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Impact of the Global Crisis on the Financial Linkages between the Stock Market and the Foreign Exchange Market from Romania

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Abstract
This paper explores the financial linkages between the Romanian stock market and the exchange market in the context of the global crisis. We investigate such relations for two periods of time: one from January 2006 to February 2008, when the Romanian financial markets were quite tranquil and the other from March 2008 to September 2009, while the global crisis effects were considerable for Romania. For the first period of time we could not prove significant relations between the foreign exchange market and the stock market. Instead, for the second period of time we found a unidirectional causality from the exchange rates to the stock prices.

Keywords: Romanian financial markets, Vector Autoregression, GARCH, Granger causality, financial linkages

JEL Code: G 19, C 01

1. Introduction

In Romania in the last decade the linkages between the stock market and the foreign exchange (FOREX) market strengthen. The restrictions to the foreign capitals were step by step abolished and many investors from abroad were able to fructify the opportunities of a dynamic stock market which became very attractive since the economic recovery. For many years the substantial investment from abroad caused an increase of the national currency demand. However, in the last months, in the context of the global crisis, the stock prices decreased while the national currency depreciated (Fig. 1 and Fig. 2).

In the actual context it is important to evaluate the changes induced by the global crisis to the linkage between the stock market and the FOREX market. The results of such an investigation could be useful in anticipating the future evolutions of the two markets. However, despite the importance of the subject, the changes provoked by the global crisis on the linkages between the Romanian financial markets were not, at least to our knowledge, approached until now in the specialized literature.

This situation is somehow justified since the actual global crisis is still far from the end. In this paper we attempt to make a preliminary investigation about the effects of the crisis on the stock market and FOREX market from Romania. For this purpose we use a sample of data from January 2006 to September 2009, consisting in daily values of the representative index on the Romanian Stock Market and the nominal exchange rate of the nominal currency against the euro. We study the eventual cointegration between the two time series and we analyze their interactions in a Vector Autoregression (VAR) framework. We also use ARCH – GARCH models to investigate how volatility from a market could be transferred from another market.

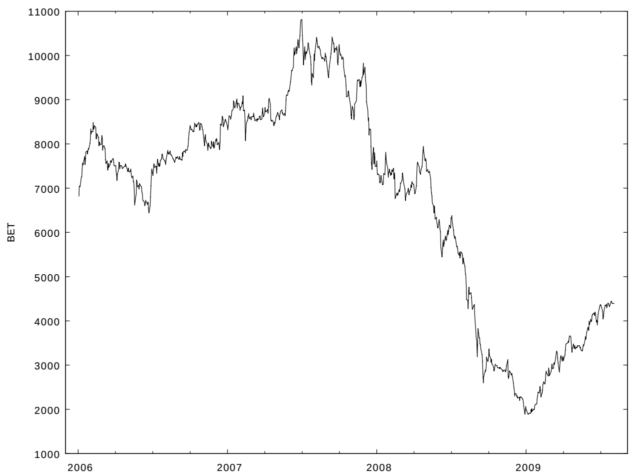

Figure 1. Evolution of BET index from January 2006 to September 2009

Figure 2. Evolution of the exchange rate of euro against the Romanian National Currency from January 2006 to September 2009

The rest of this paper is organized as follows. In the second part we approach the specialized literature, in the third part we describe the data and the methodology used in our investigation, in the fourth part we present the empirical results and in the fifth part we conclude.

2. Literature Review

In the specialized literature could be found two major approaches on the relationship between the stocks prices and exchange rates: the traditional approach and the portfolio balance model. The traditional approach explained the causalities between the exchange rates mainly through the competitiveness of the firms. When the local currency is appreciated the competitiveness of a firm is reduced, so its profit declined and so did its stock price. On the contrary, the depreciation of the national currency could raise the firm profit, increasing its stock price (see, for example, Dornbusch and Fischer, 1980). In conclusion, the stocks prices are determined by the exchange rates evolution.

The portfolio balance model appeared in the context of the financial markets integration. A decrease in the stocks prices led to a reduced demand for money. This ensures low interest rate which determines the depreciation of the national currency by encouraging the outflow of capital. By contrary, the increase of the stocks prices could lead to the appreciation of the national currency. In that case the exchange rates are determined by the stock prices (for example Frankel, 1983).

The empirical researches on the relationship between the exchange rates and the stock prices provided mixed results. Bahmani – Oskooee and Sohrabian (1992) found bidirectional causality between the S & P index and the effective exchange rates. Hatemi – J and Irandoust (2002) analyzed the financial markets from Sweden and they concluded that stocks prices caused the exchange rates, but the opposite situation was not true.

Some papers approached the relationship between the stocks prices and the exchange rates in the emerging markets. Abdalla and Murinde (1997) studied it based on the data from four Asian countries and they found evidence in favor of the traditional approach. Aydemir and Demirhan (2009) investigated the exchange rates and several indices of the stock market from Turkey and their results indicate bidirectional causal relationships.

The Asian financial crisis from 1997 to 1998 provided evidences about the relations between the FOREX markets and the stock markets in the circumstances of high instability. Granger et al. (1998) studied the behavior of the financial markets from eight South – East Asian countries and they found that for most of them the stock markets led the FOREX markets. Hussain and Liew (2005) found unidirectional causality from the exchange rates to the stocks prices in the case of Thailand and a bidirectional causality in the case of Malaysia.

3. Data and Methodology

In our investigation we employ daily values of BET, one of main indices from the Bucharest Stock Exchange, and of the nominal exchange rates of euro against the Romanian national currency. The data are provided by the Bucharest Stock Exchange, for BET, and by NBR, for exchange rates. We use the two variables in logarithmic forms with the following symbols:

- l_BET as the natural logarithm of BET;
- l_NEER as the natural logarithm of the nominal exchange rates for euro against the Romanian national currency.

We use also the first differences of the two variables:

- d_l_BET as the first difference of l_BET;
- d_l_NEER as the first difference of l_NEER.

In order to capture the bull and bear market circumstances we define two dummy variables:

- $d\_l\_BET^{+}$ = 1 if d_l_BET is positive and 0 otherwise;
- $d\_l\_NEER^{+}$ = 1 if d_l_NEER is positive and 0 otherwise.

In our analysis we use a sample of data from January 2006 to September 2009. We split this period of time in two sub-samples:

- first sample, from January 2006 to February 2008, a period of time when the effects of the actual global financial crisis were not very significant for Romania;
- a second sample, from March 2008 to September 2009, a period of time when Romania was considerable affected by the global crisis.

The descriptive statistics of l_BET and l_NEER, presented in the Table 1, indicate significant changes from the first to the second period of time. The mean of l_BET decreased from 9.03 to 8.29, indicating the bear market conditions. The mean of l_NEER increased from 1.24, reflecting the depreciation of the national currency. For both variables the values of standard deviations and of the coefficient of variation raised significantly, indicating a plus of volatility. Skewness and excess kurtosis of l_BET and l_NEER changed considerably, indicating different conditions of the markets. The Jarque-Bera test rejected, for both variables, the null hypothesis of the non normality.

Table 1. Descriptive statistics of l_BET and l_NEER for the two sub-samples

Indicator	l_BET		l_NEER	
	Jan 2006 – Feb 2008	Mar 2008 – Sept 2009	Jan 2006 – Feb 2008	Mar 2008 – Sept 2009
Mean	9.02991	8.29132	1.23854	1.36954
Median	9.02884	8.21592	1.25099	1.36962
Minimum	8.76996	7.54282	1.13501	1.24470
Maximum	9.28856	8.98045	1.32694	1.46156
Std. Dev.	0.114954	0.404086	0.0423556	0.0739576
C.V.	0.0127304	0.0487360	0.0341979	0.0540017
Skewness	0.216075	0.0855410	-0.416357	-0.131152
Ex. kurtosis	-0.764314	-1.14440	-0.292687	-1.72485
Jarque - Bera test for normality	17.6671***	21.5342***	17.8539***	48.956***

The analysis of the two time series has to begin by testing their stationarity for levels and for their first differences. For this purpose we employ the classical unit root test Augmented Dickey-Fuller (Dickey and Fuller, 1979). If this test proves that both time series are integrated at order 1 (are non stationary in levels but stationary in their first differences) we may continue by analyzing their cointegration. We use the Engle-Granger procedure (Engle-Granger, 1987), the more powerful Johansen cointegration test (Johansen, 1995) and the Breitung non parametric test of cointegration (Breitung, 2002). If both time series are stationary, at least in their first differences, we analyze their interactions in a VAR framework proposed by Lütkepohl and Kratzig (2004). We may also test the Granger causality between the two variables (Granger, 1969). In our investigation we intend to estimate the impact of a variable variation to the volatility of other variable. For this purpose we use ARCH and GARCH models (Engle, 1982 and Bollerslev, 1986).

4. Empirical Results
4.1. Analysis of the stationarity for the variables employed

Based on the graphical representations of the variables employed (Figure 3) we chose as deterministic terms constant and trend for the level values and only constant for their first differences.

In the Table 2 there are presented the results of the Augmented Dickey-Fuller Test for the observations from the first sub-sample. It shows that both l_BET and l_NEER are non stationary in levels but stationary in their first differences.

Table 2. Augmented Dickey-Fuller Test for the observations from the first sub-sample (from January 2006 to February 2008)

Variable	Deterministic terms	Lagged differences	Test statistics	Asymptotic p-value
l_BET	Constant and no trend	27	-1.19183	0.6804
	Constant and trend	27	-0.853024	0.9594
d_l_BET	No constant and no trend	26	-5.08609	4.935e-007
	Constant and no trend	26	-5.08947	1.335e-005
l_NEER	Constant and no trend	31	-1.2529	0.6535
	Constant and trend	31	-0.642751	0.9761
d_l_ NEER	No constant and no trend	30	-3.53998	0.0003946
	Constant and no trend	30	-3.5485	0.006856

Note: The number of the lagged differences was chosen based on Akaike Information Criteria.

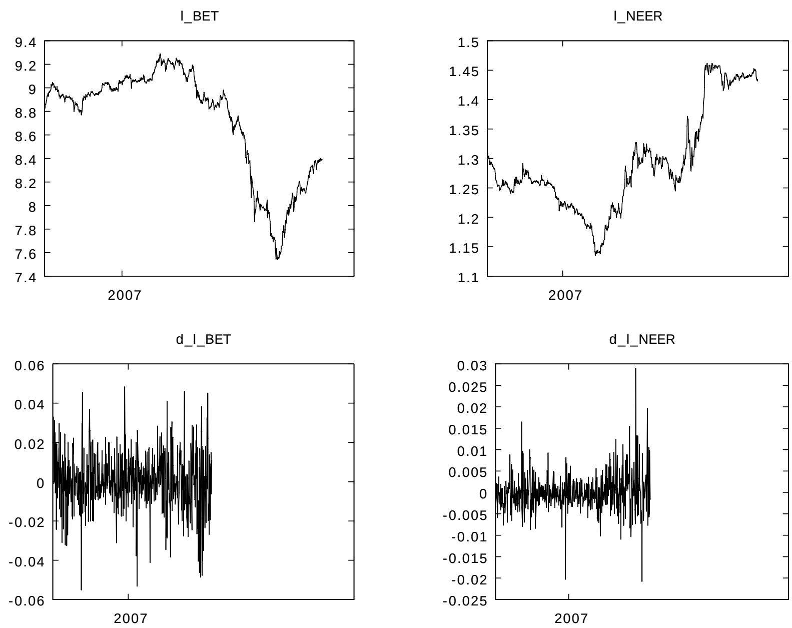

Figure 3. Evolutions of l_BET, d_l_BET, l_NEER and d_l_ NEER from January 2006 to September 2009

The results of the Augmented Dickey-Fuller Test for the observations from the second sub-sample are presented in the Table 3. It shows again that the two time series are non stationary in level values but stationary in their first differences.

Table 3. Augmented Dickey-Fuller Test for the observations from the second sub-sample (from March 2008 to September 2009)

Variable	Deterministic terms	Lagged differences	Test statistics	Asymptotic p-value
l_BET	Constant and no trend	29	-1.66984	0.4467
	Constant and trend	29	-0.861427	0.9586
d_l_BET	No constant and no trend	32	-4.71173	2.9e-006
	Constant and no trend	32	-4.71386	7.572e-005
l_NEER	Constant and no trend	28	-0.964379	0.7679
	Constant and trend	28	-2.14209	0.5216
d_l_ NEER	No constant and no trend	27	-3.0586	0.002171
	Constant and no trend	27	-3.14916	0.02315

Note: The number of the lagged differences was chosen based on Akaike Information Criteria.

4.2. Analysis of the cointegration between the variables

Since the Augmented Dickey-Fuller Test proved that both l_BET and l_NEER were integrated at order 1, we investigate if they are cointegrated. First we employ the Engle-Granger method for both sub – samples. The results for the first sample are presented in the Table 4. Since the residuals of the cointegration equation are not stationary we accepted the null hypothesis of no cointegration between l_BET and l_NEER.

Table 4. Results of the Engle-Granger method to test the cointegration between l_BET and l_NEER for the observations from the first sub-sample (from January 2006 to February 2008)

Variable	Coefficient	Std. Error	t-ratio	p-value
const	11.4759	0.0985533	116.4	0.0000***
l_NEER	-1.97490	0.0795255	-24.83	8.97e-092***
R-squared	0.529494	Durbin-Watson Test		0.034379
Augmented Dickey-Fuller Test on the residuals of the cointegration regression (with 11 lags and constant as deterministic term)			test statistic	-2.30997
			asymptotic p-value	0.368

Note: The number of the lagged differences for the Augmented Dickey-Fuller Test was chosen based on the Akaike Information Criteria.

In the Table 5 there are presented the results of the Engle-Granger method for the second sub-sample. Again, the residuals of the cointegration equation are not stationary so we can conclude that l_BET and l_NEER are not cointegrated.

Table 5. Results of Engle-Granger method to test the cointegration between l_BET and l_NEER for the observations from the second sub-sample (from March 2008 to September 2009)

Variable	Coefficient	Std. Error	t-ratio	p-value
const	13.8669	0.256043	54.16	3.67e-182 ***
l_NEER	-4.07040	0.186704	-21.80	3.30e-069 ***
R-squared	0.552480	Durbin-Watson Test		0.016163
Augmented Dickey-Fuller Test on the residuals of the cointegration regression (with 29 lags and constant as deterministic term)			test statistic	-1.14675
			asymptotic p-value	0.8714

Note: The number of the lagged differences for the Augmented Dickey-Fuller Test was chosen based on the Akaike Information Criteria.

The Johansen cointegration test (results are presented in the Table 6) indicates, for both sub-samples, a null cointegration rank. In these circumstances we can not reject the null hypothesis of no cointegration between l_BET and l_NEER.

Table 6. Results of the Johansen cointegration test

Period of time	Deterministic term	Lag order	Rank	Eigenvalue	Trace test	p-value	Lmax test	p-value
January 2006 to February 2008	Unrestricted constant	2	0	0.019438	13.082	0.1119	10.757	0.1693
			1	0.0042330	2.3246	0.1273	2.3246	0.1273
March 2008 to September 2009	Restricted constant	2	0	0.015668	8.9047	0.7462	6.0956	0.7749
			1	0.0072509	2.8090	0.6239	2.8090	0.6227

Note: The number of the lagged differences was chosen based on the Akaike Information Criteria.

The results of the Breitung nonparametric cointegration test, presented in the Table 7, suggest again, for both sub-samples, a null cointegration rank. We may conclude that l_BET and l_NEER are not cointegrated.

Table 7. Results of the Breitung nonparametric cointegration test

Period of time	Deterministic term	H_0	H_1	Test statistic	10% Critical value	5% Critical value
Jan 2006 to Feb 2008	no drift	r = 0	r > 0	95.58	261.00	329.90
		r = 1	r > 1	20.24	67.89	95.60
	drift	r = 0	r > 0	348.71	596.20	713.30
		r = 1	r > 1	69.20	222.40	281.10
Mar 2008 to Sept 2009	no drift	r = 0	r > 0	57.70	261.00	329.90
		r = 1	r > 1	11.95	67.89	95.60
	drift	r = 0	r > 0	157.48	596.20	713.30
		r = 1	r > 1	44.38	222.40	281.10

4.3. Analysis of the interactions between l_BET and l_NEER in a VAR framework

For the first sample we didn't find a suitable VAR model to reflect the relationship between l_BET and l_NEER. For the second sample we obtained the VAR model presented in the Table 8.

Table 8. VAR model for the second sample with l_BET and l_NEER as dependent variables

Equation 1: d_l_BET - Heteroskedasticity-robust standard errors

Variables	*Coefficient*	*Std. Error*	*t-ratio*	*p-value*
const	-0.00110495	0.0013843	-0.7982	0.42525
d_l_BET_1	0.140383	0.0744808	1.8848	0.06021*
d_l_BET_2	-0.0588214	0.0698585	-0.8420	0.40031
d_l_NEER_1	0.395655	0.358502	1.1036	0.27045
d_l_NEER_2	-0.758827	0.375922	-2.0186	0.04423**

Mean dependent var	-0.001334	S.D. dependent var	0.028298
Sum squared resid	0.296480	S.E. of regression	0.027859
R-squared	0.040817	Adjusted R-squared	0.030773
F(4, 382)	2.333875	P-value(F)	0.055206
rho	-0.009346	Durbin-Watson	2.018536

Equation 2: d_l_NEER - Heteroskedasticity-robust standard errors

Variables	*Coefficient*	*Std. Error*	*t-ratio*	*p-value*
const	0.000286284	0.000287032	0.9974	0.31921
d_l_BET_1	-0.00108423	0.0149959	-0.0723	0.94240
d_l_BET_2	0.0210115	0.0147027	1.4291	0.15379
d_l_NEER_1	0.24461	0.0750812	3.2579	0.00122***
d_l_NEER_2	-0.0808835	0.0678716	-1.1917	0.23411

Mean dependent var	0.000315	S.D. dependent var	0.005999
Sum squared resid	0.012930	S.E. of regression	0.005818
R-squared	0.069090	Adjusted R-squared	0.059342
F(4, 382)	3.981587	P-value(F)	0.003536

Note: The number of the lagged differences was chosen based on Schwartz Information Criteria

For the two equations the t-ratio values indicate there are coefficients which individually are not statistically significant. However, the p-value associated to the F test suggests that collectively all the coefficients are statistically significant. The low values of the Adjusted R-squared indicate a relative weak relationship between the two variables.

In the VAR framework we evaluate, for the second sample, the interactions between exchange rates and stocks prices using impulses – responses functions. In the Figure 4 there are presented the responses of d_l_NEER to an impulse from d_l_BET. It shows that after a short decrease d_l_NEER began to rise abruptly to a maximum, from there beginning to decrease arriving to come back at the initial level.

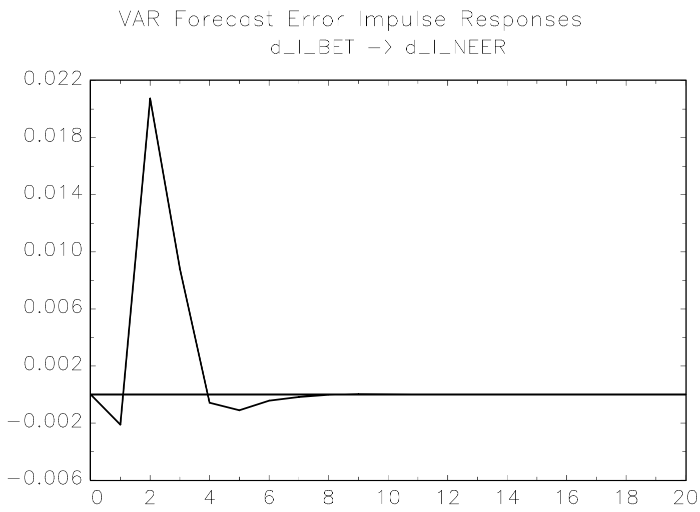

Figure 4. Responses of d_l_NEER to an impulse from d_l_BET

The responses of d_l_BET to an impulse from d_l_NEER are presented in the Figure 5. Initially d_l_BET rose but after a while fell sharply under the initial level and then it rose again to the initial value.

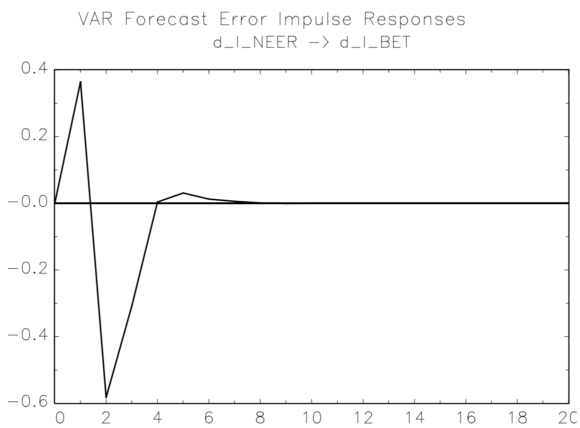

Figure 5. Responses of d_l_BET to an impulse from d_l_NEER

4.4. Evaluation of volatility by ARCH-GARCH models

We quantify the volatilities of the two variables by conditional variances provided by ARCH and GARCH models. Since the variables in levels are not stationary we use their first differences.

4.4.1. ARCH and GARCH models for d_l_BET

For the observations from the first sub-sample, the most adequate model for the volatility of d_l_BET proved to be a GARCH (1,1) with d_l_BET$^+$ as independent variable (see Table 9).

Table 9. GARCH model for the first sub-sample with d_l_BET as dependent variable and d_l_BET^{+} as independent variable

Variables	*Coefficient*	*Std. Error*	*z-stat*	*p-value*
const	-0.00918041	0.000725683	-12.6507	<0.00001***
d_l_BET^{+}	0.0192794	0.00107664	17.9070	<0.00001***
alpha(0)	1.85496e-05	5.12726e-06	3.6178	0.00030***
alpha(1)	0.302636	0.118265	2.5590	0.01050**
beta(1)	0.544806	0.0816058	6.6761	<0.00001***

Mean dependent var	0.000162	S.D. dependent var	0.015087
Log-likelihood	1779.628	Akaike criterion	-3547.256
Schwarz criterion	-3521.407	Hannan-Quinn	-3537.154

Figure 6 presents the conditional variance obtained from this model. It shows that periods of high volatility alternate with more tranquil periods of time.

For the second sub-sample the best fitted model for d_l_BET volatility is an ARCH(2) with d_l_BET^{+} as independent variable (Table 10). The conditional variance of d_l_BET, presented in the Figure 5, reveals a high volatility from the end of 2008 to the beginning of 2009 (Figure 7).

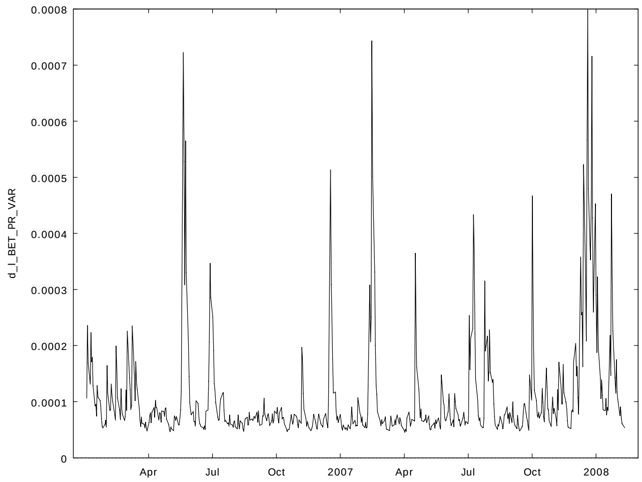

Figure 6. Conditional variance of d_l_BET obtained from a GARCH (1, 1) model using observations from the first sample

Table 10. ARCH model for the second sub-sample, model with d_l_BET as dependent variable and d_l_BET^{+} as independent variable

Variables	*Coefficient*	*Std. Error*	*t-ratio*	*p-value*
const	-0.0199843	0.00125767	-15.8899	<0.00001***
d_l_BET^{+}	0.0390134	0.0018115	21.5365	<0.00001***
alpha(0)	0.000248652	5.5006e-05	4.5205	<0.00001***
alpha(1)	0.146318	0.0503343	2.9069	0.00386***
alpha(2)	0.185568	0.0503308	3.6870	0.00026***

Statistics based on the weighted data

Sum squared resid	374.2449	S.E. of regression	0.989797
R-squared	0.548368	Adjusted R-squared	0.547186
F(1, 382)	463.8213	P-value(F)	6.37e-68
Log-likelihood	-539.9318	Akaike criterion	1083.864
Schwarz criterion	1091.765	Hannan-Quinn	1086.998
rho	-0.009338	Durbin-Watson	2.015460

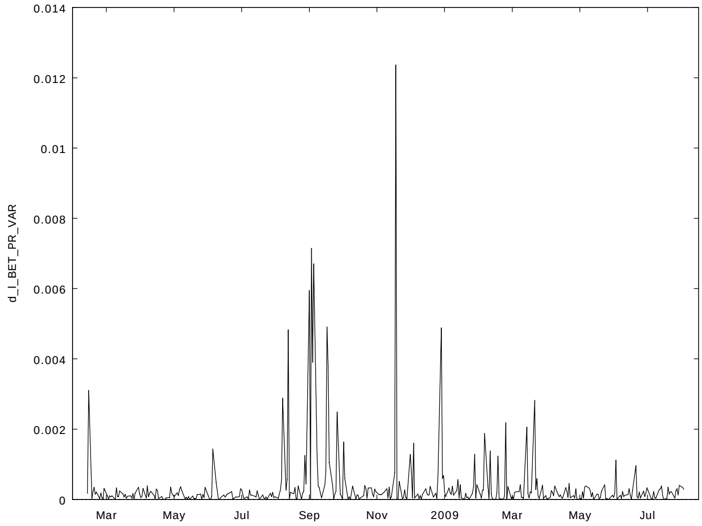

Figure 7. Conditional variance of d_l_BET obtained from an ARCH (2) model using observations from the second sub-sample

4.4.2. GARCH models for d_l_NEER

For the first sub-sample, the most adequate model for the volatility of d_l_NEER proved to be a GARCH(1,1) with no independent variable (Table 11). The conditional variance of d_l_NEER provided by this model has highest values at the end of 2008 and at the beginning of 2009 (Figure 8).

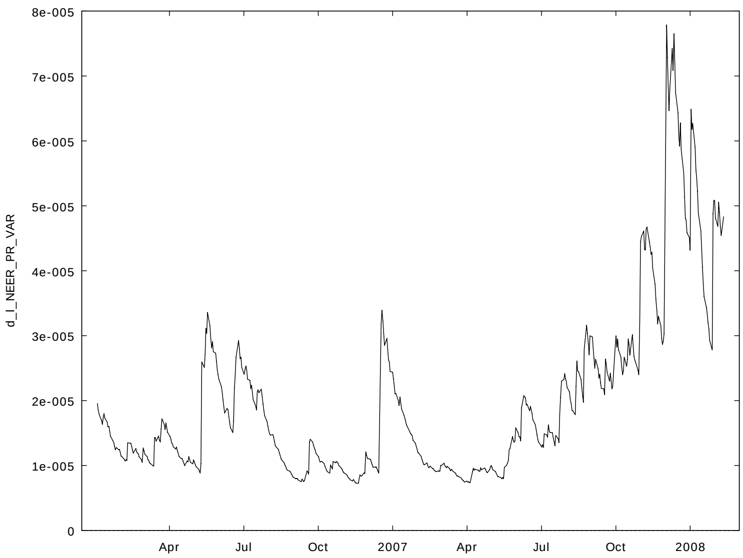

Figure 8. Conditional variance of d_l_NEER obtained from a GARCH (1, 1) model using observations from the first sub-sample

In the case of the second sub – sample the best fitted model is a GARCH(1,1) with d_l_NEER$^+$ as independent variable. The conditional variance provided by this model is highest in the fourth quarter of 2008 (Figure 9).

Table 11. GARCH model for the first sub - sample with d_l_NEER as dependent variable

Variables	*Coefficient*	*Std. Error*	*z-stat*	*p-value*
const	-0.000228071	0.000136497	-1.6709	0.09474*
alpha(0)	3.38331e-07	2.64551e-07	1.2789	0.20094
alpha(1)	0.0578618	0.021375	2.7070	0.00679***
beta(1)	0.928646	0.0288128	32.2303	<0.00001***

Mean dependent var	0.000017	S.D. dependent var	0.004411
Log-likelihood	2245.824	Akaike criterion	-4481.648
Schwarz criterion	-4460.108	Hannan-Quinn	-4473.230

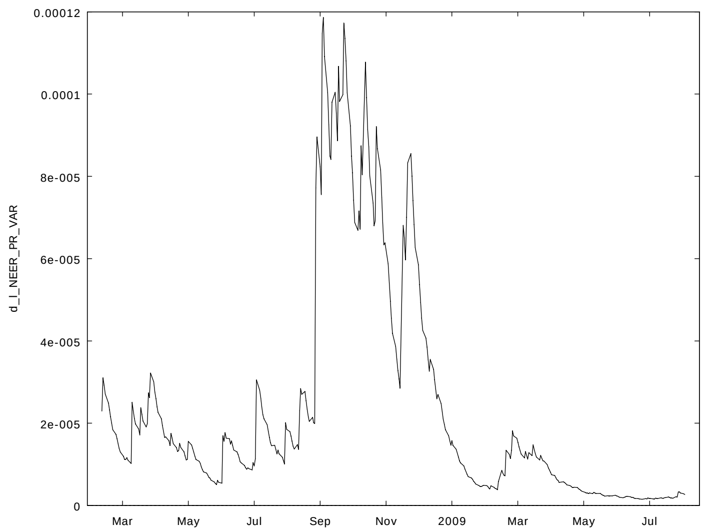

Figure 9. Conditional variance of d_l_NEER obtained from a GARCH (1, 1) model using observations from the second sub-sample

Table 12. GARCH model, for the second sub-sample with d_l_NEER as dependent variable and d_l_NEER$^+$ as independent variable

Variables	*Coefficient*	*Std. Error*	*z-stat*	*p-value*
const	-0.00201783	0.000327298	-6.1651	<0.00001***
d_l_NEER$^+$	0.00465787	0.000551805	8.4412	<0.00001***
alpha(0)	2.71953e-08	5.21455e-08	0.5215	0.60200
alpha(1)	0.0830708	0.0361925	2.2953	0.02172**
beta(1)	0.916929	0.0330954	27.7056	<0.00001***

Mean dependent var	0.000320	S.D. dependent var	0.006006
Log-likelihood	1609.333	Akaike criterion	-3206.667
Schwarz criterion	-3182.932	Hannan-Quinn	-3197.255

4.4.3. Evaluation of the interactions between the volatilities of exchange rates and stock prices using GARCH models

We introduced, for the first sub-sample, d_l_NEER as independent variable in ARCH and GARCH models with d_l_BET as dependent variable. The best fitted was proved to be the GARCH (1, 1) model presented in the Table 13. Based on the value of z-stat we may conclude the coefficient of d_l_NEER is statistically significant and the exchange rates variation has a considerable effect on the stock prices volatility.

Table 13. GARCH model for the first sub-sample with d_l_BET as dependent variable and with d_l_NEER and $d\_l\_BET^{+}$ as independent variables

Variables	*Coefficient*	*Std. Error*	*z-stat*	*p-value*
const	-0.00914798	0.000643468	-14.2167	<0.00001***
d_l_NEER	-0.531937	0.126888	-4.1922	0.00003***
$d\_l\_BET^{+}$	0.0190936	0.000947756	20.1462	<0.00001***
alpha(0)	1.79442e-05	5.02455e-06	3.5713	0.00036***
alpha(1)	0.23699	0.0851413	2.7835	0.00538***
beta(1)	0.583377	0.0740369	7.8796	<0.00001***

Mean dependent var	0.000162	S.D. dependent var	0.015087
Log-likelihood	1796.033	Akaike criterion	-3578.065
Schwarz criterion	-3547.909	Hannan-Quinn	-3566.280

We found also for the first sub-sample a GARCH (1, 1) model with d_l_NEER as dependent variable and with d_l_BET and $d\_l\_NEER^{+}$ as independent variables (Table 14). The coefficient d_l_BET is statistically significant, so we may conclude the variation of stock prices has a considerable effect on the exchange rates volatility.

Table 14. GARCH model for the first sub-sample with d_l_NEER as dependent variable and with d_l_BET and $d\_l\_NEER^{+}$ as independent variables

Variables	*Coefficient*	*Std. Error*	*z-stat*	*p-value*
const	-0.0023877	0.000168048	-14.2084	<0.00001***
$d\_l\_NEER^{+}$	0.00498263	0.000313391	15.8991	<0.00001***
d_l_BET	-0.0466497	0.013389	-3.4842	0.00049***
alpha(0)	1.08425e-07	9.47942e-08	1.1438	0.25271
alpha(1)	0.043323	0.0197817	2.1901	0.02852**
beta(1)	0.950385	0.0186357	50.9980	<0.00001***

Mean dependent var	0.000017	S.D. dependent var	0.004411
Log-likelihood	2436.336	Akaike criterion	-4858.673
Schwarz criterion	-4828.516	Hannan - Quinn	-4846.887

For the second sub-sample we didn't find any ARCH or GARCH model which allows combinations of d_l_BET and d_l_NEER.

4.5. Tests of the Granger causality between exchange rates and stock prices

We tested the Granger causality between d_l_NEER and d_l_BET. For the first sub-sample we found no causality. Instead, for the second sub-sample the results indicate a unidirectional causality from exchange rates to stock prices (Table 15).

Table 15. Tests of Granger causality between the variables

Period of time	Null hypothesis	F-statistic	P-value	Causal inference
Jan 2006 to Feb 2008	H0: d_l_NEER do not Granger-cause d_l_BET	0.0313	0.8597	d_l_NEER do not Granger-cause d_l_BET
	H0: d_l_BET do not Granger-cause d_l_NEER	0.0993	0.7528	d_l_BET do not Granger-cause d_l_NEER
Mar 2008 to Sept 2009	H0: d_l_NEER do not Granger-cause d_l_BET	4.6682	0.0097***	d_l_NEER Granger-cause d_l_BET
	H0: d_l_BET do not Granger-cause d_l_NEER	2.0822	0.1254	d_l_BET do not Granger-cause d_l_NEER

5. Conclusions

In this paper we investigated the financial linkages between the exchange rates and the stock prices. We used a sample of daily values divided in two sub-samples: one from the relative tranquil period of time between January 2006 and February 2008 and the more volatile period between March 2008 and September 2009. We found that for the two sub-samples both variables are integrated at the order 1. However all the tests applied indicated that we cannot reject the hypothesis of no cointegration between the exchange rates and the stock prices.

We analysed the interactions between the two variables in a VAR framework. For the first sub-sample we did not find any suitable VAR model. From a VAR model for the second sub-sample it resulted that the stock prices react to the exchange rates variation much more substantial than the exchange rates to the stock prices variation. We tested for the both sub-samples the Granger causality between the two variables.

For the first sub-sample we could not reject the hypothesis of no causality. Instead, for the second sub-sample, we found a unidirectional Granger causality from the exchange rates to the stock prices. We evaluated the volatilities of the two variables using ARCH – GARCH models. From the first to the second sub-sample we identified significant changes in the conditional variances, especially for the stock prices. We found that very often the conditional variances of the two variables have similar patterns.

We investigated the correlations between their volatilities by GARCH models with independent variables. For the first sub-sample we found that the variation of a variable could influence the volatility of the other variable. Our finding confirmed for the second sub-sample the traditional approach of the financial links between the FOREX market and the stock market. It could be an effect of some Romanian financial markets particularities.

Firstly, on the FOREX market the NBR interventions are still determinant, annihilating partially the effects of the stock market evolutions. Secondly, The Romanian stock market is very sensitive to the foreign stock markets, so the influence of the FOREX market is significant only for abrupt variations of the exchange rates. In the first sub-sample such changes were quite seldom, but in the second sub-sample they occurred pretty often. This investigation could be completed by the analysis of the interactions between the conditional variances of the exchange rates and the stock prices.

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