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## STUDY ON CORRELATION BETWEEN STOCK MARKET PERFORMANCE AND ECONOMIC GROWTH

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### Abstract

During the last years there have been a lot of studies on the relation between stock market development and economic growth, this subject being intensively debated both at the level of a country and in a region. The purpose of this article is to determine whether, at Romania level, there is any relation between the capital market and economic growth during the period 2005 – 2018, through the Granger causality test and multiple regression, the frequency of data used being quarterly. The results confirm that there is a direct and positive relationship between them, the performance of the capital market being few influenced by the economic growth and vice versa.

**Keywords:** *economic growth, capital market development, stock market, multiple regression, Granger causality test.*

**JEL Classification:** E44; G14; D53; O40.

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### Introduction

In theory, the stock market is classified as an accelerator of economic growth, which stimulates the mobilization of domestic economies. Although there are many studies on this subject, few of them analyse a single country, the focus being on a group of countries or individual undeveloped countries, the developing countries being less evaluated. There are different opinions regarding the impact of the stock market on the economy, and over time, the results can change.

Theoretical research studies clearly conclude that the development of the stock market contributes in some way to the stimulation of the nation's economic growth. Empirical evidence supports this claim. Petru-Ovidiu Mura and Flavia Barna (2010), for example, argue that the development of the stock market is positively correlated with the progress of the economy, the strongest correlation being between the economic growth and the capital market, suggesting that the financial development follows the economic growth, the economic growth determining financial institutions to innovate and evolve.

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The stock market plays a significant role in the economy. The distribution of capital to corporate institutions contributes to the stimulation of economic activities in any country. Due to this stimulating role of the stock market in the economy, government authorities closely monitor the activities carried out on the stock market. This is favored by the large number of studies whose results claim that the development of the stock market contributes to economic growth (Ioana Maria Dobjanschi, 2018). This is due to the fact that the capital market offers liquidity to companies. When companies want to raise capital to expand their business, they can usually issue shares on the market. Nowadays, the capital market plays an important role in accessing capital funds. Thus, the stock market is important both in terms of industry and investors.

In this paper we intend to analyse the impact of the capital market on economy in Romania, the analysed period being 2005 - 2018 (quarterly data), having as main objective the identification if there is a relationship between the capital market and economic growth.

We can also see if:

- The stock exchange market can be useful for assessing the economic performance of the nation;
- The economic growth influences the development of the capital market

In the data analysis we will use the Granger causality test to identify the long-term relationship and regression analysis, the least squares method, using Eviews as an econometric program.

Further we will compare the results obtained in our research with the conclusions of the studies carried out on the same topic.

We will also make an analysis of the evolution of the indicators over the whole period analysed and a graphical representation of them.

## **1. Review of the scientific literature**

In the financial literature on endogenous growth, the relationship between capital market development and economic growth has been a subject approached by several researchers. Various studies have been carried out over the years, only a few of them being mentioned in this paper.

The causal relationship between stock market development and economic growth was examined by Vazakidis and Adamopoulos (2009) for France for the period 1965-2007. This study involved cointegration, the Granger causality test, and the vector error correction model; the results show that there is a positive association between economic progress and stock market development and, at the same time, the interest rate has a negative effect on the stock market development.

Nowbutsing and Odit (2009) analysed the relationship between the stock market and the economic growth in Mauritius, taking into account data for 17 years. The study analyses the two variables for the development of the stock market, namely the size and liquidity of the market. The study concluded that there is a positive relationship between economic growth and stock market development over a long period of time, as well as a short one.

Petru-Ovidiu Mura and Flavia Barna (2010) analysed the link between the development of the capital market and the economic growth in Romania using a regression function. The results show that the stock market development is positively correlated with the progress of the economy, with a feedback effect, but the strongest connection is between economic growth and the capital market, suggesting that financial development

follows economic growth, economic growth causing financial institutions to innovate and to evolve.

Simion Dalia (2015) realized a study on this topic, for a period of 18 years (1994 - 2012), using the multiple regression model, the country analysed being Romania. The variables included in the model are: GDP growth (dependent variable), stock market capitalization, domestic credit, turnover of traded shares, loan rate and monetary growth rate (independent variables). The results showed that there is a direct relationship between the growth of the gross domestic product and the market capitalization, as well as between the growth of the gross domestic product and the credit to the banking sector. Also, it was found that there is an indirect relationship between the growth of GDP and the rate of money supply and the lending rate, which means that an increase of the loan rate determines the decrease of GDP.

Darko Lazarov, Emilija Miteva-Kacarski and Krume Nikoloski (2016) conducted a study examining the effects of stock market development as an integral part of a financial system on economic growth for a group of 14 transition countries in Central and South - East European region between 2002-2012. The variables included in the model are the rate of economic growth as a rate of real GDP per capita, the investment rate measured as a ratio between the formation of fixed capital and GDP, the level of openness of trade (the sum of imports and exports as a percentage of GDP), the annual inflation rate and the net inflows of foreign direct investments. Estimated results suggest that stock market development is positively associated with economic growth. Most of the estimated results related to growth factors (net inflows of foreign direct investments, degree of openness of trade) are in concordance with the main findings of the empirical studies carried out on this topic, except for the development of the banking sector, which is not a determinant factor of growth.

Ioana Maria Dobjanschi (2018), analysed the relationship between the stock market and the growth of the economy on a group of 30 developed and developing countries between 2006 and 2016. An analysis of panel data using fixed effects tests was performed. and variables, by the method of estimating Ordinary Least Squares (OLS), the variables included in the model being the gross domestic product as a dependent variable, and, as independent variables, credit in the banking sector and stock market capitalization. It was concluded that there is a direct relationship both between the evolution of GDP and the capitalization of the stock market and between the evolution of GDP and credit in the banking sector.

The studies mentioned above have contributed to the choice of the variables we used in the study, as well as the analysis model.

## **2. Economic growth and performance in Romania**

In this section we aim to analyse the quarterly performance of macroeconomic variables in Romania, between 2005 and 2018. The study includes analysis of gross domestic product, private consumption, total government spending, total investments, foreign direct investment, credit provided by banks in private sector and domestic savings.

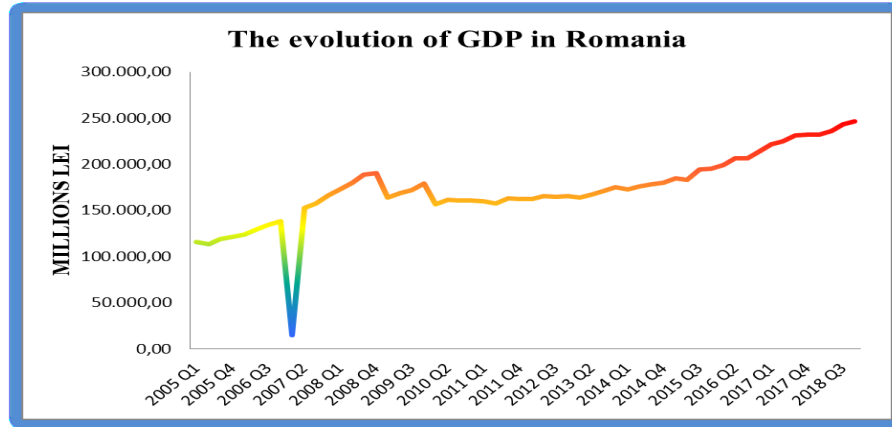
### **2.1 Analysis of the gross domestic product (GDP)**

One of the ways to indicate the economic performance of a country is to analyse the gross domestic product. This it increased from 115108.82 million lei in 2005 to 246056.86

million in 2018, the growth being 2.13 times over the period. The highest growth rate is observed in the third quarter of 2015 (109.0582%), and the lowest in the first quarter of 2007 (99.2915%).

In order to measure the growth rate volume (growth index), the GDP at current prices is evaluated according to the prices of the previous quarter, and the changes in the calculated volume are imposed at the reference level of a quarter; this is called a chain-linked series. As a result, price movements will not change the growth rate.

Graph 2.1: The evolution of GDP in Romania



Source: processing data in Excel

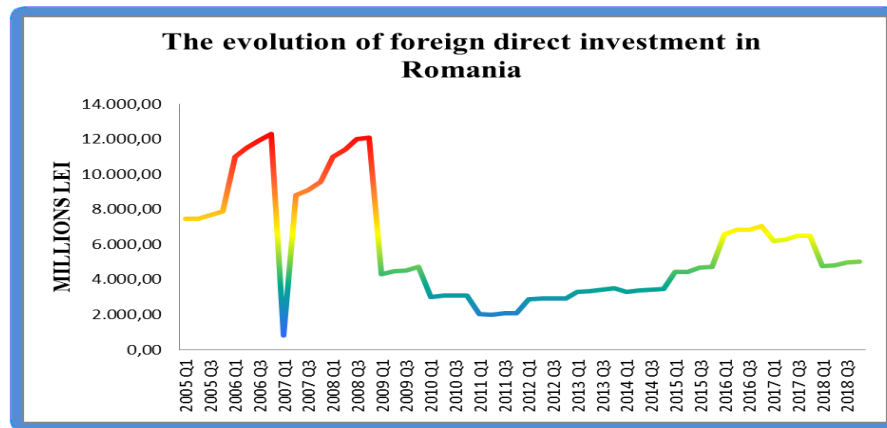
The graph indicates that there is an increasing average trend of the evolution of the gross domestic product since 2009, in 2007 decreasing substantially, this year being marked by the beginning of the economic crisis.

## 2.2 Analysis of foreign direct investments

The representative chart of the foreign direct investments shows that they had a similar trend with the level of the domestic production, registering a consistent decrease at the beginning of 2009, in the following period having an average tendency.

The highest growth rate was observed in the second quarter of 2007 with 109,4932 percent, the lowest being observed in the first quarter of the year 99,06819 percent.

Graph 2.2: Evolution of foreign direct investments in Romania



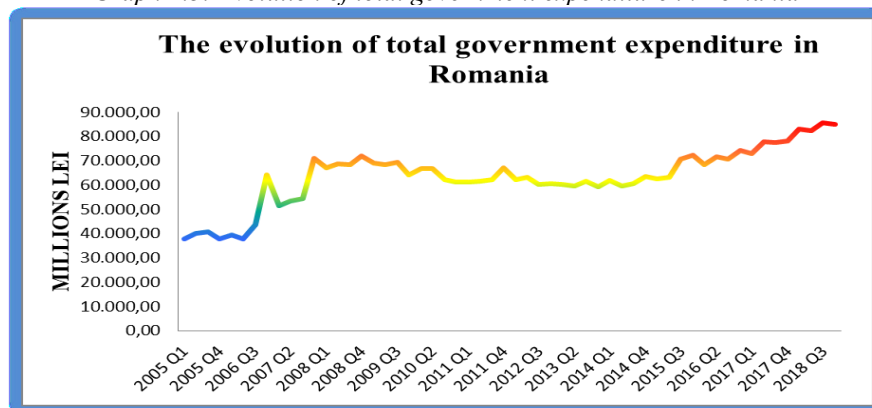
Source: processing data in Excel

### 2.3 Analysis of total government expenditure

The highest level of expenses was recorded in the third quarter of 2018 (85,570.79 million lei), and the lowest in the last quarter of 2005 (37889.69 million lei).

The graphical representation of this variable is the next:

Graph 2.3: Evolution of total government expenditure in Romania



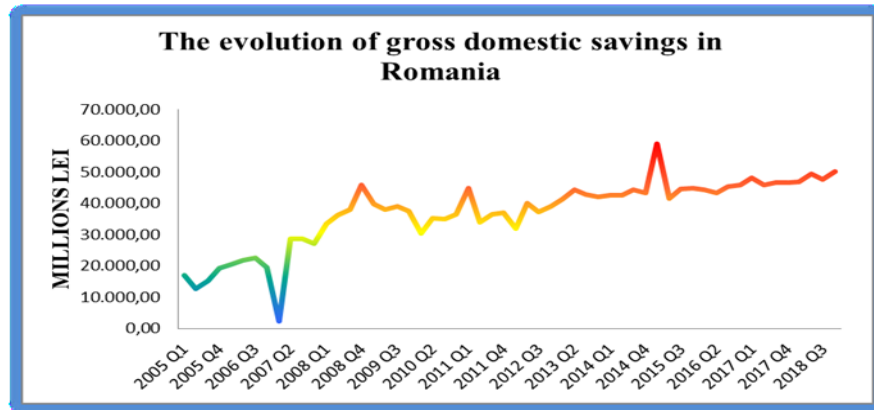
Source: processing data in Excel

We find that there is a rising - decreasing trend in the evolution of total government spending, the highest variation being recorded at the beginning of 2007.

### 2.4 Analysis of gross domestic savings

The following variable analyzed is represented by the gross savings, the graph of its evolution being illustrated in the following graph:

Graph 2.4: Evolution of gross domestic savings in Romania



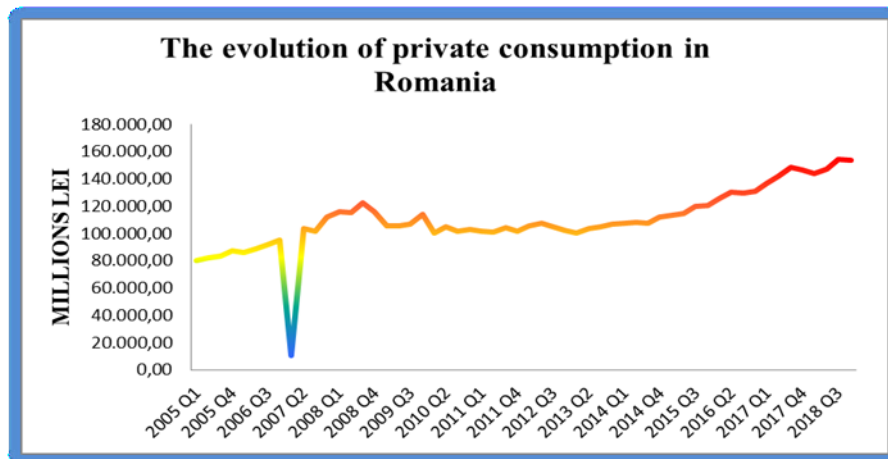
Source: processing data in Excel

As a conclusion of the obtained results, we can say that the savings show fluctuations throughout the analysed period, the smallest value (2237.76 million lei) registering in the first quarter of 2007, and the highest (59011.64 million lei) in first part of 2015.

### 2.5 Analysis of private consumption

The smallest value of private consumption was registered (10171.28 million lei) in the first part of 2007, and the highest (154001.09 million lei), in the third quarter of 2018.

Graph 2.5: The evolution of private consumption in Romania



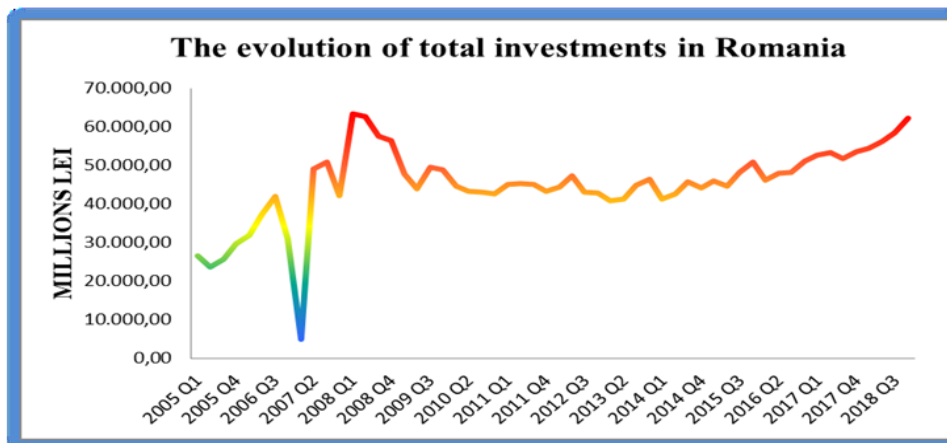
Source: processing data in Excel

Consumption, as expected, follows the same trend as the gross domestic product, the dependence between them being visible by analysing the graphs of the two variables.

**2.6 Analysis of total investments**

The total investments had in the first part of 2007 the smallest value (4904.27 million lei) of the entire period, and the highest was recorded in the first quarter of 2008.

*Graph 2.6: Evolution of total investments in Romania*



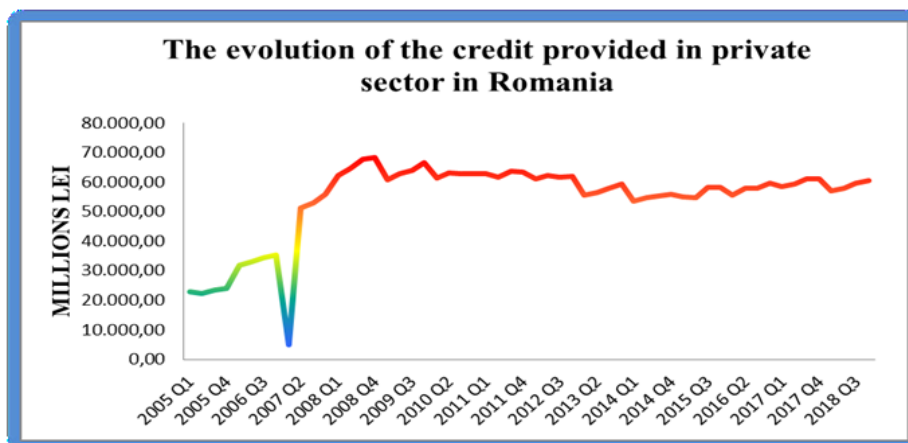
Source: processing data in Excel

In terms of graphical evolution, this variable follows the trend of gross domestic production.

**2.7 Analysis of the banking sector**

The determining variable of the banking sector, in our study is represented by the credit provided by banks in private sector.

*Graph 2.7: The evolution of the credit provided by banks in private sector*



Source: processing data in Excel

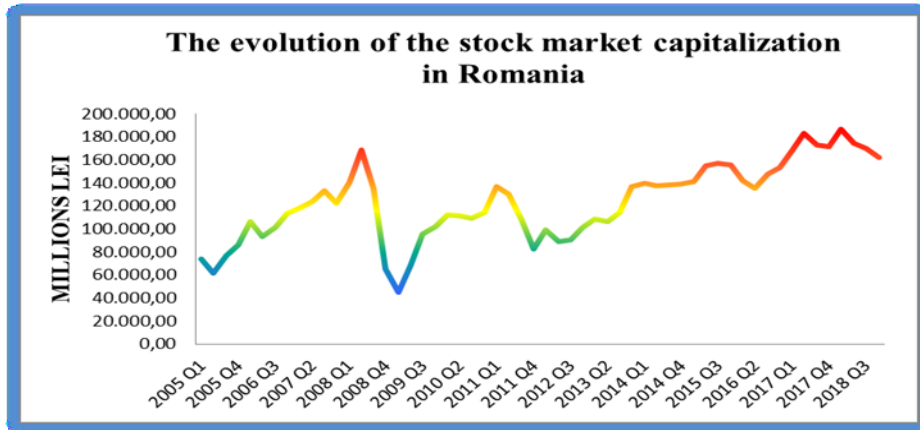
The credit values ranged between 4895.47 million lei (2007 Q1) and 68326.03 million lei (2008 Q4), the variation index having values between 99.13791% and 109,4932%.

### 3. Growth and performance of the stock market

#### 3.1 Stock market analysis

One of the ways to indicate the development of the stock market is by evaluating its capitalization. The market capital is the product between the sum of all the shares traded by the companies and the current prices of the shares. The index variation of this variable is between 99.48301% (2008 Q4) and 100.5244% (2009 Q2).

Graph 3.1: Evolution of stock market capitalization in Romania



Source: processing data in Excel

The graphical representation of the capitalization shows that it has periods of growth followed by periods of decline, the smallest value being recorded in the first quarter of 2009 (44720.17 million lei), and the highest in the first quarter of the last year analysed (186597.25 million lei).

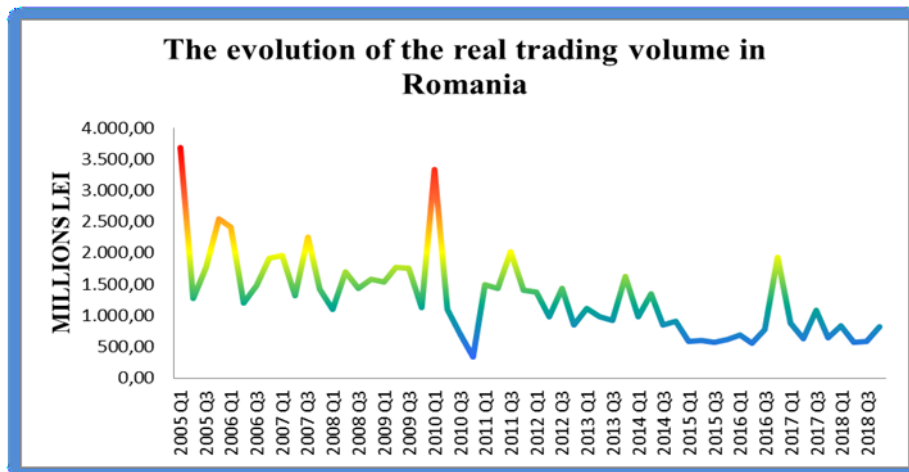
The huge volume of market capitalization indicates that there is a large public participation in the capital market. This shows that there is a high return on equity investments over other sectors.

#### 3.2 Analysis of the actual trading volume

To analyze the liquidity of the market, we use as an explanatory variable the trading volume, which has values between 3686.7 million lei (2005 Q1) and 344.06 million lei (2010 Q4).



Graph 3.2: Evolution of the real trading volume in Romania

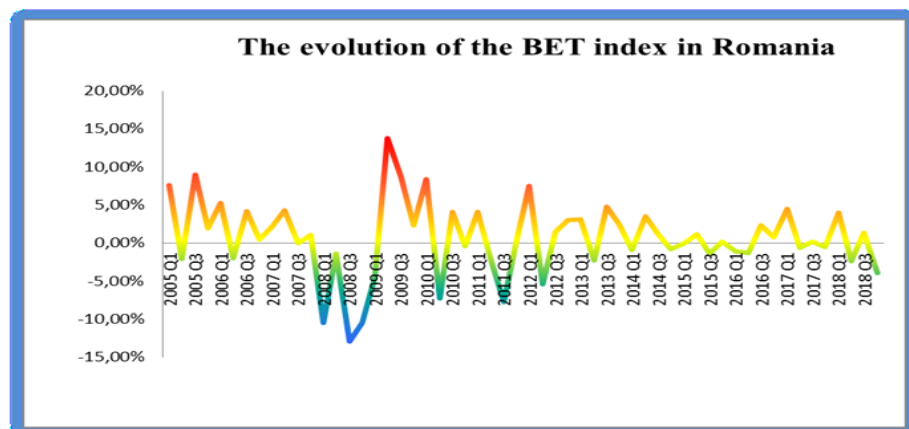


Source: processing data in Excel

From the graphical representation of the variable it shows that it has a decreasing trend, having fluctuations over the 14 years analyzed.

### 3.3 BET stock index analysis

Graph 3.3: The evolution of the BET index in Romania



Source: processing data in Excel

During the studied period, the BET index dropped sharply in the third quarter of 2008 and increased sharply in the second quarter of 2009, its average being around 0.

This unexpected rise and fall in the demand of shares indicates that there are risks associated with investments in the stock market.

#### 4. Research methodology

This paper aims to determine the correlation between the performance of the capital market and the economic growth in Romania, between 2005 and 2018, using quarterly data.

The data was collected from the following sources: Bucharest Stock Exchange, Eurostat, World Bank, European Central Bank, etc.

##### 4.1 Indicators used in the model

*4.1.1 Stock market indicators can be grouped into three categories:*

1. Market size indicators: market capitalization in nominal or real values;
2. Liquidity indicators: trading volume in real or nominal values, number of shares traded, turnover;
3. Reference indicators: BET index.

The data for the stock market indicators were collected from the website of the Bucharest Stock Exchange in nominal monthly values, subsequently being calculated as quarterly values and deflated with the average quarterly index of consumer prices to eliminate the effect of inflation.

*4.1.2 Macroeconomic indicators*

The macroeconomic indicators used are the following: gross domestic product, private credit (representative for the development of the banking system), gross domestic savings and investments, private consumption, government spending and foreign direct investment.

In our model we will use their real quarterly values. The data were collected from the Eurostat website at face value, then deflated using the quarterly average consumer price index.

##### 4.2 Data analysis

The data used in the model are noted as follows:

PIBR = the real value of the gross domestic product, expressed in millions of lei;

CAP = real market capitalization, as a percentage of GDP;

VOLR = the real trading volume, expressed in logarithmic values;

CA = the ratio between the traded volume and the market capitalization;

INVTOT - total investments expressed as a percentage of GDP;

CONSUM - private consumption expressed as a percentage of GDP;

ECONOMISIRE - the value of the total savings expressed as a percentage of GDP;

CREDITP = the amount of credit granted by banks to the private sector, expressed as a percentage of GDP;

ISD = foreign direct investment, expressed as a percentage of GDP;

CH\_GUV\_TOT = total government expenditure expressed as a percentage of GDP.

#### 4.2.1 Descriptive statistics

Table 4.2.1: Descriptive statistics

	L_PIBR	CAP	L_VOLR	BET	CH_GUV_TOT	CONSUM	CREDITP	ECONOMISI...	INVTOT	ISD	CA
Mean	25.86389	0.704192	20.86871	0.006544	0.420741	0.642018	0.316241	0.211556	0.264143	0.035596	0.008067
Median	25.85578	0.719704	20.87204	0.006233	0.357921	0.634500	0.324199	0.216714	0.259000	0.025454	0.006993
Maximum	26.22883	0.940553	22.02800	0.137200	3.538011	0.724000	0.393061	0.320562	0.367000	0.089098	0.018097
Minimum	25.39808	0.274056	19.65631	-0.129470	0.294225	0.604000	0.198078	0.113118	0.209000	0.012920	0.002824
Std. Dev.	0.197286	0.127630	0.493462	0.048907	0.425318	0.029790	0.059174	0.037336	0.033198	0.022754	0.003527
Skewness	-0.297045	-1.221943	0.009578	-0.316935	7.218930	1.158327	-0.357345	-0.227539	1.043507	1.102252	1.161476
Kurtosis	2.927346	3.278874	2.678343	4.013265	53.42115	3.405734	2.031539	3.846803	3.934734	2.893082	3.652646
Jarque-Bera	0.835851	22.17309	0.242271	3.333160	6418.403	12.90686	3.380297	2.156400	12.20183	11.36630	13.58478
Probability	0.045841	0.000015	0.038859	0.188892	0.000000	0.001575	0.018449	0.034020	0.002241	0.003403	0.001122
Sum	1448.378	39.43476	1168.648	0.366483	23.56150	35.95300	17.70952	11.84716	14.79200	1.993402	0.451785
Sum Sq. Dev.	2.140693	0.895913	13.39276	0.131553	9.949237	0.048811	0.192585	0.076669	0.060615	0.028476	0.000684
Observations	56	56	56	56	56	56	56	56	56	56	56

Source: processing data in eviews

The table above presents the descriptive analysis of the data on the real gross domestic product in logarithmic values (l\_pibr), government spending (ch\_guv\_tot), total savings (economisire), foreign direct investments (isd), total investments (invtot), private consumption (consum), the credit provided by banks in private sector (creditp), market capitalization (cap), turnover (ca), the actual trading volume in logarithmic values (volr) and the BET index (bet) for 14 years. The table represents the average value, the standard deviation, the minimum and maximum sum, the skewness coefficient, the series kurtotics and the Jarque-Bera test of the selected variables.

In the case of normal distribution:

- Asymmetry coefficient (skewness) = zero - the normal distribution is symmetrical - Kurtotica (kurtosis) is 3.
- When this indicator has a value greater than 3, then the distribution is leptokurtotic, and when it is less than 3 then the distribution is platikurtotic.

When analyzing kurtotics, it is observed that some variables have leptokurtotic distribution (BET, CA, CAP, CH\_GUV\_TOT, CONSUMPTION, ECONOMISING, INVTOT), and others have a platikurtotic distribution (CREDITP, ISD, L\_VOLR, L\_PIBR).

#### 4.2.2 Correlation analysis

The variables selected for this study include real gross domestic product in logarithmic values (l\_pibr), government expenditure (ch\_guv\_tot), total savings (economisire), foreign direct investments (isd), total investments (invtot), private consumption (consum), credit provided by banks in private sector (creditp), market capitalization (cap), turnover (ca), actual trading volume in logarithmic values (volr) and BET index (bet). First, an attempt is made to determine the relationship between these variables. For this purpose, the correlation was calculated and presented in the following table in the form of the correlation matrix.

The correlation analysis presented in the following table indicates the fact that all variables included in the analysis contribute statistically significant to the long-term

relationships between GDP and the rest of the variables, with one exception, the BET index.

Table 4.2.2 Correlation

	L_PIBR	CAP	CA	L_VOLR	BET	CH_GUV_TOT	CONSUM	CREDITP	ECONOMISI...	INVTOT	ISD
L_PIBR	1.000000	0.984310	0.915583	0.999590	0.132069	0.704707	0.998655	0.983207	0.985637	0.992085	0.842560
CAP	0.984310	1.000000	0.911100	0.983463	0.136705	0.707230	0.983714	0.960479	0.966221	0.978419	0.845888
CA	0.915583	0.911100	1.000000	0.924007	0.228583	0.716521	0.928392	0.882610	0.867580	0.915193	0.892342
L_VOLR	0.999590	0.983463	0.924007	1.000000	0.139096	0.708905	0.999181	0.983229	0.983105	0.992937	0.850088
BET	0.132069	0.136705	0.228583	0.139096	1.000000	0.120016	0.136556	0.105629	0.108603	0.101665	0.082637
CH_GUV_TOT	0.704707	0.707230	0.716521	0.708905	0.120016	1.000000	0.714286	0.706735	0.671178	0.728919	0.641823
CONSUM	0.998655	0.983714	0.928392	0.999181	0.136556	0.714286	1.000000	0.979037	0.977429	0.992006	0.862359
CREDITP	0.983207	0.960479	0.882610	0.983229	0.105629	0.706735	0.979037	1.000000	0.984601	0.988489	0.788157
ECONOMISI...	0.985637	0.966221	0.867580	0.983105	0.108603	0.671178	0.977429	0.984601	1.000000	0.977867	0.766770
INVTOT	0.992085	0.978419	0.915193	0.992937	0.101665	0.728919	0.992006	0.988489	0.977867	1.000000	0.854745
ISD	0.842560	0.845888	0.892342	0.850088	0.082637	0.641823	0.862359	0.788157	0.766770	0.854745	1.000000

Source: processing data in eviews

### 4.3 Causality test

The rule of decision of the causality test affirm that if the value of the probability of estimation is greater than the level of probability of 10% (0,1) we cannot reject the null hypothesis, and if the probability is less than 10%, we reject the null hypothesis, between the variables exist a causal relationship.

Following the obtained results we observe that there is a unidirectional relationship between: gross domestic product and the actual trading volume, the actual trading volume and capitalization, capitalization and BET, total investments and capitalization, direct foreign investments and capitalization, consumption and turnover, turnover and government spending, turnover and private credit, turnover and total investments, consumption and trading volume, trading volume and credit, total investments and BET index, foreign direct investments and BET, government consumption and expenditure, private consumption and credit, total consumption and investment, direct foreign investment and consumption, foreign direct investment and private credit, foreign direct investment and government spending.

It was found that there is a bi-directional relationship between market capitalization and gross domestic product, turnover and gross domestic product, turnover and foreign direct investment, consumption and gross domestic product, government spending and GDP, GDP and total investment, GDP and credit , total investment and credit, foreign direct investment and credit, which means that a change in one of the variables leads to a change in the other variable and vice versa.

Concluding the results obtained the stock market influences the gross domestic product in the long term.

### 4.4 Regression analysis

To verify the relationship between gross domestic product and stock market capitalization we will perform a regression analysis, using the least squares method in Eviews.

In order to perform the regression analysis, all variables must be stationary. As a result, the first difference series of the integrated variables will be used.

The variables used are presented down as follows:

- DL\_PIBR - the first difference of the L\_PIBR series;
- CAP - Market capitalization expressed as a percentage of GDP;
- CA - the ratio between traded volume and capitalization;
- VOLR - the real trading volume;
- DCONSUM - The first difference of the CONSUM series;
- DECONOMISIRE - The first difference of the ECONOMISING series;
- CH\_GUV\_TOT - total government spending;
- DISD - the first difference of the ISD series;
- DINVTOT - the first difference of the INVTOT series;
- DCREDITP - the first difference of the CREDITP series.

We will estimate 2 regression models using GDP as a dependent variable, analyzing both the relationship between stock market indicators and economic growth and the relationship between macroeconomic indicators and stock market indicators.

The regression models are as follows:

1.  $DL\_PIBR = \alpha + \beta_1 * CAP + \beta_2 * L\_VOLR + \beta_3 * CA$
2.  $DL\_PIBR = \alpha + \beta_1 * CAP + \beta_2 * CA + \beta_3 * L\_VOLR + \beta_4 * CH\_GUV\_TOT + \beta_5 * DCREDITP + \beta_6 * DINVTOT + \beta_7 * DISD + \beta_8 * DECONOMISIRE + \beta_9 * DCONSUM$

Table 4.1 Results of the estimated regression models

<i>independent variable</i> → <i>dependent variable</i> ↓	ECUATION 1		ECUATION 2	
	DL_PIBR		DL_PIBR	
	Coefficient	Prob	Coefficient	Prob
CAP	0,054378**	0,0468	0,048819**	0,0403
L_VOLR	7,097301**	0,0497	10,26615**	0,0177
CA	0,050666**	0,0385	0,041113***	0,0016
CH_GUV_TOT			0,055573**	0,0355
DISD			1,398636	0,0293
DINVTOT			0,311152	0,0264
DECONOMISIRE			0,285673**	0,0244
DCONSUM			0,948547**	0,0323
DCREDITP			0,656967**	0,0468
<b>R - Squared</b>	<b>10,52%</b>		<b>59,71%</b>	
<b>Durbin- Watson</b>	<b>1,48</b>		<b>1,37</b>	
<b>Prob ( F-statistic)</b>	<b>0,01258</b>		<b>0</b>	
<i>Statistical significance</i>	<i>*p&lt;0,1 ; **p&lt;0,05; ***p&lt;0,01.</i>			

Source: processing data in eviews

The validity of the first model is confirmed by the values of the probabilities of the F and t - statistical tests, which have values lower than the significance threshold of 5%, but

the stock market variables explain only 10.52% of the variation of the income, being able to conclude that the national income is very little influenced of the stock market.

In the case of the second regression, the dependent variables explain 59.71% of the variation of the gross domestic production, the model being statistically significant, taking into consideration the analysis of the F-statistical test, which has a value very close to 0, an increase of the GDP with a unit generating the growth of all the factors included in the equation. It is found that between the variables there is a direct and positive relationship.

## 5. Conclusions

Due to the study regarding the correlation between the performance of the capital market and the economic growth between 2005 and 2018 in Romania, we can say that between the development of the capital market and the economic growth there is a bi-directional relationship, a result obtained from the Granger causality test. which explains the causal relationship between two long-term variables. The results obtained coincide with the findings of previous studies by Hondrayiannis, Lolos and Papapetrou (2005) in the case of Greece and theirs Nieuwerburgh, Buelens and Cuyvers (2006) in the case of Belgium.

The results of the regression analysis concluded the following:

- Between the market capitalization, the actual trading volume, the turnover (the ratio between trading volume and capitalization) and the gross domestic product there is a direct and positive relationship, the economic growth being influenced by a very small percentage of the market capitalization (10.52%) ;
- The evolution of the gross domestic product is positively and directly influenced by the evolution of consumption, total government spending, foreign direct investment, total investment, credit but also capitalization.
- The results show that the representative variables of the capital market change in the same direction as the gross domestic product, the coefficients of the indicators having a positive value.

These results are in concordance with the results of the study by Darko Lazarov, Emilija Miteva-Kacarski and Krume Nikoloski (2016), which examines the effects of the stock market development as an integral part of a financial system on economic growth for a group of 14 countries in transition in South-East in Central Europe in the period 2002-2012. Estimated results suggest that stock market development is positively associated with economic growth.

The large number of studies, including this study, considers that the financial system based on the capital market is advantageous for the country. Therefore, the lack of a well-developed stock market would be a disadvantage for any country, since the source of capital financing is essential for an economy which wants to grow. Young and developing companies can obtain financing through these sources.

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