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Correlation between BET Index Evolution and the Evolution of Transactions' Number – Analysis Model

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Abstract *The Bucharest Exchange Trading (BET) index and the total number of the transactions displayed between January and September 2015 by the The Bucharest Stock Market represents the topic of the present approach in regard to the intensity of the relation between them, using the simple regression function as mathematical mean. More studies were completed with the aim of establishing the relevance of these two variables, be it dependant or independent. The correlation between the evolution of the BET index and the number stock transactions was important for the present study, as well as the correlation between the total number of transactions and the stock transaction number that revealed itself as very powerful. Simple linear regression model is a relatively easy and very effective way to establish the correlation between two economic indicators. Thus, the use of this analysis method in economic research allows determining how a given economic variable, defined as independent determines the evolution of the second results indicator.*

Key words Simple regression, endogenous variable, explanatory variable, determination quotient, statistic tests

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1. Introduction

In Romania, the largest part of capital market transactions are conducted through the Bucharest Stock Exchange, so conclusions about developments of this institution can be extended to the entire Romanian capital market. Analysis of results the Bucharest Stock Exchange activity from the last period revealed an increase in capital investments from local and international investors. In these circumstances, it is necessary to identify the influence of the main Romanian capital market index - BET - on another important indicator, namely the evolution of transactions' number in financial instruments traded by the Bucharest Stock Exchange. BET Index is a price index weighted by free-float capitalization and reflects the overall trend of the shares issued by the top ten companies, ranked according to their liquidity. Following the quarterly adjustment in September 2015, the component companies whose shares are taken into account to determine the BET are: Property Fund 19.98%; OMV Petrom SA 19.92%; Banca Transilvania SA 19.25%; Romgaz SA 12.30%; BRD - Groupe Societe Generale SA 10.54%; Electrica SA 7.21%; Transgaz SA 5.25%; Transelectrica 3.30%; Nuclearelectrica SA 1.41%; Bucharest Stock Exchange SA 0.84%.

2. Literature review

Econometric regression model and actual possibilities for its use in economic analysis and also in the capital market analysis, were analyzed in detail in the specialty literature. Note in this regard the work of researchers such as Dacunha-Castle and Duffo (1983), DeGroot (2004), Florens, Mouchart and Rolin (1990), Hendry (1995), Devroye (1986). One approach reference regression model is considered Spanos (1986), which called linear regression model as opposed to the Gaussian linear model. Gourieroux and Montfort (1996) showed equivalence of the least squares method and developed method of moments. They also made contributions to the study of restricted regression model, along with Greene (1990), Spanos (1986), Judge, Griffiths, Hill, Lutkepol and Lee (1988). Frisch (1938) and Boiled (1945) studied nonconvergence estimators of least squares with structure parameters of a model with endogenous variables. For modeling studies of unobservable variables see Sevestre and Matyas (2004). In recent years, these analysis models were completed and adapted to the specific requirements of the modern economy. In this regard it is

noted works by the Guijarati (2004), Bardsen (2005), Wooldrige (2006). Dougherty (2008). In Romania, simple linear regression aspects are investigated by Andrei and Bourbonais (2008), Anghelache (2013), Anghel (2014).

3. Research methodology and data analysis

As a result of my investigation, four studies concerning the relation between BET index and the number of transactions were done. I established a series of monthly data regarding the values attributed to the two indicators between January and September 2015, as well as the graphic imagery of their evolution at the time mentioned.

Table 1. Monthly values of BET index and the values of the transactions during January – September 2015*

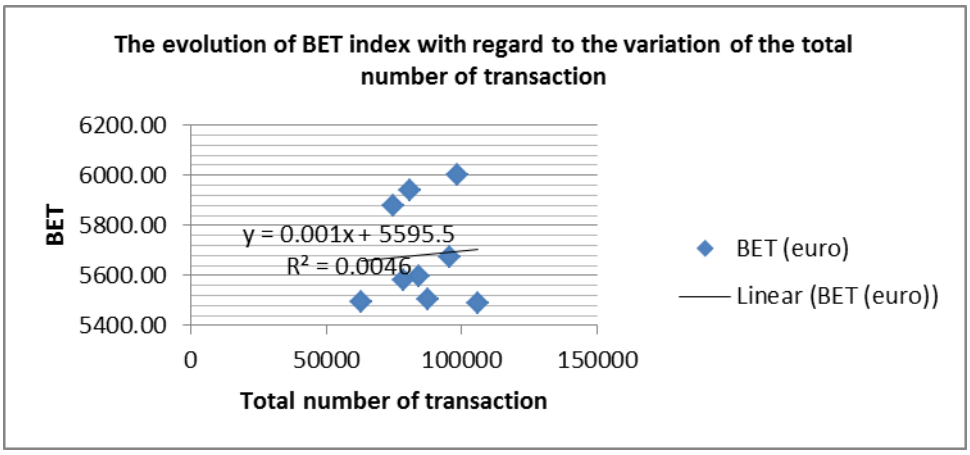
Month	Transactions number		BET (Euro)
	Total	Stock transaction number	
January	87713	62547	5504.96
February	84041	65844	5598.25
March	78539	53442	5579.71
April	81027	53272	5937.74
May	74673	47686	5879.94
June	95551	59901	5672.80
July	98444	67379	5998.98
August	105950	78964	5490.01
September	62831	43311	5496.40

** Provisional data taken from the site www.bvb.ro were estimated by author (personal presentation)*

A similar evolution regards the number of transactions, both intense decreasing and recovery being registered for the the same period. This made us more interested in the study of the respective correlation.

Graphic 1. Monthly evolution of BET index and of the transactions number between January and September 2015

BET is a dependant variable, while the evolution of the transaction number is an independant variable. The regression model type used to detail the relation between them and its intensity is obtained through graphic representation as a cloud of points of the series of the respective data.



Graphic 2. The correlation BET – total number of transactions

The Graphic 2 underlines a liniar relation between the respective variables. This correlation is denoted by the simple liniar regression model:

BET = α + β * Number of transactions + ε (1)

In order to estimate the parameters of the econometric model of regression analysed, the method of the ordinary least squares was used.

Table 1. Estimation of the regression model for BET _Total number of transactions

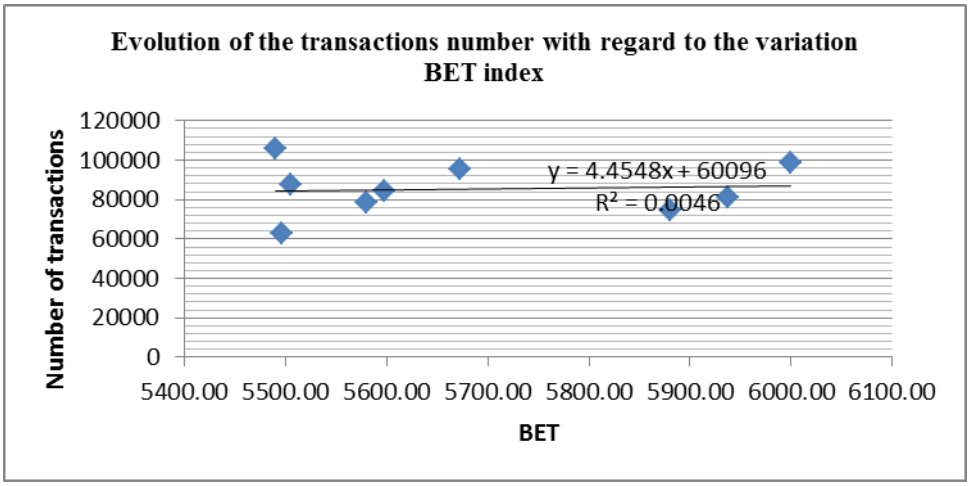
SUMMARY OUTPUT								
Regression Statistics								
Multiple R	0.068060225							
R Square	0.004632194							
Adjusted R Square	-0.137563207							
Standard Error	215.0473748							
Observations	9							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	1	1506.501	1506.501	0.032576259	0.86188295			
Residual	7	323717.6	46245.37					
Total	8	325224.1						
	Coefficients	*ndard Err*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	5595.489282	497.305	11.25162	9.78393E-06	4419.549771	6771.428793	4419.549771	6771.428793
NrT	0.001039827	0.005761	0.180489	0.86188295	-0.012583164	0.014662817	-0.012583164	0.014662817

The values of the parameters are established based on the mentioned data, and written as follows:

BET= 5595.4892 + 0.0010398 * Number of transactions

The results denote that the intercept represents a high value meaning a considerable influence of the factors that were not included in the BET model, confirmed by the registered value of R-squared. It indicates that the BET index values stand for only 046% of the total number of transactions made. The difference is covered by the influence of other factors that are not included in the present model. The influence of the total number of transactions on the BET index is not important and is lacking any significance.

The relation between the two variable is a direct one, still extremely diminished and showing that for the increase of one unit of the total number of transactions, the BET index increases by only 0.0010. The Standart Error indicates that the values of the BET index have an average deviation of ± 215.047 from the theoretical values of the regression line. The values registered by the F-statistic test (small compared to the reference level in the table presented) and the F Significance test show that the variable is lacking statistic significance. For the second regression model, the role of the variables was inversed. The existing correlation being studied, the dependant variable is represented by the the total number of transactions made by BVB in the first nine months of 2015. Same steps are taken as previously indicated with the following results.



Graphic 3. Total number of transactions correlation

Evidently, in this case too, there is a liniar relation between the variables, and the simple liniar regression model was used as a consequence.

Total number of transactions = α + β * BET (2)

The estimators of the regression equation were get by using OLS, ordinary least squares.

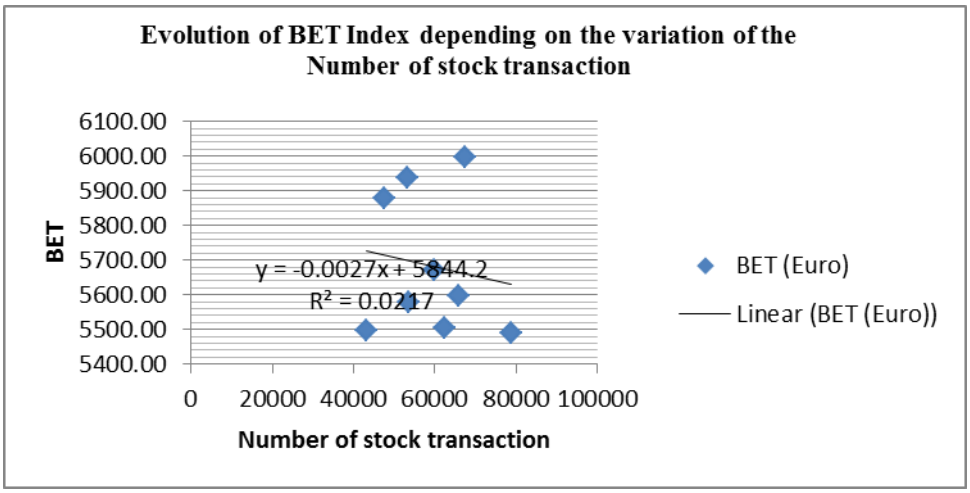
Table 2. The estimation of the regression model - Total number of transactions_BET

SUMMARY OUTPUT								
Regression Statistics								
Multiple R	0.068060225							
R Square	0.004632194							
Adjusted R Square	-0.137563207							
Standard Error	14075.58967							
Observations	9							
ANOVA								
	df	*SS*	*MS*	*F*	*gnificance F*			
Regression	1	6454081	6454081	0.032576	0.861883			
Residual	7	1.39E+09	1.98E+08					
Total	8	1.39E+09						
	Coefficients	*ɔndard Err*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*ower 95.0%*	*pper 95.0%*
Intercept	60096.45232	140376.9	0.428108	0.681436	-271842	392035.1	-271842	392035.1
BET	4.454775594	24.68171	0.180489	0.861883	-53.9082	62.81774	-53.9082	62.81774

The total number of transactions = 60096.45232 + 4.4547755 * BET

In this case too, the variable is lacking statistic significance. The influence of the factors not being included in the present model on the number of transactions is veri large. It is based of the values registered by the free term of the model, the value being extremely high; by Significance F, (high value), F-statistic (very small value with regard to the level indicated by the reffering table); multiple R (6.90%). Being direct, the link between the two variables indicates an increase of the total number of transactions by 4.454, at an increase by one unit of BET index.

Regarding the relation between BET index and the number of stock transactions, this is a liniar and indirect relation.



Graphic 4. Graphic expression of the correlation between BET index and Number of stock transactions

BET = α + β * Number of stock transactions (3)

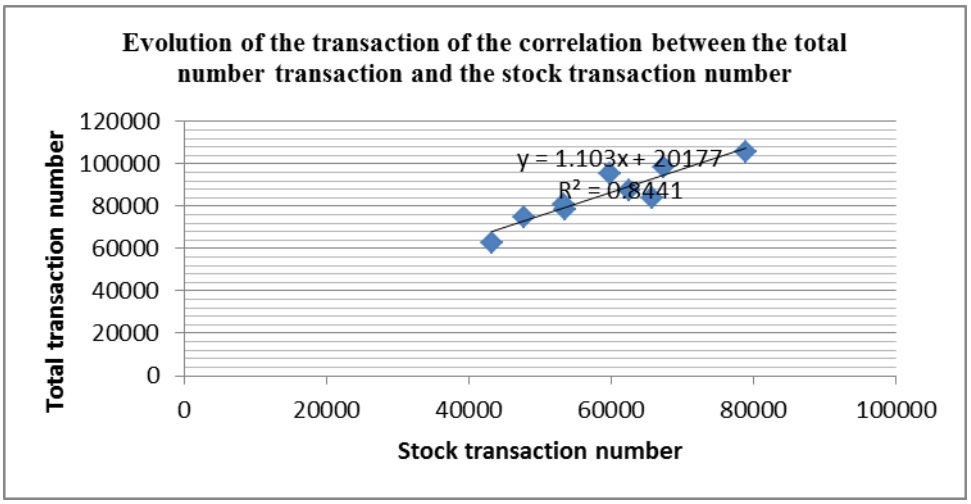
Table 3. Estimation of the regression model of BET index and the Numvber of stock transactions

SUMMARY OUTPUT								
Regression Statistics								
Multiple R	0.147395							
R Square	0.021725							
Adjusted R Square	-0.11803							
Standard Error	213.1929							
Observations	9							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	1	7065.591	7065.591	0.155454	0.705112499			
Residual	7	318158.5	45451.22					
Total	8	325224.1						
	Coefficients	*andard Err*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*ower 95.0%*	*pper 95.0%*
Intercept	5844.225	411.77	14.19293	2.05E-06	4870.543976	6817.907	4870.544	6817.907
NrTA	-0.0027	0.006857	-0.39428	0.705112	-0.01891792	0.013511	-0.01892	0.013511

BET =5844.225 - 0.0027 * Number of stock transaction

Although the values indicated by the Multiplr R and by R Square are a little bit higher than those in the other two analyses presented above, they are quite close to 0. The regression coefficient value is negative (-0.0027) meaning an indirect relation between the two variables.

Previously, some aspects were reasons of doubt regarding the validity of the model and of the high values indicated by the free term. This implies a significant influence of the factors that were not included in the model. In order to prevent this shortcoming, the relation between the influence of the transaction numbers and the total number was approached. The aim regards the identification of the main factor which influences the evolution of the total number of BVB total transactions during the period mentioned in this article, also estimating the quality of its influence by means of the regression model used.



Graphic 5. Graphic expression of the correlation between the total number transactions and the stock transaction number

Total transaction number = α + β * Stock transaction number (4)

Table 4. The estimation of the regression model of the Total transaction number and the Stock transaction number

SUMMARY OUTPUT								
Regression Statistics								
Multiple R	0.918723							
R Square	0.844051							
Adjusted R Square	0.821773							
Standard Error	5571.421							
Observations	9							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	1	1.18E+09	1.18E+09	37.88649	0.000465164			
Residual	7	2.17E+08	31040734					
Total	8	1.39E+09						
	Coefficients	*tandard Err*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*ower 95.0%*	*Upper 95.0%*
Intercept	20177.23	10760.88	1.875054	0.102911	-5268.214352	45622.68	-5268.21	45622.683
NrTA	1.102993	0.179197	6.1552	0.000465	0.679259577	1.526726	0.67926	1.5267263

The Total transaction number = 20177.23+1.1029 * Stock transaction number

In order to confirm the validity of this model, the interpretation of the statistic tests results is required. It results that the determination coefficient R-squared and the Adjusted determination coefficient R-squared have values close to 1. The value of the statistic F test exceeds the reference level in the table and the one of the F Significance test which is close to 0. It indicates that this model is correct and the variable is also statistic correct. 84.40% of the total transaction number is composed of stock transactions, the difference to 100% consisting of other factors not included in the present model. The relation between the two variables is direct and extremely powerful, indicating that when the stock transaction number increases with a unit, the total transaction number increases with 1.1020.

4. Conclusions

The liniar model is a unifactorial regression model and widely used. By using the simple liniar regression model in this study, some dependences between significant indicators of the capital market in Romanian were approached. The conclusions of the present study refer to the evaluation of the evolution trend of the total transaction number in the first nine month of 2015 and its influence on the evolution of BET index, that was not significant. On the contrary, the influence of BET index on the indicator of the total number of transactions was extremely powerful. The correlation between the two variables is not clear.

Information obtained by using simple linear regression model is not always sufficient to characterize the evolution of an economic phenomenon and, especially, to identify possible its further development. A significant argument in this regard can be considered quite high value of the free term (like the image of the factors that were not included in the model) that appears in each of the four linear regressions analyzed.

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