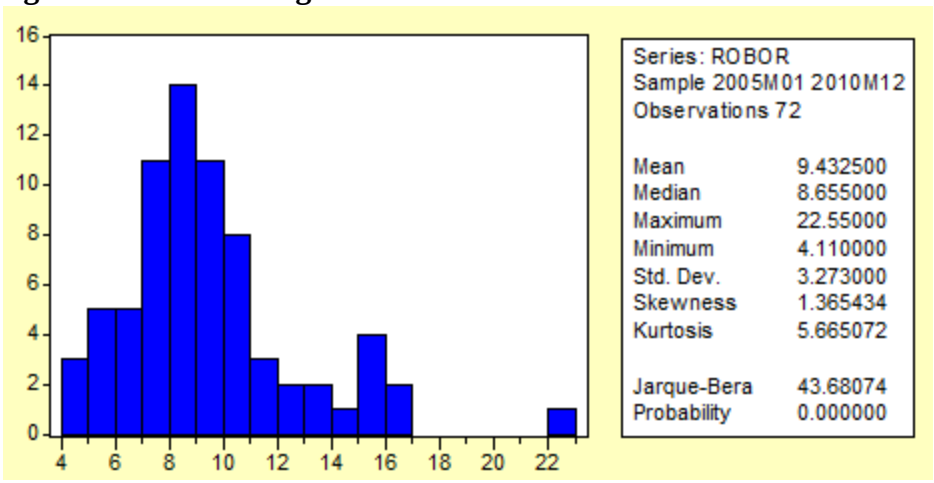
As we can observe, the average of the exchange rate was of 3,77, with a maximum of 4,3988 and a minimum of 3,134 (this thing shows us that due to the events occurred in the year 2008, the national currency had greatly suffered). The Skewness is positive, meaning we can observe a deviation to the left.

3) The interbank interest rate 1M Robor

The data on this variable were obtained with the help of the interactive database of BNR, after that being processed and represented at monthly average level, originally were daily data series). Because we have decided to make this analysis using a monthly frequency of observations, from BNR statistics were processed the interbank interest rate values for one month.

In order to better interpret the values of this indicator, we will present below its histogram.

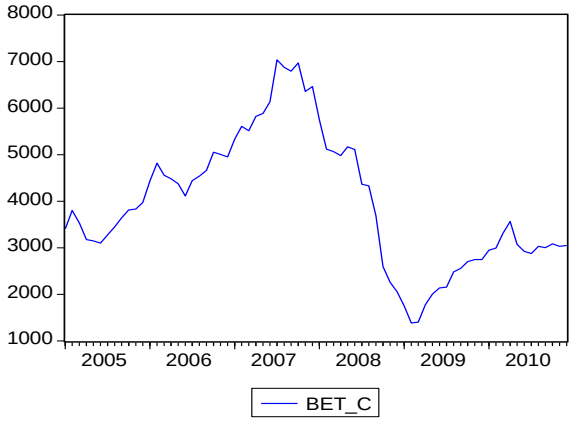
Figure 4. Robor Histogram



Source: Authors own manipulations in E-Views 6

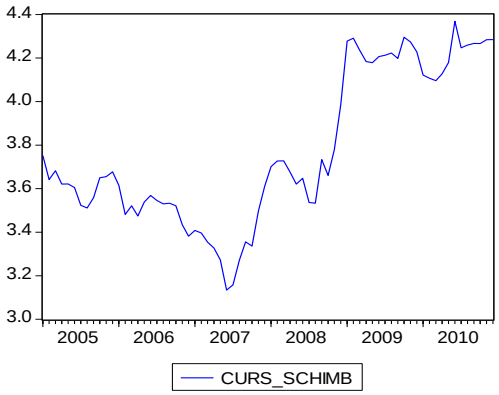
Like the other variables, we notice a deviation to the left of the observations (meaning a negative skewness). Also, in trend with the evolution with the other two variables, we can observe that this one have had an oscillating evolution (the minimum was 4,11 and the maximum was 22,55). The average of this variable was 9,4325. In order to synthesize the information presented, we will present the variables evolutions by using some graphics generated by using E-Views.

Figure 5. The evolution of the Bet-C composite index in 2005-2010



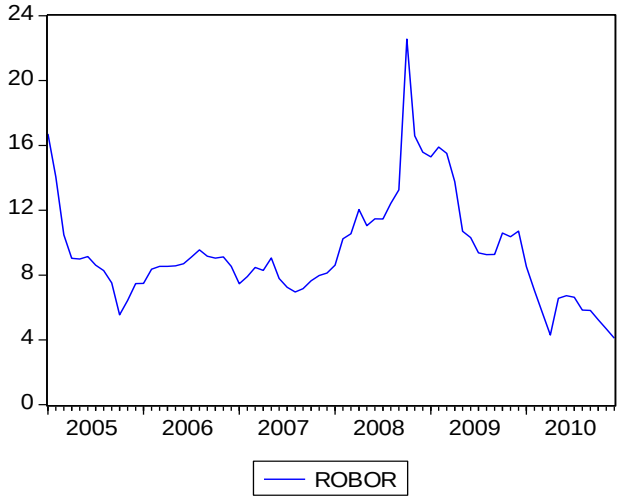
Source: Authors own manipulations in E-Views 6

Figure 6. The evolution of Euro/Ron exchange rate in 2005-2010



Source: Authors own manipulations in E-Views 6

Figure 7. The evolution of interbank interest rate Robor 1M



Source: Authors own manipulations in E-Views 6

As we can notice, the evolutions of the three indicators are in a tight connection, that it will be highlighted by achieving an econometric model based on a multiple regression.

The Model

Starting from the analysis of some reference works, we have decided to test the connection between the three variables, more exactly the way the exchange rate and the interbank interest rate influences the stock market evolution.

In the paper " The analysis of the relation between the evolution of the Bet Index and the main macroeconomic variables in Romania (1997-2008), conducted by I.A. Zoicaș and M. C. Făt, the authors present the existent correlation between the Bet Index and the interbank rate.

According to them, between Bet Index and the interbank interest rate expressed with the help of ROBID and ROBOR at 12 months there is an obvious negative correlation. The evolution is represented as rhythms of growing, the chosen based period being the year 1997.

From 1997 and until 2002, the Bet Index was below the initially level taken into consideration (1997), and ROBID and ROBOR at 12 months above. From 2003 the trend has reversed, Bet Index and the indicators representing interbank interest evolving basically in the mirror.

Analyzing the results obtained from other researchers in various emerging countries, such as Turkey, Brazil and even India, we have decided to include in our analysis also the euro/ron exchange rate.

For example, a study conducted by Bhattacharya, B. and Mukherjee, J, in the case of India reveals the fact that, even it is a transition country and the stock market has not reached a certain maturity, this has a very important role in the economy and that it is subject to the influences of some economic variables. The authors demonstrate that is a clear correlation between the stock market and the exchange rate.

Performing a multiple regression, using E-Views 6, I have obtained the following results:

Estimated equation is as follows:

BET_C = C(1)*CURS_SCHIMB + C(2)*ROBOR + C(3)

Substituting the coefficients we get:

BET_C = -3238.794725*CURS_SCHIMB - 131.3844068*ROBOR+17420.74535

Table 1. Descriptive analysis of the first model

Dependent Variable: BET_C
Method: Least Squares
Date: 03/16/11 Time: 18:02
Sample: 2005M01 2010M12
Included observations: 72

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CURS_SCHIMB	-3238.795	245.1064	-13.21383	0.0000
ROBOR	-131.3844	26.40720	-4.975326	0.0000
C	17420.75	950.0655	18.33636	0.0000

R-squared	**0.748919**	Mean dependent var	3968.030
Adjusted R-squared	0.741641	S.D. dependent var	1431.298
S.E. of regression	727.5144	Akaike info criterion	16.05792
Sum squared resid	36520131	Schwarz criterion	16.15278
Log likelihood	-575.0851	F-statistic	102.9059
Durbin-Watson stat	1.703353	Prob(F-statistic)	0.000000

Source: Authors own manipulations in E-Views 6

The value of R-squared is 0,748919, which indicates the fact that between the endogenous variable (in our study Bet-C) and a exogenous ones (represented by curs_schimb, Robor and constant C) there is a strong correlation, which could be anticipated since the graphics presentation that showed their evolution in the analyzed period.

The biggest influence is given by the exchange rate, having a coefficient of -3238,795.

From the obtained results, it notice also that both the exchange rate Euro/Ron and also the interbank interest rate Robor have a negative influence on Bet-C evolution, implicitly on the Bucharest Stock Exchange.

In other words, when the exchange rate is low and/or the interest rate is low, the Bet-C composite Index will increase.

Also, we tested the correlation between relative changes of the variables listed above. The new variables taken into account are:

- d_bet_c=(bet_c-bet_c(-1))/bet_c(-1)
- d_curs_schimb=(curs_schimb-curs_schimb(-1))/curs_schimb(-1)
- d_robor=(robor-robor(-1))/robor(-1)

The estimated equation is as fallows:

D_BET_C = C(1)*D_CURS_SCHIMB + C(2)*D_ROBOR + C(3)

Substituting the coefficients we get:

D_BET_C = -1.357438888*D_CURS_SCHIMB - 0.2757874411*D_ROBOR + 0.0026317356

Upon completion these multiple regressions, where obtained the following results:

Table 2. Descriptive Analysis of the second model

Dependent Variable: D_BET_C
Method: Least Squares
Date: 03/17/11 Time: 09:12
Sample (adjusted): 2005M02 2010M12
Included observations: 71 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D_CURS_SCHIMB	-1.357439	0.401863	-3.377867	0.0012
D_ROBOR	-0.275787	0.058597	-4.706526	0.0000
C	0.002632	0.008763	0.300321	0.7648

R-squared	0.326641	Mean dependent var	0.002439
Adjusted R-squared	0.306837	S.D. dependent var	0.088099
S.E. of regression	0.073348	Akaike info criterion	-2.345873
Sum squared resid	0.365834	Schwarz criterion	-2.250266
Log likelihood	86.27848	F-statistic	16.49316
Durbin-Watson stat	1.592170	Prob(F-statistic)	0.000001

Source: Authors own manipulations in E-Views 6

The value of R squared in this case is much more smaller that the one from the first model, which shows a weaker connection between the endogenous variable and the exogenous ones.

As we can see, the sign of coefficients are kept the same as at the first model, which strengthens our claim that between the exchange rate, ROBOR and the Bet-C composite Index, there is an inverse relation.

Conclusion

Bucharest Stock Exchange plays an increasingly important role in the Romanian economy, representing basically a barometer of it.

Through our approach, we have decided to show the interconnections between stock market, exchange rate dynamics and the evolution of interbank interest rate.

Since 2005, the analysis starting point and by mid 2007, we can observe a steady appreciation of the Bet-C representative Index, a decrease of the Euro/Leu parity (meaning a Leu appreciation) and the interbank interest rate with a descending trend. These evolutions were made possible due to the economic increasing rhythms known by Romania, by the improvement of the business environment and by the grater confidence enjoyed by the Romanian economy from international organisms.

But once with the global financial crisis, we can notice how the stock exchange, also called the barometer of the economy, was first to react and fallen dramatically. Of course, hadn't delayed to appear also negative effects, including increasing euro/leu parity and the increased interbank interest rate.

In the present period, we notice that both the stock market, represented by Bet-C composite index, and also the exchange rate and the interbank interest have a much lower oscillations and tend to be stabilized.

By comparing the results of our research with other results obtained in different emerging countries, we can say that there is, basically, the same type of connection between the studied variables.

In the future, we propose to analyze the influence of some important macroeconomic indicators (such as unemployment rate) on the stock exchange, in order to strengthen the affirmation that the connection between this and the real economy is a strong one.

REFERENCES

Aydemir, O., Demirhan, E., *The Relationship between Stock Prices and Exchange Rates Evidence from Turkey*, International Research Journal of Finance and Economics ISSN 1450-2887 Issue 23 (2009);

Bhattacharya, B., Mukherjee, J., *Causal relationship between stock market and exchange rate, foreign exchange reserves and value of trade balance: a case study for India (*www.igidr.ac.in/~money/mfc_5/basabi.pdf)

Bubula, A. and Otker-Robe, I. 2002, *The Evolution of Exchange Rate Regimes Since 1990: Evidence from De Facto Policies*, IMF Working Paper No. 02/155, IMF, Washinton, D.C.;

Dobrotă, G., Popeangă, G., *Determinarea cursului valutar in condițiile economice contemporane*, Ager Publishing, București, 2000;

Dobrotă, G., *Politica și regimul de schimb în România după 1990*, Constantin Brancusi University, Economic Series Paper No. 2/2009;

Khrawish, H.A., Siam, W. Z., Jaradat, M., *The relationships between stock market capitalization rate and interest rate: Evidence from Jordan*, Business and Economic Horizons, July, 2010;

Tabak, B. M., *The Dynamic Relationship between Stock Prices and Exchange Rates: evidence for Brazil*, Central Bank of Brazil, Working Paper Series 124.;

Zoicaș, I. A., Făt, M.C., *The analysis of the relation between the evolution of the Bet Index and the main macroeconomic variables in Romania (1997-2008) at* http://steconomice.uoradea.ro/anale/volume/2008/v3-finances-banks-accountancy/113.pdf*;*

*** http://www.bnro.ro/Baza-de-date-interactiva-604.aspx

***http://www.bvb.ro/IndicesAndIndicators/indices.aspx?t=2&p=BSE&i=BETC&m=&d=3/17/2011