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THE IMPACT OF THE CRISIS MANIFESTED IN FINANCIAL MARKETS ON ECONOMIC GROWTH. A COMPARATIVE ANALYSIS OF ROMANIA AND BULGARIA

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Abstract: *The global financial crisis affected the international financial markets, having a general effect on the economies of EU member states: Romania and Bulgaria. Because of economic instability of the last two years, many investors are also following the evolution of the GDP in making decisions of stock portfolio. The study is going to present the relationship between the stock indices' values of the two countries and the GDPs, for underlining and verifying a possible link, based on information from 2008 and 2009. The results obtained will test the causal relationship, and formulate some conclusions regarding the influence of the global financial crisis over the economic loss of the two countries.*

Key words: *financial markets, economic growth, comparative analysis.*

1. Introduction

Instability periods can signal the presence of some difficulties for companies, but also some opportunities for development through mergers and acquisitions, launching new products or entering new markets. The economic growth represents the barometer of a company, being taken into consideration both by seeing the efficiency of the presence of a company in one country, but also by the investors from the capital market.

The macroeconomic signals have a direct link to the microeconomic level, through governmental strategies, and through the level of the gross domestic product, current account deficit and the interest rate set by the national bank.

These macroeconomic indicators influence the expectations of investors for the future evolution of the stock exchange.

2. Objective

Through this research, we will try to establish a quantitative relation between the evolution of stock indices from Romania and Bulgaria and the evolution of the gross domestic product from each country. Moreover, based on the two indices BET and SOFIX, we will look for a correlation, based on the hypothesis that investors are closely following the evolution of the other stock exchanges in

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the region, especially in the case of Romania and Bulgaria, the newest members of European Union.

3. Material and Methods

To achieve the goals, information was collected for the evolution of the BET index, SOFIX index, and information about the GDP of each country. The analyzed period was the third quarter of 2007 – end of 2009. For the comparative analysis, we used simple models of regression, looking for potential relations based on the models we found. For analyzing the GDP, quarter values were identified, and were compared with the quarter values of stock indices. As instruments, we used for calculations Eviews 4.1. and Microsoft Excel 2007.

3.1. Analysis of the Evolution of BET Index and SOFIX Index between 1st of October 2007 and 31st of December 2009

The evolution of BET index of Bucharest Stock Exchange was studied based on daily information. An overview of the evolution of this index is given by the graphic presentation of BET. Through this we can find more descriptive information.

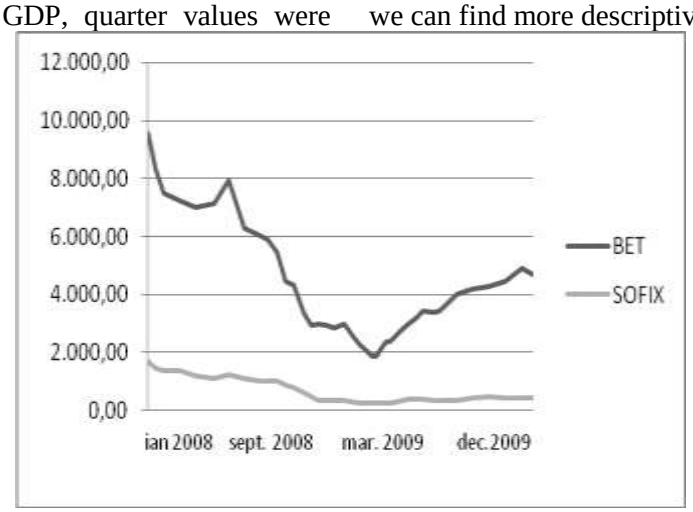

Fig. 1. *Evolution of BET and SOFIX*

BET minimum is found in March 2009 and stands at a value of 1887,14 points. The maximum of the considered period was in January 2008, at a level of 9567,16 points. Analysis based on this chart shows the decrease in "V" shape of this index. The evolution of the index is attributed to several factors, which taken together contributed to a decrease in the period under review, but also to the return of the last quarter of analysis.

The economy of Bulgaria was deeply affected by the global financial crisis, with a decreasing level of macroeconomic indicators. Moreover, the capital market represented by the Sofia Stock Exchange, presented a negative evolution, by a pronounced decrease, continued by maintenance of the SOFIX index at a constant level.

In the case of SOFIX index, there is a decrease of 84, 67% to the value of 261, 75 points registered in February 2009. This decrease remained at a constant level, and the stock exchange presented an upward trend after reaching a minimum value of 422, 8 points registered at the end of 2009.

3.2. Correlation between BET Index and SOFIX Index

3.2.1. Verifing the Link between Absolute Values of the Two Indices

To verify the relation between the values of the two indices we started from two premises:

- Premise A: There is a correlation between the value of BET and value of SOFIX;
- Premise B: There is a correlation between value of SOFIX and value of BET.

These premises were verified with econometric methods.

Following the analysis for the premise A of the two indices, we obtained the result in figure 1.

Dependent Variable: BET
Method: Least Squares
Date: 03/08/10 Time: 16:36
Sample(adjusted): 1 41
Included observations: 41 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
SOFIX	4.652083	0.235431	19.75983	0.0000
C	1311.244	176.3043	7.437390	0.0000

R-squared	0.909186	Mean dependent var	4213.654
Adjusted R-squared	0.906858	S.D. dependent var	2045.819
S.E. of regression	624.3677	Akaike info criterion	15.75891
Sum squared resid	15203567	Schwarz criterion	15.84250
Log likelihood	-321.0576	F-statistic	390.4508
Durbin-Watson stat	0.278560	Prob(F-statistic)	0.000000

Fig. 2. *Correlation BET-SOFIX*

After calculation we obtain the relationship equation:

BET = 1311,244 + 4,652 * SOFIX
(176, 30) (0, 2354)

Verifying the model:

- For the free term: the estimated value is 1311,244, with a deviation of 176,30 and the value of t-stat is 7,437390. Because the marginal level (p-value) is lower than 0, 05 (in our case is 0,000), we have to reject the null hypothesis that free term is nil. In conclusion the free term is significantly different from zero.
- For the influence term: the estimated value for β parameter is 4,652, with a deviation based on OLS of 0, 2354, and the t-stat value is 19,75983. Because the marginal level is 0,000, we admit the alternative hypothesis which assures us that the influence term is different from zero. By verifying the significance of obtained estimators by ordinary least squares method, the result is that all of them are different from zero. For the regression model, we can observe that the value of F-statistic, whose determination was based on the data, is of 390,4508, and the marginal level has a small value (0,000). This leads us to the conclusion that the model is correct. A qualitative indicator of this model is the coefficient of determination (R-squared). Values close to 1 of this coefficient show us that the variations of the "BET" variable are explained by the variations of the "SOFIX" variable. In our case, the value of the coefficient of determination is of 0,9091, which shows us that the presented model adjusts very well the data in the sample.
- For the premise B. After the analysis of this correlation between the value of the

SOFIX index and the value of the BET index, we obtained the results presented in figure 3.

After calculation we obtained the relationship equation:

SOFIX = - 199,6066 + 0,1954 * BET
(176,30) (0,009891)

Verifying the model we obtained the following conclusions: we reject the null hypothesis for the free term and for the beta term, because the marginal levels are reduced (0,0000). The model is formulated correctly because the coefficient of determination (R-squared) has a value close to 1.

Dependent Variable: SOFIX
Method: Least Squares
Date: 03/08/10 Time: 17:02
Sample(adjusted): 1 41
Included observations: 41 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
BET	0.195436	0.009891	19.75983	0.0000
C	-199.6066	46.22006	-4.318614	0.0001

R-squared	0.909186	Mean dependent var	623.8949
Adjusted R-squared	0.906858	S.D. dependent var	419.3206
S.E. of regression	127.9733	Akaike info criterion	12.58907
Sum squared resid	638709.8	Schwarz criterion	12.67266
Log likelihood	-256.0760	F-statistic	390.4508
Durbin-Watson stat	0.255742	Prob(F-statistic)	0.000000

Fig. 3. *Correlation SOFIX-BET*

3.2.2. Verifying the Link between the Percentage Evolution of the Two Indices

To study the possible causal relation between the values of the two indices, we calculated the evolution of the percentage variations. The results from figure 4 show us a trend evolution but with different variations. For clarifying this aspect, a further analysis is required.

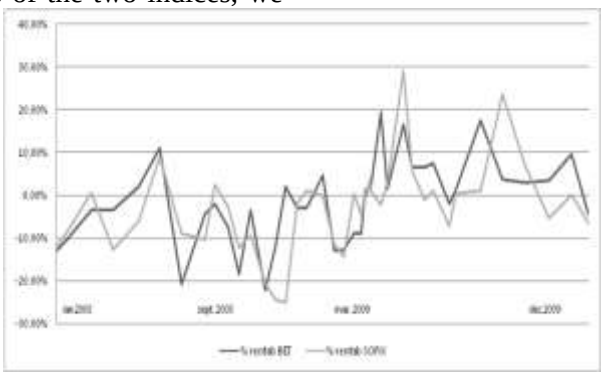

Fig. 4. *Percentage variation of BET and SOFIX*

Based on the percentage variations of the two indices, we calculated the possibility of interdependence between them. We tested both the possibility, that the SOFIX index influences the BET index, and the reverse influence.

In both situations there is a significant relationship between percentage changes of the two indices, the coefficient of determination having a value of 0,383251, presenting a significant linear regression from the statistics point of view.

Δ%Rsofix = a + b * Δ%Rbet
Δ%Rsofix = - 0,020226 +0,6688* Δ%Rbet
Δ%Rbet= a + b * Δ%Rsofix
Δ%Rbet=0,003577 + 0,572959 *Δ%Rsofix

3.3. Correlation between BET and SOFIX and International Stock Indices

Following the link above, we can say that there is a strong link between changes of BET and SOFIX indices. Thus, the stock exchange markets of the two countries have evolved in about the same manner. This link could be explained through the correlation of BET and S&P 500, and moreover by the correlation of SOFIX and S&P 500. We chose this index, because of the complexity and size, S&P 500 being frequently used in calculation by financial analysts.

3.3.1. Correlation BET – S&P500

First we tested the hypothesis of correlation between the percentage change of BET and percentage change of S&P 500, the results showing a coefficient of determination of 41,82%. We can say that over 40% of BET change is due to the evolution of S&P500. Investors at the Bucharest Stock Exchange, closely follow the evolution of international indices, substantiating their decisions of selling and buying.

Dependent Variable: RBET
Method: Least Squares
Date: 03/28/10 Time: 17:03
Sample(adjusted): 1 40
Included observations: 40 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RSP	0.995627	0.190478	5.226980	0.0000
C	-0.008739	0.011827	-0.738854	0.4645

R-squared	0.418260	Mean dependent var	-0.012987
Adjusted R-squared	0.402951	S.D. dependent var	0.096578
S.E. of regression	0.074625	Akaike info criterion	-2.303984
Sum squared resid	0.211616	Schwarz criterion	-2.219540
Log likelihood	48.07969	F-statistic	27.32132
Durbin-Watson stat	2.074305	Prob(F-statistic)	0.000007

Fig. 5. *Correlation -percentage change of BET – percentage change of S&P 500*

After the econometric calculation we obtained the equation:

Δ%Rbet = - 0,008 + 0,9957 * Δ%Rs&p

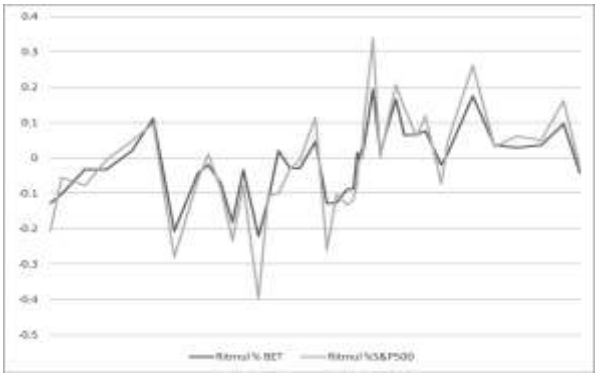

Fig. 6. *Graphic of percentage change of BET and S&P 500*

3.3.2. Correlation SOFIX – S&P500

Development of international financial markets stands in the case of new member states of the European Union. Thus, Bulgaria is noted for development of the stock market. Testing the correlation between the percentage change of SOFIX index and percentage change of S&P 500, we reached a coefficient of determination of 17,3%. This result shows a correlation between the two indices, but the amount is less than the coefficient calculated for BET. We can say that 17,3% of the evolution of SOFIX is attributable to the evolution of S&P 500 index.

Dependent Variable: RSOFIX
Method: Least Squares
Date: 03/28/10 Time: 17:04
Sample(adjusted): 1 40
Included observations: 40 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RSP	0.691969	0.245398	2.819781	0.0076
C	-0.025965	0.015237	-1.704079	0.0965

R-squared	0.173035	Mean dependent var	-0.028918
Adjusted R-squared	0.151273	S.D. dependent var	0.104358
S.E. of regression	0.096141	Akaike info criterion	-1.797299
Sum squared resid	0.351236	Schwarz criterion	-1.712855
Log likelihood	37.94598	F-statistic	7.951168
Durbin-Watson stat	1.611338	Prob(F-statistic)	0.007594

Fig. 7. *Correlation percentage change of SOFIX and S&P 500*

After the econometric calculation we obtained the equation:

$$\Delta\%Rsofix = -0{,}0259 + 0{,}6919 * \Delta\%Rs\&p$$

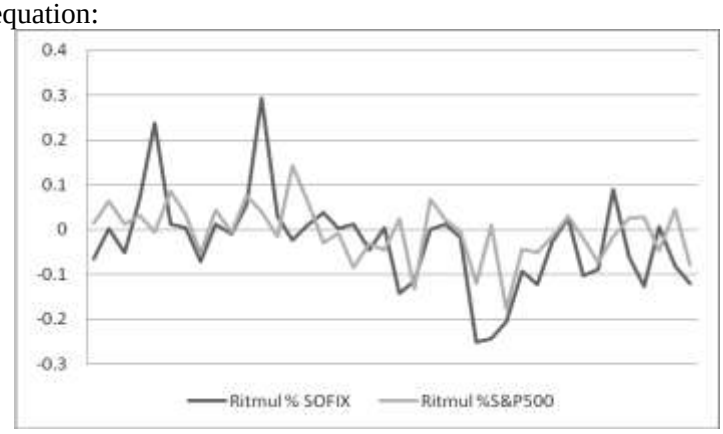

Fig. 8. *Graphic of percentage change of SOFIX – percentage change S&P 500*

3.4. Evolution of the Percentage Change of the GDP in Romania and Bulgaria

The Gross Domestic Product (GDP) is a macroeconomic measurement that reflects the sum of market value of all goods and services destined for final consumption, produced in all sectors of the economy in one country within a year. This can be calculated within a region or locality.

For a detailed analysis we compared the evolution of the GDP in Romania and Bulgaria with the levels in the European Union (EU 27), with the level of EU 25 (European Union except Romania and Bulgaria), and with the level of Euro zone (EU 16).

The analysis was developed taking into consideration the percentage changes of GDP between quarters, following eight periods (2008-2009).

In the period under review we can see a similar trend of change in percentages of GDPs in the two countries. Romania has a different value than the average in the European Union. Thus in quarter one of 2008, Romania's GDP increased by 6,6% from the previous quarter, while the EU average was down by 0,6%. Bulgaria's GDP increased in the same period by 3,7%.

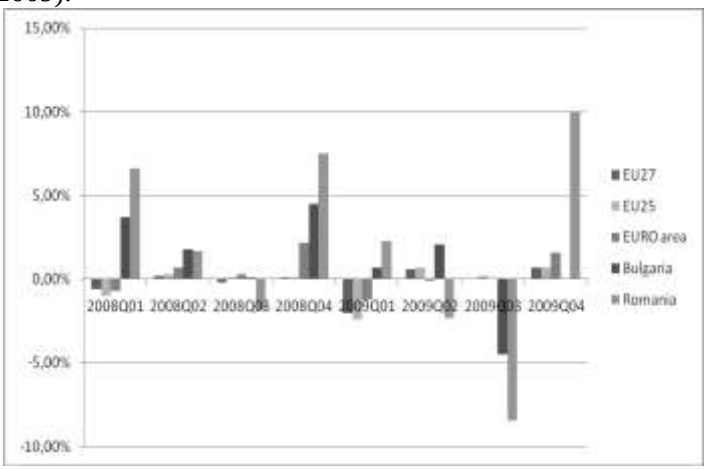

Fig. 9. *Comparative evolution of GDP's percentage changes*

The Gross Domestic Product in Romania presents fluctuations of considerable increase/decrease, showing economic instability. Thus in the third quarter of 2008, the GDP decreased by 1,8%, and in the fourth quarter there can be seen an increase by 7,5%. The year 2009 marked by the gradual decrease of GDP between quarters, the third quarter presenting a decrease of 8,5%.

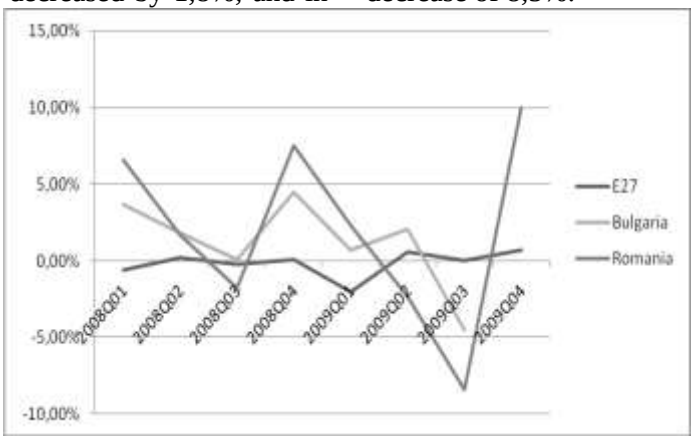

Fig. 10. *Comparative fluctuations of percentage changes of GDP*

3.5. Relation between Percentage Change of Indices and Changes in GDP

Macroeconomic measurements are used by investors for making some decisions of buying or selling. Such information is essential to verify economic climate, and future condition of financial markets. However, one problem is emerging regarding the time. A hypothesis that changes of GDP in one quarter would be related to the change of the stock index in the same quarter could be incorrect. Investors know the values of macroeconomic indicators at the end of the quarter and fundament their future decision on these values.

Another method might be that of checking the variation of stock indices based on forecasted values of macroeconomic indicators.

We stopped to check causality between previous values of increase / decrease of GDP with the current values (current quarter) of stock indices, because of the lack of relevant data on quarterly GDP's growth forecast in both countries.

In the table below, comparative values of percentage changes of indices and gross domestic product for each country are presented.

Quarter comparative %change BET and PIB Table 1

Romania	'07Q4	'08Q1	'08Q2	'08Q3	'08Q4	'09Q1	'09Q2	'09Q3	'09Q4
%change BET	0,71%	-22,19%	-7,18%	-32,41%	-32,96%	-20,66%	41,62%	28,00%	6,47%
GDP	9,00%	6,60%	1,70%	-1,80%	7,50%	2,30%	-2,30%	-8,40%	10,00%

Romania is noted for different and uncorrelated values. For 2008, the indices show negative value, having a pronounced decrease. Comparing the percentage change of gross domestic product in the fourth quarter of 2007, with the percentage change of the indices, we see a significant difference.

For example, in the case of Romania, while the gross domestic product increased by 9% in the fourth quarter of 2007, we can see a pronounced decrease of BET for the first quarter of 2008. Comparing quarterly progress, and more specifically the quarterly evolution of BET with the GDP change from the previous quarter, we can see notable differences. These differences can be quantified in order to see more precise information about the level of GDP's and level of stock indices.

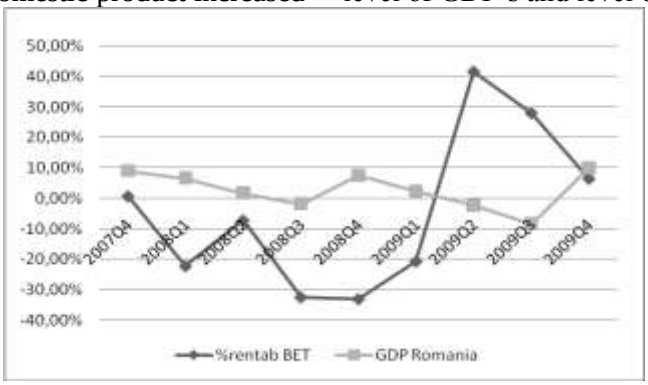

Fig. 11. *Graphic- comparison between percentage change of BET and GDP of Romania*

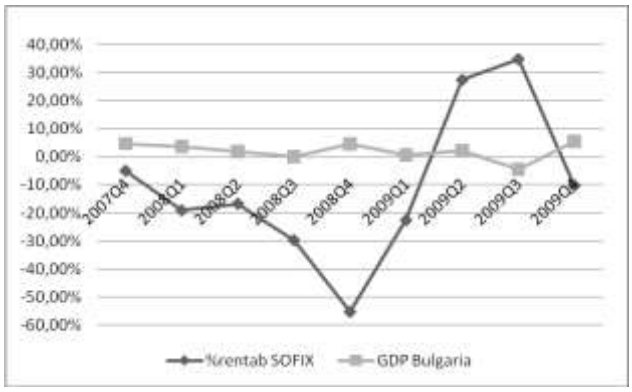

Fig. 12. *Graphic- comparison between percentage change of SOFIX and GDP of Bulgaria*

Quarter comparative %change SOFIX and PIB Bulgaria Table 2

Bulgaria	'07Q4	'08Q1	'08Q2	'08Q3	'08Q4	'09Q1	'09Q2	'09Q3	'09Q4
%change SOFIX	-5,03%	-19,14%	-16,78%	-29,78%	-55,33%	-22,61%	27,42%	34,80%	-10,27%
GDP	4,70%	3,70%	1,80%	0,10%	4,50%	0,70%	2,10%	-4,50%	5,50%

4. Conclusions

Following the presentation of study results, several conclusions emerge.

The case of new EU member states, Bulgaria and Romania, is similar. Both countries have a similar evolution of major stock indices and similar change of the gross domestic product.

Thus, the BET and the SOFIX indices, show a higher level of correlation especially through links with major international stock indices. As shown, the link with the S&P 500 is visible, and in case of Bucharest Stock Exchange is very pronounced. The level of these relations can be explained by the way in which investors buy and sell shares on stock exchanges of both countries. By the opening of financial markets, the information became available. Furthermore, the investors from the two markets are interested in investing on international markets, due to the dynamics of these markets. Based on the results presented above, arises the relative relation between stock indices and gross domestic product. However, one observation must be made. Given the complexity of economic climate, we can admit the initial hypothesis: relation between changes of GDP and changes of stock indices. Investors in the stock market follow the developments of companies in their portfolio both for increasing it, but also by lowering the portfolio by selling the shares that underperform. These orders for sale and purchase are closely related to the evolution of macroeconomic indicators such as gross domestic product, which shows national growth and hence economic climate. Foreign investor may be interested, based on their position on the market (bear or bull) of decrease/increase in share.

The time when presenting the values of macroeconomic indicators, can be the basis for upcoming decisions, combined with financial statements of companies from investors' portfolios and other relevant information about the companies.

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