Linkages between the stock prices and the exchange rates during the global crisis: the case of Romania

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LINKAGES BETWEEN THE STOCK PRICES AND THE EXCHANGE RATES DURING THE GLOBAL CRISIS: THE CASE OF ROMANIA

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Abstract: *Since the Asian flu several empirical studies revealed that in the crisis circumstances the relationship between the stock prices and the exchange rates could suffer significant changes. Such findings were confirmed during the global crisis that started in 2008. In the case of Romania the global crisis caused sharp shocks on both the capital market and the foreign exchange market. Contagion from the foreign financial markets and some impulses from the national economy led to complex evolutions of both markets, where ascendant and descendent trends alternated. In this paper we study the interactions between the stock prices and the exchange rates during some distinct stages of the recent crisis. We find that contagion from the foreign financial markets, the exchange rates policy changes and the national economy situation had a major impact on the relationship between the stock prices and the exchange rates.*

Keywords: Global Crisis, Stock Prices, Exchange Rates, Causality

JEL classification: G01, G19

1. Introduction

In this paper we investigate the relationship between the stock prices and the exchange rates during the actual global crisis. We use in our investigation two variables: BET-XT, a reference index for the Bucharest Stock Exchange (BSE), and the exchange rate of euro against the Romanian national currency (RON/EUR). Since the start of that crisis, both the capital market and the foreign exchange market experienced some turbulent periods of time. Romania's adhesion to the European Union which attracted massive inflows of foreign capitals caused a sharp raise of the stock prices in the first three quarters of 2007. However, during the next fourth quarters, the worsening perspective about the political and the economical situation, combined with the tensions from the foreign financial markets caused a significant decline. This decline was aggravated by the announcement of Lehman Brothers' bankruptcy, on 15th September 2008, which was considered as the beginning of the global crisis. In the first months of 2009, when the global crisis attenuated, the stock prices from BSE resumed their ascendant trend. This trend was interrupted in the second quarter of 2010, when the information about the national economy fragility became public and radical austerity measures were implemented (Figure 1).

In the last decades, the National Bank of Romania (NBR) maintained an active role on the foreign exchange market attenuating most of the shocks. In the months that followed the adhesion to European Union, the optimist perceptions about the national economy and consistent inflows of foreign capitals contributed to a significant appreciation of the national currency. However, in the next months this trend was reversed. The start of the global crisis caused a sharp depreciation which lasted until the first days of 2009. After that, NBR managed to maintain, for a long period of time, a relative stability on the foreign exchange market (Figure 1).

We analyze the interactions between the stock prices and the exchange rates employing the Vector Autoregression

Model and the Granger causality method. In order to capture these interactions in various circumstances we apply the two methods on four periods of time:
- a first period of time, from the Romania's adhesion to the European Union to the announcement of Lehman Brothers' bankruptcy;
- a second period of time, corresponding to an acute stage of global crisis;
- a third period of time, when the intensity of the global crisis attenuated;
- a fourth period of time, when the financial markets from Romania was affected by the news about the macroeconomic disequilibrium and by the austerity measures.

The remainder of this paper is organized as follows. The second part approaches the relevant literature, the third part describes the data and methodology used in our investigation, the fourth part presents the empirical results while the fifth part concludes.

2. Literature Review

The relationship between stock prices and exchange rates provoked some debates in the specialized literature. The portfolio approach stipulates that stock prices lead the exchange rates. According to that theory, the stock prices fall, which generates outflows of capitals, should depreciate the national currency. By contrary, the stock prices raise, which attracts inflows of capitals, should lead to the appreciation of the national currency [1]. In contrast with the portfolio approach, the current account hypothesis, assigned to the exchange rates, plays the determinant role. It suggests the depreciation of the national currency, which increases the profits of the domestic firms, should generate the stock prices increase. Instead, when the national currency appreciates, the profits decreases, causing a decrease of the stock prices [2]. Several papers investigated the relationship between the two variables using the Vector Autoregression and the Granger causality methods with various results. For some industrialized countries it was found that usually stock prices caused the exchange rates [3]. Instead, for many emerging markets it resulted that quite often the exchange rates cause the stock prices [4]. Some papers found bidirectional causality between the two variables: the stock prices Granger caused the exchange rates and, simultaneously, the exchange rates Granger caused the stock prices [5]. There are also empirical researches that found no evidence about the causality between the two variables [6].

The Asian financial crisis from the end of 1990s (Asian Flu) brought a new dimension to the study of the relationship between the stock prices and the exchange rates. It was revealed that in the turbulent financial markets circumstances the interactions between the two variables were different from those acting in relatively calm periods [7]. For most of the East Asian countries badly hit by the crisis such interactions strengthen [8].

3. Data and Methodology

In our investigation we use daily values of BET-XT, provided by BSE, and the nominal exchange rate of euro against the Romanian national currency, provided by NBR. For both variables, we calculate the returns by the formula:

$$R_t = 100 * [\ln(P_t) - \ln(P_{t-1})] \quad (1)$$

where P_t is the values of BET-XT or exchange rate at day t.

Our sample of data covers a period of time from January 2007 to June 2011. We divide this period of time in four sub-samples:
- first sub-sample, from 3rd January 2007 to 15th September 2008;
- second sub-sample, from 15th September 2008 to 27th February 2009;
- third sub-sample, from 2nd March 2009 to 30th April 2010;
- fourth sub-sample, from 3rd May 2010 to 30th June 2011.

We use the following notations for the variables employed in our investigation:
- $RBETXT_i$ for the returns of BET-XT on

sample i;
- $RNEER_i$ for the returns of the nominal exchange rate of euro against the Romanian national currency on sample i.

We analyze the stationarity of the variables using the Augmented Dickey-Fuller Test in which the deterministic terms are established by graphical representation while the number of lags is chosen by the Akaike Information Criterion.

We study the intensity of interactions between the stock prices and the exchange rates in a Vector Autoregression framework. We investigate also the causalities between these variables using the Granger Causality tests.

4. Empirical Results

In the Table 1 there are presented the results of the Augmented Dickey-Fuller tests indicating the stationarity of all the variables.

The Vector Autoregression method revealed only weak interactions between the stock prices and the exchange rates (Table 2).

We found different forms of the Granger causality on the four sub-samples. We identified no causality between the two variables for the first sub-sample. We found bidirectional causality for the second sub-sample: $RBETXT_2$ Granger-cause $RNEER_2$ and $RNEER_2$ Granger-cause $RBETXT_2$. For the third sub-sample we identified a unidirectional causality from stock prices to exchange rates. Instead, for the fourth sub-sample the tests revealed a unidirectional causality from the exchange rates to the stock prices (Table 3).

5. Conclusions

In this paper we investigated the relationship between the stock prices and the exchange rates using the Vector Autoregression and the Granger Causality methods. The first technique failed to identify significant interactions but the second revealed different forms of causality during the global crisis.

From the Romania's adhesion to the European Union until the global crisis start we found no causality between the two variables. In this period of time BSE was influenced mainly by the foreign capital flows while the NBR played a major role on the foreign exchange market. During the first stage of the global crisis we identified bidirectional causality between the stock prices and the exchange rates. In this period of time, characterized by a high turbulence, the investors from BSE were very sensitive to the evolutions from the other financial markets while NBR adopted a cautionary policy to avoid wasting its reserves to defend the national currency. Between March 2009 and April 2010, when the turbulence on the foreign financial markets attenuated, we found the stock prices Granger caused the exchange rates. In this period of time some optimistic perceptions among the investors increased the stock prices and in general NBR didn't oppose to the appreciation of the national currency as a result of the stock prices increase. From May 2010 to June 2011, when the financial markets from Romania was affected by the news about the macroeconomic disequilibrium and by the austerity measures, we found that exchange rates Granger caused the stock prices. In this period of time NBR played an active role on foreign exchange market in order to defend the stability of the national currency while the investors were very sensitive to the evolutions from the domestic financial markets.

The results of this investigation revealed that contagion from the foreign markets and the national economy situation could influence, in different ways, the relationship between the stock prices and the exchange rates.

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Appendix

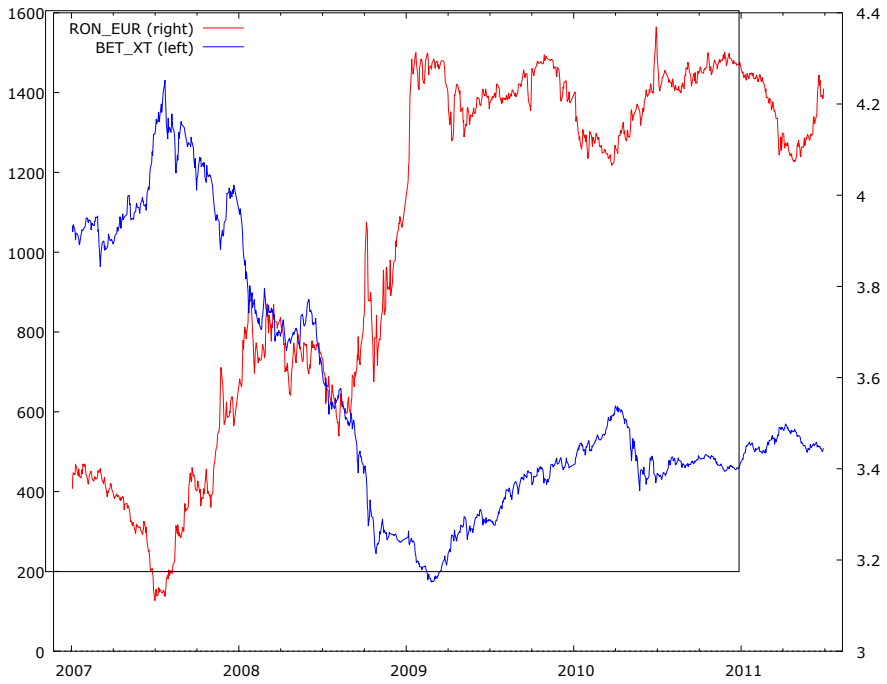

Figure 1: Evolution of BET-XT index and of the exchange rate of euro against the Romanian National Currency from January 2007 to June 2011

Table 1 Results of Augmented Dickey-Fuller Tests

Sub-samples	*Variables*	*Lagged differences*	*Test statistics*	*Asymptotic p-value*
First sub-sample	$RBETXT_1$	10	-4.9408	2.694e-005
	$RNEER_1$	12	-4.57788	0.0001374
Second sub-sample	$RBETXT_2$	10	-9.30388	5.981e-013
	$RNEER_2$	6	-3.25296	0.01715
Third sub-sample	$RBETXT_3$	7	-5.34972	1.346e-007
	$RNEER_3$	10	-6.05908	8.625e-008
Fourth sub-sample	$RBETXT_4$	12	-4.04308	0.001201
	$RNEER_4$	4	-9.6579	4.105e-018

Notes: For all the variables only intercept were used as deterministic term; the number of lags is chosen by the Akaike Information Criterion.

Table 2 Results of Vector Autoregressive Analysis

Panel 1: First Sub-sample				
Equation 1: $RNEER_1$				
Variable	Coefficient	Std. Error	t-ratio	p-value
const	0.0138066	0.0244366	0.5650	0.57238
$RNEER_1$_1	0.111706	0.0514914	2.1694	0.03060**
$RBETXT_1$_1	-0.0013132	0.0146728	-0.0895	0.92873
Adjusted R-squared = 0.008269				
F(2, 425) = 2.780111		P-value(F) = 0.063160		
Equation 2: $RBETXT_1$				
Variable	Coefficient	Std. Error	t-ratio	p-value
const	-0.156535	0.0865619	-1.8084	0.07126*
$RNEER_1$_1	0.292959	0.182398	1.6062	0.10898
$RBETXT_1$_1	0.092692	0.0519753	1.7834	0.07524*
Adjusted R-squared = 0.005262				
F(2, 425) = 2.129336		P-value(F) = 0.120183		
Panel 2: Second Sub-sample				
Equation 1: $RNEER_2$				
Variable	Coefficient	Std. Error	t-ratio	p-value
const	0.195588	0.0884464	2.2114	0.02922**
$RNEER_2$_1	0.275448	0.0953295	2.8894	0.00471***
$RNEER_2$_2	-0.135982	0.0946529	-1.4366	0.15385
$RBETXT_2$_1	0.0207075	0.0205577	1.0073	0.31616
$RBETXT_2$_2	0.0437799	0.0204626	2.1395	0.03476**
Adjusted R-squared = 0.106172				
F(4, 103) = 4.177456		P-value(F) = 0.003553		
Equation 2: $RBETXT_2$				
Variable	Coefficient	Std. Error	t-ratio	p-value
const	-0.780784	0.414056	-1.8857	0.06215*
$RNEER_2$_1	0.521686	0.446279	1.1690	0.24511
$RNEER_2$_2	-0.980115	0.443112	-2.2119	0.02918**
$RBETXT_2$_1	0.141214	0.0962398	1.4673	0.14534
$RBETXT_2$_2	-0.0672172	0.0957946	-0.7017	0.48446
Adjusted R-squared = 0.028063				
F(4, 103) = 1.772361		P-value(F) = 0.140069		

Panel 3: Third Sub-sample				
Equation 1: $RNEER_3$				
Variable	Coefficient	Std. Error	t-ratio	p-value
const	-0.00268383	0.0176198	-0.1523	0.87904
$RNEER_3\_1$	0.127772	0.0598845	2.1336	0.03371**
$RBETXT_3\_1$	-0.0241103	0.00796241	-3.0280	0.00268***
Adjusted R-squared = 0.057290				
F(2, 290) = 9.872580		P-value(F) = 0.000071		
Equation 2: $RBETXT_3$				
Variable	Coefficient	Std. Error	t-ratio	p-value
const	0.373747	0.136173	2.7447	0.00644***
$RNEER_3\_1$	0.687755	0.46281	1.4860	0.13835
$RBETXT_3\_1$	0.0836769	0.0615365	1.3598	0.17495
Adjusted R-squared = 0.003724				
F(2, 290) = 1.545764		P-value(F) = 0.214900		
Panel 4: Fourth Sub-sample				
Equation 1: $RNEER_4$				
Variable	Coefficient	Std. Error	t-ratio	p-value
const	0.00706647	0.016253	0.4348	0.66404
$RNEER_4\_1$	0.215501	0.0595656	3.6179	0.00035***
$RBETXT_4\_1$	0.00038347	0.00907585	0.0423	0.96633
Adjusted R-squared = 0.039303				
F(2, 294) = 7.054834		P-value(F) = 0.001017		
Equation 2: $RBETXT_4$				
Variable	Coefficient	Std. Error	t-ratio	p-value
const	-0.0296875	0.107739	-0.2756	0.78309
$RNEER_4\_1$	-0.683927	0.394852	-1.7321	0.08430*
$RBETXT_4\_1$	-0.119433	0.0601625	-1.9852	0.04805**
Adjusted R-squared = 0.011498				
F(2, 294) = 2.721567		P-value(F) = 0.067429		

Table 3 Results of Granger Causality Tests

Sub-samples	*Null hypothesis*	*F-statistic*	*P-value*	*Causal inference*
First sub-sample	H0: "$RBETXT_1$" do not Granger-cause "$RNEER_1$"	0.0080	0.9287	"$RBETXT_1$" do not Granger-cause "$RNEER_1$"
	H0: "$RNEER_1$" do not Granger-cause" $RBETXT_1$"	2.5797	0.1086	"$RNEER_1$" do not Granger-cause "$RBETXT_1$"
Second sub-sample	H0: "$RBETXT_2$" do not Granger-cause "$RNEER_2$"	3.1189	0.0463	"$RBETXT_2$" Granger-cause "$RNEER_2$"
	H0: "$RNEER_2$" do not Granger-cause "$RBETXT_2$"	2.6293	0.0746	"$RNEER_2$" Granger-cause" $RBETXT_2$"
Third sub-sample	H0: "$RBETXT_3$" do not Granger-cause "$RNEER_3$"	9.1689	0.0026	"$RBETXT_3$" Granger-cause "$RNEER_3$"
	H0: "$RNEER_3$" do not Granger-cause "$RBETXT_3$"	2.2083	0.1378	"$RNEER_3$" do not Granger-cause "$RBETXT_3$"
Fourth sub-sample	H0: "$RBETXT_4$" do not Granger-cause "$RNEER_4$"	0.0018	0.9663	"$RBETXT_4$" do not Granger-cause "$RNEER_4$"
	H0: "$RNEER_4$" do not Granger-cause "$RBETXT_4$"	3.0002	0.0838	"$RNEER_4$" Granger-cause "$RBETXT_4$"