ECONOMETRIC ANALYSIS OF THE COMPANY ON STOCK EXCHANGE

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In this work are presented general concepts for determining the link between the volume of transactions and their value. On the basis of these concepts is the study of a simple regression model, which helps us to solve many economic problems. Based on data from the sample build Econometric Model, we estimate and test the parameters of the model, we calculate the correlation of determination and report using the statistical program SPSS.

Keywords: econometrics, linear multiple regression, autocorrelation, correlation report, determination report

Jel classification: C01, C13, C51, C87

1. Problem presentation

In a market economy, financial investors are interested in ongoing development activities on the exchange. Being a period of crisis, the share rate had chaotic variations. Consulting the data provided by the Bucharest Stock Exchange we notice that there is a dimination of the share rate variation, this one following a path upward.

An economic phenomenon can be influenced by one factor or more. The simple linear model is the most simple econometric model or the most simple explanatory scheme of the dependence between two variables. In economics there are situations in which a result or a phenomenon can be explained in a high only by the influence of a simgle factor. This factor appears in the econometric model as an independent variable and the rest of the influences is taken by the residual variable.

The model of simple linear regression expresses the relationship between two variables and takes the form:

$$Y = \alpha + \beta X + \varepsilon \tag{1}$$

where: *Y* is the dependent variable, random variable *X* is independent, non-random variable and random error or residual.

The regression equation is:

- α is the ordinate which shows the value of variable Y when $X = 0$;
- β is the slope of the right, called the regression coefficient, $\beta = \frac{\partial Y}{\partial X}$.

In the regression equation α and β are unknown parameters. The sign β of the regression parameter indicates the direction of the link between the two variables correlated. A value of the conditional variable y_i, $Y_i \middle| X = x_i$, $i = \overline{1,n}$ can be written:

$$y_i = \alpha + \beta x_i + \varepsilon_i \tag{2}$$

The value of the regression parameters is estimated based on the estimators $\hat{\alpha}$ and $\hat{\beta}$. Using data recorded on a sample of *n* pairs of observations on variables *X* and *Y*, we calculate the estimations *a* and *b* of the parameters α and β. The punctualt estimation of the regression equation parameters determined using the method of the least squares. Confidence interval for the regression coefficient β estimated for the observed sample is defined by the relationship: $b \pm t_{\alpha/2} \cdot s_{\hat{\beta}}$. Analogous to the parameter α, we determine the interval: $a \pm t_{\alpha/2} \cdot s_{\hat{\alpha}}$.

Testing of the model parameters and the model regression is performed by a classical scheme of the test process through the following steps: formulating hypotheses, choosing materiality α, choosing the appropriate statistical test, determining a theoretical value of the test, depending on the percentile and the threshold of significance chosen, calculating a value of test statistics based on data from another sample and applying the rule of decision for accepting or rejecting the null hypothesis.

Testing significance of regression coefficient β starts whith the formulation of the following assumptions:

$$H_0: \ \beta = 0$$
$$H_1: \ \beta \neq 0$$

If you reject the hypothesis H_0, with a threshold of significance α chosen, then the link between the two variables *X* and *Y* is significant. In economic practice is considered, usually one $\alpha = 0.05$, that is considered a risk of 5% to reject the hypothesis H_0 when it should be true. The link can be measured using correlation coefficient and correlation ratio. The value of correlation coefficient is between -1 and +1. Regression model assumptions are: the normality of errors, homoscedasticity, non-correlation errors, the lack of correlations between the independent variable and the variable error.

2. Descriptive analysis of model variables

To estimate the model we considered the evolution of the market shares transactions TGN during 1.04.2009 - 4.05.2009. In our analysis we took the varying volume of transactions and total value thereof.

Table 1. Evolution shares transactions TGN during 1.04.2009 - 4.05.2009

Date	Volume	Value
4.05.2009	2750.00	401701.4
30.04.2009	4515.00	647314.5
24.04.2009	2700.00	358336.1
23.04.2009	411.00	53384.00
22.04.2009	1499.00	195084.5
21.04.2009	4709.00	598495.7
17.04.2009	985.00	128282.8
16.04.2009	3579.00	456260.1
15.04.2009	5771.00	728165.7
14.04.2009	3851.00	487252.5
13.04.2009	2210.00	284856.6
10.04.2009	2585.00	329358.0
9.04.2009	1852.00	232824.7
8.04.2009	971.00	116784.1
7.04.2009	658.00	80218.50
6.04.2009	1634.00	203731.1
3.04.2009	1930.00	237887.2
2.04.2009	3313.00	402100.4
1.04.2009	1209.00	141461.9

Based on data from Table 1, we obtain Figure 1, which shows a direct liniar link, between the transactions volum and the value of these transactions. Therefore, for the case considered, the estimation of the value of the transactions is carried out using linear regression equation: $y = a + bx + e$.

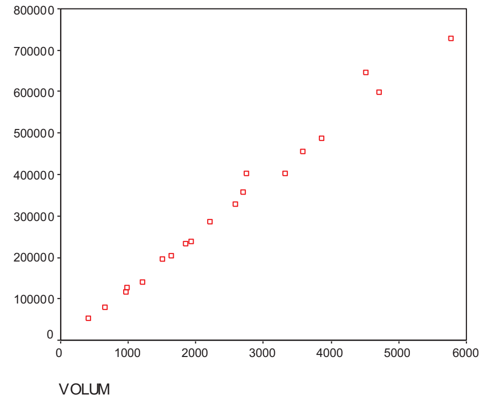

Figure 1. The relationship between volume and value of transactions

Daily values of transactions and the TGN are presented in Table 2.

Table 2. Indicators of descriptive statistics

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
VOLUM	19	411.00	5771.00	2480.6316	1491.2681
VALOARE	19	53384.00	728165.70	320184.2	196640.2538
Valid N (listwise)	19				

Volume of transactions is 2480.6316, and their average value is 320184.2.

The results ofthe market model estimation, using the method of the least squares, to the TGN transactions during 1.04.2009-4.05.2009 are presented in the following tables:

Tabel 3. Regression model variables

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	VOLUM[a]	.	Enter

a. All requested variables entered.

b. Dependent Variable: VALOARE

Table 3 presents the model variables: volume is the independent variable and value is the dependent variable.

Tabel 4 . Estimated regression model

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	-5034.86	9839.971		-.512	.615	-25795.4	15725.667
	VOLUM	131.103	3.424	.994	38.293	.000	123.880	138.327

a. Dependent Variable: VALOARE

The equation is estimated:

$$y_x = -5034.86 + 131.103x \quad (3)$$

Since *Sig.* Associated to *z* test for testing the ordonate at origin is less than the risk assumed by $\alpha = 0.05$ the hypothesis H_0 is rejected. So the ordonate at origin is significantly different from zero. To an increase of one unit of the indicator volume, the trading value increases by an average of 131,103 lei a day. According to Table 4, with a probability of 0.95 and the parameter of our model is covered by the (123.880,138.327) and (-25795.4,15725.667).

For a threshold of significance α, is read from table Student a theoretical value of the test $t_{\alpha/2;n-2} = 2.11$ to be compared with the value calculated from the observed sample. To test the significance of regression coefficient β is defined by using statistical *t* ratio, which is a statistic following a law *Student* percentile of 17 degrees of freedom. From Table 4 we have $t = 38.293$. For a risk $\alpha = 0.05$, if $t_{calc} > t_{\alpha/2;n-2}$ (38.293 >2.11) H_0 hypothesis is rejected, ie the regression coefficient is considered significantly different from 0.

ANOVA table shows the estimations of the two components of variation, the corresponding degrees of freedom, estimations of the explained and residual variations, the calculated value of the Fischer raport and the significance of the test.

Table 5. Table ANOVA

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	688036348153.6	1	688036348153.559	1466.4	.000[a]
	Residual	7976661249.561	17	469215367.621		
	Total	696013009403.1	18			

a. Predictors: (Constant), VOLUM

b. Dependent Variable: VALOARE

From Table 5, the value of *Sig.* for F test is less than 0.05, ie the model explains the dependence of the constructed variables by a linear relation, which is considered significant.

Tabel 6. Model summary

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.994[a]	.989	.988	21661.3796	.593

a. Predictors: (Constant), VOLUM

b. Dependent Variable: VALOARE

The estimations of the correlation and determination ratio are presented in Table 6 $R = 0.994$ and $R^2 = 0.989$. High value of the correlation shows that the relationship between the two variables is very strong.

Kolmogorov-Smirnov test is used to test if the distribution of errors follows a law of normal distribution and in Table 7 is observed that the value Sig. is greater than the risk $\alpha = 0.05$, therefore, with a 95% confidence we can say that the assumption of normality of errors is acceptable.

Tabel 7. Kolmogorov- Smirnov test

One-Sample Kolmogorov-Smirnov Test

		Unstandardized Residual
N		19
Normal Parameters[a,b]	Mean	-7.06723E-05
	Std. Deviation	21051.07617
Most Extreme Differences	Absolute	.257
	Positive	.257
	Negative	-.150
Kolmogorov-Smirnov Z		1.119
Asymp. Sig. (2-tailed)		.163

a. Test distribution is Normal.

b. Calculated from data.

Testing the correlation between non-parameter $\hat{\varepsilon}_i$ and Volume$_i$, is performed using Student test and the results are presented in Table 8.

Tabel 8. Results of testing Spearman correlation coefficient between $\left|\hat{\varepsilon}_i\right|$ and Volume

Correlations

			VOLUM	Unstandardized Residual
Spearman's rho	VOLUM	Correlation Coefficient	1.000	-.321
		Sig. (2-tailed)	.	.180
		N	19	19
	Unstandardized Residual	Correlation Coefficient	-.321	1.000
		Sig. (2-tailed)	.180	.
		N	19	19

Because *Sig t* .= 0.180, which is greater than $\alpha = 0.05$, Student test conducted on the correlation coefficient indicates The lack of a link between errors and the independent variable, ie the model is homoscedastic.

Autocorrelated testing is done with errors Runs test and the results of this test are given below:

Tabel 9. Runs test results

Runs Test

	Unstandardized Residual
Test Value[a]	-4943.807617
Cases < Test Value	9
Cases >= Test Value	10
Total Cases	19
Number of Runs	8
Z	-.935
Asymp. Sig. (2-tailed)	.350

a. Median

The significance test has the value 0.350, which is more than the threshold of significance 0.05, the decision to accept the null hypothesis is taker, ie the errors do not recorded autocorrelation phenomenon.

3.Conclusion

In this paper we analyzed the influence of the volume of TGN share transactions the period 1.04.2009 - 4.05.2009, ever the trading value of shares in a period of economic recession. Using the database provided by www.bvb.ro, and analyzing these data using a linear regression model, we see that the transaction value of the shares is influenced significantly by the volume of transactions and for an increase with a unit of the volume indicator, the trading value increases with an average of 131.103 lei a day. The results of the testing Spearman correlation coefficient between $\left|\hat{\varepsilon}_i\right|$ and volume shows that the model is homoscedastic, and Kolmogorov-Smirnov test and Runs test show that the errors follow a normal distribution and they are not autocorrelations.

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