TESTING THE HYPOTHESIS OF AN EFFICIENT MARKET IN TERMS OF INFORMATION – THE CASE OF THE CAPITAL MARKET IN ROMANIA DURING RECESSION

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Abstract:
This paper is trying to test the hypothesis of efficient market (EMH Efficient Market Hypothesis), the case of capital market in Romania during the economic financial crisis. According to the purpose in view our research is aiming at testing the hypothesis of random walk of stock exchange indexes BET, BET-C, BET_FI of Bucharest Stock Exchange. In this respect we will enforce statistic tests to see if the capital market in Romania is efficient in a weak form during this period.

***Keywords*:** *efficient capital market, random walk, stationary tests, normal distribution.*

1. Introduction

The informational efficient capital market concept (*Efficient Market Hypothesis)* was introduced by the American professor Fama Eugene (1965, 1970), marking the beginning of modern literature on the subject, *defining an efficient capital market as a market in which the rate of financial assets completely reflects the available information at some point on the market*.

According to this thesis, no investor on the market can obtain earnings by speculating some imbalances between the stock rate (the observed value) and the financial value (intrinsic) of the investment. So, generalized, the value of a company is looked upon as being equal with the stock capitalization. But in reality, there are informed investors and uninformed investors on the financial market.

Due to this fact, many researchers have brought a series of criticism upon this concept, so that Fama Eugene eventually proposes that to the meaning of this balanced value corresponds the balanced price determined through a general balance model or a convention of dividing the investors from the market in informed and uninformed (naives).

This is practically very hard to achieve because the overall available information cannot be precisely known, and setting the balanced price must be made based on a model. In this respect, in his article from [1970], Fama proposes a much more agreed new definition: "a market in which the price perfectly and permanently reflects the available information is an efficient market".

Conceptually, there are three forms of the informational efficiency of the capital markets, which will be presented as follows:

- ***The poor form:*** *the price of an asset instantaneously and completely reflects all the information contained in the past history of that investment's price. This means the impossibility of obtaining consistent surplus profit from transactions inspired by studying the history of the assets' rate based on a technical or graphical analysis. The fundamental hypothesis of the technical or graphical analysis is that the past tends to repeat itself, and some graphical forms, once tracked, will offer information regarding the future rate variation.*
- ***The semi-strong form:*** *the information considered relevant is, this time, besides the rate history, all the public information available about the issuer. This includes: the balance sheet, the operating accounts, capital risings, announcements about mergers or acquisitions, public information related to the perspective of the activity area, the perspective of the national economy etc.. On an efficient market in a semi-strong form the fundamental analysis based on the public information is useless. In the extent that the information becomes public, it is being instantaneously and completely integrated by the current price of the assets, which does not allow obtaining consistent surplus profits from transactions based on this information.*
- ***The strong form****: the relevant information embedded by the current assets rate is, by this level, the public information as well as the private one. In such a situation, all the unexploited possibilities of earnings shall be eliminated. The difference between public and private information is not so easy to achieve. Three categories of agents are susceptible to having private information: the mediators from the financial markets, the managers of the companies which have information regarding their company and the administrators of the investment funds. In the empiric studies it is difficult to establish how much of the performance of these categories of agents is due to an informational advantage and how much is due to their superior capacity to treat common information.*

The earlier presentations of the level of efficiency may seem general and abstract, but there are a series of methodological approaches for checking them, based on empiric or econometric tests.

2. The informational efficiency of the Romanian capital market

During the last years, there have been published various studies regarding the analysis of the informational efficiency of the Romanian capital market.

Preoccupied by this matter, the majority of Romanian researchers channeled their efforts in order to underline the existence of some trends in the variation of the stock exchange rate which would deny the random walk. So, methodologically, based on the completed analysis are autocorrelation tests, stationary tests or tests analyzing the data series probability distributions based on which it has been tried to validate the hypothesis of weak form informational efficiency of the capital market in Romania.

Despite these facts, the results of the tests do not lead to a pertinent and definitive conclusion of this matter.

One particular study, relatively recent and different from those existing, which captures our attention, is that of Voineagu and Pele [2008], in which the efficiency of the capital market in Romania is tested using an econometric model based on the random walk theory, proving the weak form efficiency of this market.

3. Testing the informational efficiency of the capital market in Romania

The shares represent the most traded securities on the capital market in Romania. Despite the fact that there have been developed various specialty papers linked to the Bucharest Stock Exchange, the approaches linked to the way of evaluating these securities in the specific context of the capital market in Romania are more symptomatic. Besides, their content represents more of some translations of developed studies for other economies, which beyond the scientific importance, many times indisputable, cannot always catch the particularities of the Romanian capital market. In other words, although the approaches linked to the formal side of the stock operations accurately present the phenomenology of the capital market, they do not equally catch the substance of the problem, given by the stock evaluation logic, base of the transactions done in a rational manner. On the other hand, the issues related to the evaluation of the financial assets, as a premise of an advanced management of the portfolio, are favorite topics in the economic scientific research, even on an international scale.

In the attempt to identify the instruments through which they can be evaluated in a manner that takes notice of the particularities of the capital market in Romania, the study has been started from the hypothesis of the financial market efficiency. Unfortunately, the majority of studies that aimed at testing the capital market efficiency in Romania evidenced, partially at least, the fact that it is characterized, at least for now, through a certain level of inefficiency, which raises question marks regarding the possibility of evaluation based on the mechanisms used in the classic fundamental analysis. Among the elements which should be taken into account in order to elaborate some advanced management instruments (and also adapted to the realities in

Romania) are the liquidity variability, the volatility (many times important) of the stock rates, the rationality of the agents who act on the market.

The considered period of time for this study is the 24th July 2007 (the date of the historic maximum of the indicators tracked on the capital market in Romania) – the 29th October 2010 (the recent moment at which the research assumptions have been established).

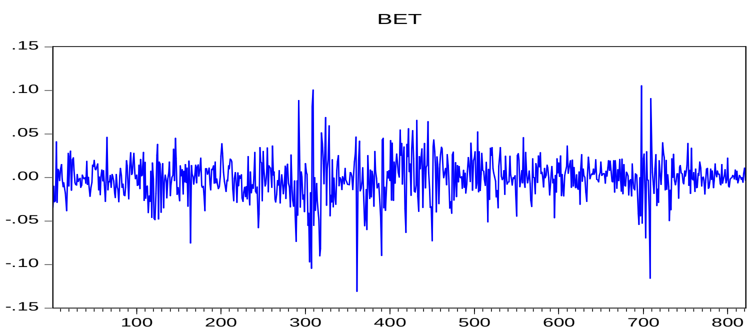
In this respect, by selecting this period, we intend to test the informational efficiency on the capital market in Romania during the economic and financial recession which affected the economic environment globally. It was analyzed the evolution of stock indices BET, BET-C and BET-FI.

Our empiric test followed the research of the random walk hypothesis of three stock indices of the Bucharest Stock Exchange, being made the following tests[1]:

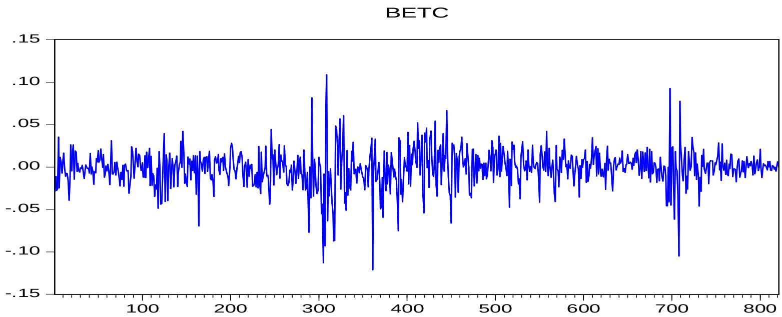
- Tests regarding respecting the normality hypothesis of distributed instantaneous yields (logarithmic) of stock indices;
- Stationary tests for instantaneous yields (logarithmic) of stock indices;

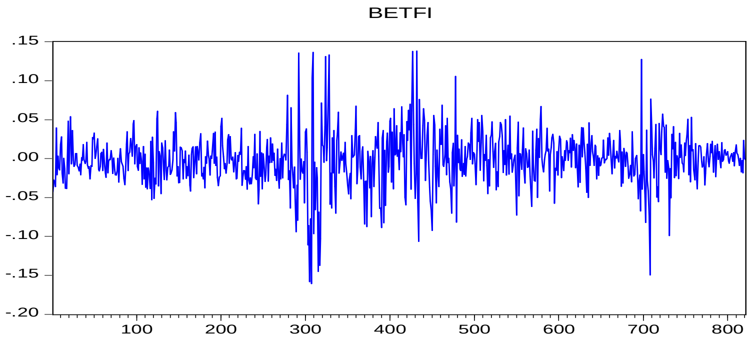
The log normal distribution is used in order to model the processes from the capital market because it eliminates the shortcomings of normal distribution.

A first analysis we can take into consideration to assess normality and homoscedascity is the study of the graphics of logogrammatic returns of stock exchange indexes, as:



[1] We specify that we used EViews 7 as technical support for the tests.



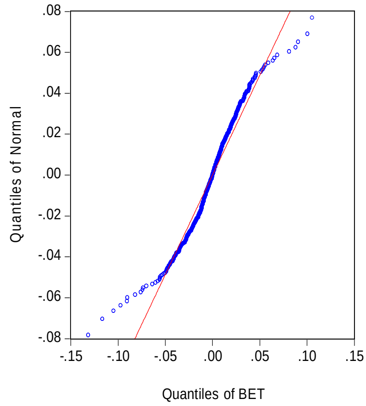


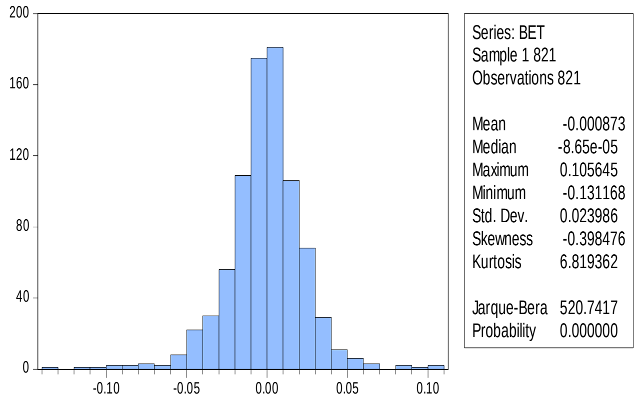
Graphically we notice that the lack of normality is not very efficient but heteroscedasticity is quite easy to be grasped by the irregular amplitude of variations.

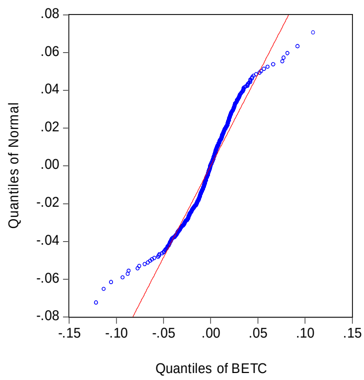
4. Tests on the hypothesis of normality of instantaneous returns of indexes followed on the Romanian Stock Exchange

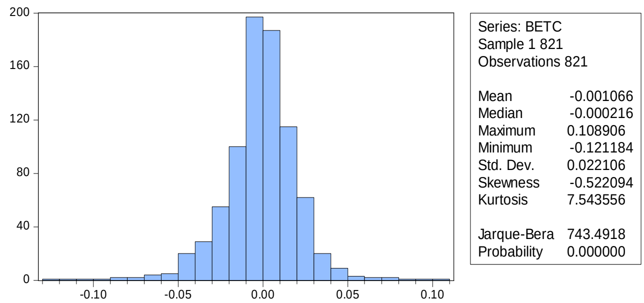
To test the hypothesis of normality[1] of instantaneous returns of indexes BET, BET-C, BET-FI we use qq-plot and the Jarque- Bera test.

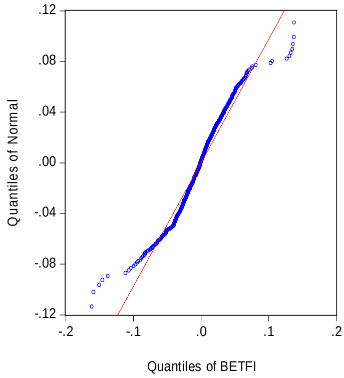
[1] On an efficient capital market, returns follow a normal (or lognormal) distribution

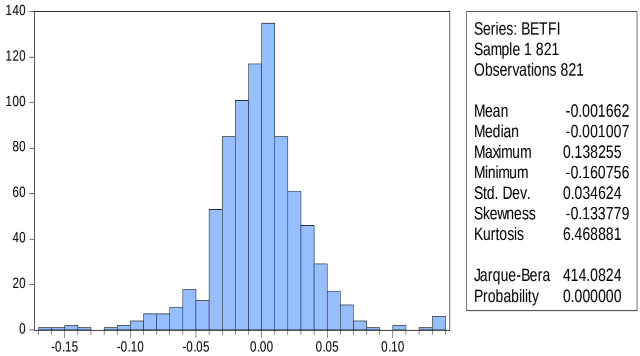

Quantiles of Normal
Quantiles of BET


Series: BET
Sample 1 821
Observations 821
Mean -0.000873
Median -8.65e-05
Maximum 0.105645
Minimum -0.131168
Std. Dev. 0.023986
Skewness -0.398476
Kurtosis 6.819362
Jarque-Bera 520.7417
Probability 0.000000


Quantiles of Normal
Quantiles of BETC


Series: BETC
Sample 1 821
Observations 821
Mean -0.001066
Median -0.000216
Maximum 0.108906
Minimum -0.121184
Std. Dev. 0.022106
Skewness -0.522094
Kurtosis 7.543556
Jarque-Bera 743.4918
Probability 0.000000





As it can be noticed from the analyzed data, the qq-plot charts for the considered stock indices highlight the fact that the daily yields are not normally distributed. Also, we cannot conclude that the series distributions are normal based on the Jarque-Bera test[1]. Because of the correlation existing between yields, and because they do not have a normal distribution, we reject the hypothesis that these time series are random walk type and so, serious question marks are raised regarding the existence of weak form informational efficiency on the capital market.

The series are asymmetric on the left, because the Skewness[2] indicator (the asymmetry coefficient) is negative in all three cases, and the Kurtosis[3] indicator (the flattening coefficient) shows us that the series have a vaulting superior to the one specific to the normal distribution (k=3), the distributions of the daily instantaneous

[1] Jarque-Bera test is synthetic test of normality. To accept the null hypothesis test is necessary that the associated value to be lower than the table value for a hi-square with two degrees of freedom $\chi^2_{1-\alpha}(2)$ to threshold of significance.

[2] Skewness measures the asymmetry distribution seriesaround its average. A positive S indicates that the distribution has the right side enlogated and a negative S implies that the distribution has a left side enlogated.

[3] Kurtosis measures how sharp or flat is the series distribution to normal distribution is.If kurtotica has a value bigger than 3, then the analyzed distribution is sharper than the normal distribution (leptokurtotical). If it is less than 3, then the distribution is flatter than the normal distribution (platykurtotical).

returns of the three stock indices being leptokurtosis. The null hypothesis is rejected in both cases.

5. Stationary tests for instantaneous returns of stock indexes observed on the capital market in Romania

To test the stationary for instantaneous returns, daily calculated, of the stock indexes on the Romanian capital market, we use *Augmented Dickey-Fuller (ADF) and Phillips-Perron tests.*

ADF test implies that the series of natural logarithms of stock indexes, analyzed by us, to follow the stochastic process[1], type AR(1)[2]. In other words, ADF Test Statistic represents the t test for accepting or rejecting the null hypothesis of the Dickey-Fuller test.

Phillips-Perron test is a test that does not include in the tested equation differences between the past series and is using the method of least squares in a simple form. The test itself is a t-statistic for regression coefficient, but adjusted to remove errors.

To interpret the results, we used the following indicators:

- *ADF Test Statistic* and *PP Test Statistic* represent the t test for accepting or rejecting the null hypothesis of the Dickey-Fuller and Phillips Perron tests. To reject the null hypothesis (series is unit root), if the value of the *t statistic test* is less than the critical value for the significant level chosen.
- *Std. Error* is the estimated standard error of the estimated coefficients. The standard error measures how statistically significant the coefficient is. The higher the standard error is the more statistical noise is contained in the estimators. If errors are normally distributed, with a 66.6% probability, the actual regression coefficient is given within one standard error, and with a probability of 95% is given within two standard errors.
- *t-Statistic*, calculated as the ratio of the estimated coefficient and standard error of this coefficient is used to test the null hypothesis: the estimated coefficient is zero.
- *Probability* - is the probability of acceptance or rejection of the null hypothesis of significant level at t test to choose. At a probability of 0.05, the absolute value of t-statistic must be at least 2.
- *R-squared* (noted with R2) measures success of the regression in forecasting the values of dependent variables. The relationship between the dependent variable variance explained by independent variables and the total variance. This indicator takes values between [0,1] and is equal to 1 if the regression fits.

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[1] A stochastic process represents a random process which can be characterized by mathematical expectancy and dispersion.
[2] Autoregressive process of order 1

- *Adjusted R-squared.* A problem with using R-squared indicator is that he never decreases as more repressor is added. Adjusted R-squared, noted with aR2, penalizes the introduction of new regressors who have no power to explain the model. aR2 may decrease as regressors are added and may be even negative.
- *SE of regression* represents the standard error of regression based on the estimated variance of the residue.
- *Sum of Squared Residuals* - is the sum of squares of residues
- *Log Likelihood* - likelihood function value (assuming that the errors are normally distributed) evaluated on the basis of estimated values of the coefficients.
- *Durbin-Watson* measures the serial correlation in residues. DW takes values within [0, 4], 0 if the correlation coefficient is 1 and 4 if the correlation coefficient is -1. If the correlation coefficient is 0, the DW is 2.
- *The average and standard deviation* of the dependent variable is calculated using standard formulas.
- *Akaike Information Criterion* is often used in models selection, as the AIC lower is, the model is better.
- *Schwarz Criterion.* It is an alternative to AIC, which penalizes more drastic the introduction of new coefficients.
- *F-statistic and associated probability*. F-statistic tests the hypothesis that all coefficients in a regression (excluding the constant) are 0. Under the null hypothesis with normally distributed errors, this indicator has F distribution with k-1, respectively T-k degrees of freedom: F (k-1, T-k). The associated probability represents the marginal significance of F test. If the p-value is lower than the Significance level (egg: 0.05) we reject the null hypothesis: that all coefficients are equal to zero.

Basically, after processing the data using the Eviews program, we have the following results:

6. The results of the ADF and PP tests for BET- calculation

For the first difference

Null Hypothesis: D(LNBET) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=20)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-27.02348	0.0000
Test critical values:	1% level	-3.438100	
	5% level	-2.864850	
	10% level	-2.568587	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNBET,2)
Method: Least Squares
Date: 11/22/10 Time: 18:21
Sample (adjusted): 3 822
Included observations: 820 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNBET(-1))	-0.942135	0.034864	-27.02348	0.0000
C	-0.000781	0.000837	-0.933558	0.3508

R-squared	0.471668	Mean dependent var	3.81E-05
Adjusted R-squared	0.471022	S.D. dependent var	0.032924
S.E. of regression	0.023946	Akaike info criterion	-4.623577
Sum squared resid	0.469058	Schwarz criterion	-4.612091
Log likelihood	1897.667	Hannan-Quinn criter.	-4.619170
F-statistic	730.2684	Durbin-Watson stat	1.999055
Prob(F-statistic)	0.000000		

Null Hypothesis: D(LNBET) has a unit root
Exogenous: Constant
Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-26.99984	0.0000
Test critical values:	1% level	-3.438100	
	5% level	-2.864850	

	10% level	-2.568587	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.000572
HAC corrected variance (Bartlett kernel)	0.000551

Phillips-Perron Test Equation
Dependent Variable: D(LNBET,2)
Method: Least Squares
Date: 11/22/10 Time: 18:26
Sample (adjusted): 3 822
Included observations: 820 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNBET(-1))	-0.942135	0.034864	-27.02348	0.0000
C	-0.000781	0.000837	-0.933558	0.3508

R-squared	0.471668	Mean dependent var	3.81E-05
Adjusted R-squared	0.471022	S.D. dependent var	0.032924
S.E. of regression	0.023946	Akaike info criterion	-4.623577
Sum squared resid	0.469058	Schwarz criterion	-4.612091
Log likelihood	1897.667	Hannan-Quinn criter.	-4.619170
F-statistic	730.2684	Durbin-Watson stat	1.999055
Prob(F-statistic)	0.000000		

<u>For level</u>

LNBET
Null Hypothesis: LNBET has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=20)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.816023	0.3728
Test critical values:	1% level	-3.438090	
	5% level	-2.864846	
	10% level	-2.568585	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNBET)
Method: Least Squares
Date: 11/15/10 Time: 19:42
Sample (adjusted): 2 822
Included observations: 821 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNBET(-1)	-0.003632	0.002000	-1.816023	0.0697
C	0.030123	0.017088	1.762783	0.0783

R-squared	0.004011	Mean dependent var	-0.000873
Adjusted R-squared	0.002795	S.D. dependent var	0.023986
S.E. of regression	0.023953	Akaike info criterion	-4.623044
Sum squared resid	0.469884	Schwarz criterion	-4.611569
Log likelihood	1899.759	Hannan-Quinn criter.	-4.618641
F-statistic	3.297939	Durbin-Watson stat	1.882567
Prob(F-statistic)	0.069732		

LNBET
Null Hypothesis: LNBET has a unit root
Exogenous: Constant
Bandwidth: 1 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-1.811805	0.3749
Test critical values:	1% level	-3.438090	
	5% level	-2.864846	
	10% level	-2.568585	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.000572
HAC corrected variance (Bartlett kernel)	0.000605

Phillips-Perron Test Equation
Dependent Variable: D(LNBET)
Method: Least Squares
Date: 11/15/10 Time: 19:52
Sample (adjusted): 2 822
Included observations: 821 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNBET(-1)	-0.003632	0.002000	-1.816023	0.0697
C	0.030123	0.017088	1.762783	0.0783

R-squared	0.004011	Mean dependent var	-0.000873
Adjusted R-squared	0.002795	S.D. dependent var	0.023986
S.E. of regression	0.023953	Akaike info criterion	-4.623044
Sum squared resid	0.469884	Schwarz criterion	-4.611569
Log likelihood	1899.759	Hannan-Quinn criter.	-4.618641
F-statistic	3.297939	Durbin-Watson stat	1.882567
Prob(F-statistic)	0.069732		

By putting into practice the 2 methodologies of testing we can conclude: the null hypothesis is accepted for level, and for the difference it is not accepted, therefore the BET is of 1 order (with 1% level of significance).

The results of the ADF and PP tests for BET-C - calculation
<u>For the first difference</u>

Null Hypothesis: D(LNBETC) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=20)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-26.38716	0.0000
Test critical values:	1% level	-3.438100	
	5% level	-2.864850	
	10% level	-2.568587	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(LNBETC,2)
Method: Least Squares
Date: 11/22/10 Time: 18:29
Sample (adjusted): 3 822
Included observations: 820 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNBETC(-1))	-0.918663	0.034815	-26.38716	0.0000
C	-0.000945	0.000771	-1.226644	0.2203

R-squared	0.459810	Mean dependent var	3.49E-05
Adjusted R-squared	0.459150	S.D. dependent var	0.029967
S.E. of regression	0.022038	Akaike info criterion	-4.789635
Sum squared resid	0.397291	Schwarz criterion	-4.778149
Log likelihood	1965.750	Hannan-Quinn criter.	-4.785228
F-statistic	696.2821	Durbin-Watson stat	2.001080

Null Hypothesis: D(LNBETC) has a unit root
Exogenous: Constant
Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-26.37006	0.0000
Test critical values:	1% level	-3.438100	
	5% level	-2.864850	
	10% level	-2.568587	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.000485
HAC corrected variance (Bartlett kernel)	0.000476

Phillips-Perron Test Equation
Dependent Variable: D(LNBETC,2)
Method: Least Squares
Date: 11/22/10 Time: 18:31
Sample (adjusted): 3 822

Included observations: 820 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNBETC(-1))	-0.918663	0.034815	-26.38716	0.0000
C	-0.000945	0.000771	-1.226644	0.2203

R-squared	0.459810	Mean dependent var	3.49E-05
Adjusted R-squared	0.459150	S.D. dependent var	0.029967
S.E. of regression	0.022038	Akaike info criterion	-4.789635
Sum squared resid	0.397291	Schwarz criterion	-4.778149
Log likelihood	1965.750	Hannan-Quinn criter.	-4.785228
F-statistic	696.2821	Durbin-Watson stat	2.001080
Prob(F-statistic)	0.000000		

<u>For level</u>

LNBETC
Null Hypothesis: LNBETC has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=20)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.882265	0.3408
Test critical values:	1% level	-3.438090	
	5% level	-2.864846	
	10% level	-2.568585	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNBETC)
Method: Least Squares
Date: 11/15/10 Time: 19:44
Sample (adjusted): 2 822
Included observations: 821 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNBETC(-1)	-0.003260	0.001732	-1.882265	0.0602
C	0.025338	0.014049	1.803578	0.0717

R-squared	0.004307	Mean dependent var	-0.001066
Adjusted R-squared	0.003092	S.D. dependent var	0.022106
S.E. of regression	0.022072	Akaike info criterion	-4.786609
Sum squared resid	0.398983	Schwarz criterion	-4.775134
Log likelihood	1966.903	Hannan-Quinn criter.	-4.782206
F-statistic	3.542922	Durbin-Watson stat	1.837347
Prob(F-statistic)	0.060154		

LNBETC

Null Hypothesis: LNBETC has a unit root

Exogenous: Constant

Bandwidth: 5 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-1.856765	0.3530
Test critical values:	1% level	-3.438090	
	5% level	-2.864846	
	10% level	-2.568585	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.000486
HAC corrected variance (Bartlett kernel)	0.000552

Phillips-Perron Test Equation

Dependent Variable: D(LNBETC)

Method: Least Squares

Date: 11/15/10 Time: 19:53

Sample (adjusted): 2 822

Included observations: 821 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNBETC(-1)	-0.003260	0.001732	-1.882265	0.0602
C	0.025338	0.014049	1.803578	0.0717

R-squared	0.004307	Mean dependent var	-0.001066
Adjusted R-squared	0.003092	S.D. dependent var	0.022106
S.E. of regression	0.022072	Akaike info criterion	-4.786609

Sum squared resid	0.398983	Schwarz criterion	-4.775134
Log likelihood	1966.903	Hannan-Quinn criter.	-4.782206
F-statistic	3.542922	Durbin-Watson stat	1.837347
Prob(F-statistic)	0.060154		

Similar to BET index and for BET-C for the level the null hypothesis is accepted and for the difference it is not accepted therefore the BET-C series is of 1 order (with 1% level of significance).

The results of the ADF and PP tests for BET-FI - calculation
<u>For the first difference</u>

Null Hypothesis: D(LNBETFI) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=20)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-25.14790	0.0000
Test critical values:	1% level	-3.438100	
	5% level	-2.864850	
	10% level	-2.568587	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNBETFI,2)
Method: Least Squares
Date: 11/22/10 Time: 18:34
Sample (adjusted): 3 822
Included observations: 820 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNBETFI(-1))	-0.871173	0.034642	-25.14790	0.0000
C	-0.001398	0.001201	-1.163831	0.2448

R-squared	0.436024	Mean dependent var	5.05E-05
Adjusted R-squared	0.435335	S.D. dependent var	0.045709
S.E. of regression	0.034347	Akaike info criterion	-3.902150
Sum squared resid	0.965026	Schwarz criterion	-3.890664
Log likelihood	1601.881	Hannan-Quinn criter.	-3.897742

F-statistic	632.4169	Durbin-Watson stat	2.008012

Null Hypothesis: D(LNBETFI) has a unit root
Exogenous: Constant
Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-25.16439	0.0000
Test critical values:	1% level	-3.438100	
	5% level	-2.864850	
	10% level	-2.568587	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.001177
HAC corrected variance (Bartlett kernel)	0.001189

Phillips-Perron Test Equation
Dependent Variable: D(LNBETFI,2)
Method: Least Squares
Date: 11/22/10 Time: 18:35
Sample (adjusted): 3 822
Included observations: 820 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNBETFI(-1))	-0.871173	0.034642	-25.14790	0.0000
C	-0.001398	0.001201	-1.163831	0.2448

R-squared	0.436024	Mean dependent var	5.05E-05
Adjusted R-squared	0.435335	S.D. dependent var	0.045709
S.E. of regression	0.034347	Akaike info criterion	-3.902150
Sum squared resid	0.965026	Schwarz criterion	-3.890664
Log likelihood	1601.881	Hannan-Quinn criter.	-3.897742
F-statistic	632.4169	Durbin-Watson stat	2.008012
Prob(F-statistic)	0.000000		

For level

LNBETFI

Null Hypothesis: LNBETFI has a unit root

Exogenous: Constant

Lag Length: 1 (Automatic - based on SIC, maxlag=20)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.839107	0.3616
Test critical values:	1% level	-3.438100	
	5% level	-2.864850	
	10% level	-2.568587	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(LNBETFI)

Method: Least Squares

Date: 11/15/10 Time: 19:45

Sample (adjusted): 3 822

Included observations: 820 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNBETFI(-1)	-0.003566	0.001939	-1.839107	0.0663
D(LNBETFI(-1))	0.128068	0.034594	3.702024	0.0002
C	0.035216	0.019944	1.765705	0.0778

R-squared	0.020680	Mean dependent var	-0.001612
Adjusted R-squared	0.018282	S.D. dependent var	0.034615
S.E. of regression	0.034297	Akaike info criterion	-3.903842
Sum squared resid	0.961047	Schwarz criterion	-3.886613
Log likelihood	1603.575	Hannan-Quinn criter.	-3.897231
F-statistic	8.626023	Durbin-Watson stat	2.007611

LNBETFI

Null Hypothesis: LNBETFI has a unit root

Exogenous: Constant

Bandwidth: 5 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-1.916283	0.3249

Test critical values:	1% level	-3.438090
	5% level	-2.864846
	10% level	-2.568585

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.001192
HAC corrected variance (Bartlett kernel)	0.001558

Phillips-Perron Test Equation
Dependent Variable: D(LNBETFI)
Method: Least Squares
Date: 11/15/10 Time: 19:54
Sample (adjusted): 2 822
Included observations: 821 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNBETFI(-1)	-0.003793	0.001950	-1.945370	0.0521
C	0.037285	0.020057	1.858970	0.0634

R-squared	0.004600	Mean dependent var	-0.001662
Adjusted R-squared	0.003384	S.D. dependent var	0.034624
S.E. of regression	0.034566	Akaike info criterion	-3.889470
Sum squared resid	0.978538	Schwarz criterion	-3.877995
Log likelihood	1598.627	Hannan-Quinn criter.	-3.885067
F-statistic	3.784465	Durbin-Watson stat	1.742018
Prob(F-statistic)	0.052072		

Regarding the BET-FI index, the results are similar with those for the other 2 indexes: for level the null hypothesis is accepted (unit Root) and for the difference it is not accepted, the BET series is of 1 order (with 1% level of significance).

Tests on independence of the instantaneous returns distributions

For the daily series the indexes of autocorrelation between the instantaneous yields have been calculated with a lag of k according to the formula:

$$\rho_k = \frac{\operatorname{cov}ar(d\ln S_t, d\ln S_{t-k})}{\operatorname{var}(d\ln S_t)}$$

Basically, after processing the data using the Eviews program, we have the following results:

For BET index

Autocorrelation coefficients' method for level

Date: 11/15/10 Time: 19:10
Sample: 1 822
Included observations: 822

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
.|*******	.|*******	1	0.996	0.996	819.00	0.000
.|*******	.| |	2	0.993	-0.004	1633.0	0.000
.|*******	.| |	3	0.989	0.011	2442.1	0.000
.|*******	.| |	4	0.986	0.037	3246.9	0.000
.|*******	.| |	5	0.983	0.014	4047.5	0.000
.|*******	.| |	6	0.979	-0.059	4843.2	0.000
.|*******	.| |	7	0.976	0.042	5634.6	0.000
.|*******	.| |	8	0.973	0.015	6421.8	0.000
.|*******	.| |	9	0.969	-0.043	7204.4	0.000
.|*******	.| |	10	0.966	-0.016	7982.2	0.000
.|*******	.| |	11	0.962	-0.011	8755.1	0.000
.|*******	.| |	12	0.958	-0.062	9522.5	0.000
.|*******	.| |	13	0.954	-0.001	10284.	0.000
.|*******	.| |	14	0.950	-0.001	11041.	0.000
.|*******	.| |	15	0.946	-0.030	11791.	0.000
.|*******	.| |	16	0.941	-0.021	12536.	0.000
.|*******	.| |	17	0.937	-0.005	13275.	0.000
.|*******	.| |	18	0.933	-0.001	14008.	0.000
.|*******	.| |	19	0.928	-0.004	14735.	0.000
.|*******	.| |	20	0.924	-0.043	15456.	0.000
.|*******	.| |	21	0.919	0.028	16171.	0.000
.|*******	.| |	22	0.915	-0.018	16879.	0.000
.|*******	.| |	23	0.910	0.001	17582.	0.000
.|*******	.| |	24	0.906	-0.003	18278.	0.000
.|******|	.| |	25	0.901	-0.013	18968.	0.000
.|******|	.| |	26	0.896	-0.031	19651.	0.000

.|******|	.| |	27	0.891	-0.002	20328.	0.000
.|******|	.| |	28	0.887	0.015	20999.	0.000
.|******|	.| |	29	0.882	-0.018	21663.	0.000
.|******|	.| |	30	0.877	-0.035	22320.	0.000
.|******|	.| |	31	0.872	-0.005	22971.	0.000
.|******|	.| |	32	0.866	-0.022	23614.	0.000
.|******|	.| |	33	0.861	-0.018	24250.	0.000
.|******|	.| |	34	0.856	0.029	24880.	0.000
.|******|	.| |	35	0.851	0.015	25503.	0.000
.|******|	.| |	36	0.846	0.007	26119.	0.000

Autocorrelation coefficients' method for the first difference

Date: 11/15/10 Time: 18:26

Sample: 1 821

Included observations: 821

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
.| |	.| |	1	0.058	0.058	2.7590	0.097
.| |	.| |	2	-0.013	-0.016	2.8891	0.236
.| |	.| |	3	-0.041	-0.039	4.2595	0.235
.| |	.| |	4	0.006	0.011	4.2920	0.368
.| |	.| |	5	0.061	0.059	7.3849	0.194
.| |	.| |	6	-0.047	-0.056	9.2031	0.162
.| |	.| |	7	-0.055	-0.047	11.682	0.112
.| |	.|* |	8	0.071	0.082	15.855	0.044
.| |	.| |	9	0.041	0.026	17.224	0.045
.| |	.| |	10	0.015	0.004	17.400	0.066
.|* |	.|* |	11	0.091	0.105	24.275	0.012
.| |	.| |	12	-0.007	-0.013	24.319	0.018
.| |	.| |	13	0.022	0.009	24.715	0.025
.| |	.| |	14	0.056	0.065	27.296	0.018
.| |	.| |	15	0.056	0.059	29.890	0.012
.| |	.| |	16	0.048	0.030	31.834	0.011
.| |	.| |	17	0.043	0.055	33.407	0.010
.| |	.| |	18	0.011	0.018	33.508	0.014
.| |	.| |	19	0.059	0.041	36.423	0.009
.| |	.| |	20	-0.048	-0.055	38.406	0.008
.| |	.| |	21	-0.009	0.004	38.481	0.011
.| |	*| |	22	-0.054	-0.068	40.979	0.008
.| |	.| |	23	0.031	0.029	41.769	0.010
.| |	.| |	24	0.003	-0.016	41.779	0.014

.| |	.| |	25	0.014	0.000	41.938	0.018
.| |	.| |	26	-0.006	-0.021	41.966	0.025
.| |	.| |	27	-0.026	-0.044	42.556	0.029
.| |	.| |	28	0.036	0.021	43.674	0.030
.|* |	.|* |	29	0.091	0.081	50.703	0.008
.| |	.| |	30	0.015	-0.006	50.888	0.010
.| |	.| |	31	0.032	0.042	51.768	0.011
.| |	.| |	32	0.026	0.027	52.359	0.013
.| |	*| |	33	-0.057	-0.069	55.131	0.009
.| |	.| |	34	-0.014	-0.024	55.308	0.012
.| |	.| |	35	-0.015	0.013	55.505	0.015
.| |	.| |	36	0.014	0.014	55.668	0.019

As we can see by using this method the BET series is integral of 1 order.

For BET-C index

Autocorrelation coefficients' method for level

Date: 11/15/10 Time: 19:15
Sample: 1 822
Included observations: 822

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
.|*******	.|*******	1	0.997	0.997	819.60	0.000
.|*******	.| |	2	0.993	-0.011	1634.7	0.000
.|*******	.| |	3	0.990	0.003	2445.3	0.000
.|*******	.| |	4	0.987	0.031	3251.9	0.000
.|*******	.| |	5	0.984	0.017	4054.6	0.000
.|*******	.| |	6	0.981	-0.059	4852.8	0.000
.|*******	.| |	7	0.977	0.030	5646.8	0.000
.|*******	.| |	8	0.974	0.006	6436.7	0.000
.|*******	.| |	9	0.971	-0.028	7222.3	0.000
.|*******	.| |	10	0.968	-0.012	8003.5	0.000
.|*******	.| |	11	0.964	-0.007	8780.2	0.000
.|*******	.| |	12	0.961	-0.049	9551.9	0.000
.|*******	.| |	13	0.957	-0.003	10319.	0.000
.|*******	.| |	14	0.953	-0.005	11080.	0.000
.|*******	.| |	15	0.949	-0.034	11837.	0.000
.|*******	.| |	16	0.945	-0.023	12588.	0.000
.|*******	.| |	17	0.941	-0.004	13333.	0.000

.|*******	.| |	18	0.937	0.000	14073.	0.000
.|*******	.| |	19	0.933	-0.005	14808.	0.000
.|*******	.| |	20	0.929	-0.045	15536.	0.000
.|*******	.| |	21	0.925	0.018	16259.	0.000
.|*******	.| |	22	0.920	-0.015	16976.	0.000
.|*******	.| |	23	0.916	0.001	17687.	0.000
.|*******	.| |	24	0.912	-0.003	18393.	0.000
.|*******	.| |	25	0.907	-0.011	19092.	0.000
.|*******	.| |	26	0.903	-0.029	19786.	0.000
.|******|	.| |	27	0.898	0.002	20473.	0.000
.|******|	.| |	28	0.894	0.002	21154.	0.000
.|******|	.| |	29	0.889	-0.017	21829.	0.000
.|******|	.| |	30	0.884	-0.024	22498.	0.000
.|******|	.| |	31	0.879	-0.000	23160.	0.000
.|******|	.| |	32	0.875	-0.021	23816.	0.000
.|******|	.| |	33	0.870	-0.011	24466.	0.000
.|******|	.| |	34	0.865	0.024	25108.	0.000
.|******|	.| |	35	0.860	0.010	25745.	0.000
.|******|	.| |	36	0.855	0.001	26376.	0.000

Autocorrelation coefficients' method for the first difference

Date: 11/15/10 Time: 18:28

Sample: 1 821

Included observations: 821

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat
.|* |	.|* |	1	0.081	0.081	5.4514
.| |	.| |	2	0.008	0.001	5.4998
.| |	.| |	3	-0.033	-0.034	6.4106
.| |	.| |	4	-0.000	0.005	6.4106
.|* |	.|* |	5	0.078	0.079	11.463
.| |	.| |	6	-0.030	-0.045	12.210
.| |	.| |	7	-0.044	-0.040	13.842
.| |	.| |	8	0.047	0.061	15.674
.| |	.| |	9	0.041	0.031	17.060
.| |	.| |	10	0.008	-0.009	17.117
.|* |	.|* |	11	0.076	0.087	21.958
.| |	.| |	12	0.005	0.000	21.975
.| |	.| |	13	0.033	0.019	22.884
.|* |	.|* |	14	0.087	0.087	29.173
.| |	.| |	15	0.066	0.062	32.849

.| |	.| |	16	0.050	0.027	34.915
.| |	.| |	17	0.059	0.064	37.825
.| |	.| |	18	0.020	0.021	38.173
.| |	.| |	19	0.070	0.053	42.328
.| |	.| |	20	-0.038	-0.049	43.523
.| |	.| |	21	-0.009	0.004	43.599
*| |	*| |	22	-0.069	-0.084	47.661
.| |	.| |	23	0.033	0.036	48.572
.| |	.| |	24	0.001	-0.021	48.572
.| |	.| |	25	0.024	0.011	49.068
.| |	.| |	26	0.008	-0.008	49.123
.| |	.| |	27	-0.022	-0.033	49.530
.| |	.| |	28	0.042	0.017	51.035
.| |	.| |	29	0.073	0.059	55.586
.| |	.| |	30	0.015	-0.015	55.788
.| |	.| |	31	0.039	0.037	57.061
.| |	.| |	32	0.012	0.003	57.177
.| |	.| |	33	-0.050	-0.063	59.319
.| |	.| |	34	-0.004	-0.016	59.334
.| |	.| |	35	-0.001	0.020	59.335
.| |	.| |	36	0.015	0.010	59.532

Similarly we see that by using this method the BET-C is integral of 1 order.

For BET-FI index

Autocorrelation coefficients' method for level

Date: 11/15/10 Time: 19:19

Sample: 1 822

Included observations: 822

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
.|*******	.|*******	1	0.996	0.996	818.61	0.000
.|*******	.| |	2	0.992	-0.034	1631.4	0.000
.|*******	.| |	3	0.988	-0.005	2438.4	0.000
.|*******	.| |	4	0.984	0.004	3239.7	0.000
.|*******	.| |	5	0.980	0.015	4035.4	0.000
.|*******	.| |	6	0.975	-0.051	4825.1	0.000
.|*******	.| |	7	0.971	0.035	5609.1	0.000
.|*******	.| |	8	0.967	0.014	6387.7	0.000
.|*******	.| |	9	0.963	-0.022	7160.7	0.000
.|*******	.| |	10	0.959	-0.007	7928.0	0.000

.|*******	.| |	11	0.955	0.007	8689.8	0.000
.|*******	.| |	12	0.951	-0.032	9445.6	0.000
.|*******	.| |	13	0.946	-0.000	10196.	0.000
.|*******	.| |	14	0.942	0.006	10940.	0.000
.|*******	.| |	15	0.938	-0.020	11678.	0.000
.|*******	.| |	16	0.933	-0.028	12410.	0.000
.|*******	.| |	17	0.929	-0.001	13135.	0.000
.|*******	.| |	18	0.924	-0.005	13855.	0.000
.|*******	.| |	19	0.919	0.000	14568.	0.000
.|*******	.| |	20	0.915	-0.044	15274.	0.000
.|*******	.| |	21	0.910	0.036	15974.	0.000
.|*******	.| |	22	0.905	-0.015	16668.	0.000
.|******|	.| |	23	0.900	-0.019	17356.	0.000
.|******|	.| |	24	0.896	-0.002	18036.	0.000
.|******|	.| |	25	0.891	-0.015	18710.	0.000
.|******|	.| |	26	0.886	-0.012	19378.	0.000
.|******|	.| |	27	0.881	-0.007	20039.	0.000
.|******|	.| |	28	0.876	0.009	20693.	0.000
.|******|	.| |	29	0.871	-0.005	21340.	0.000
.|******|	.| |	30	0.866	-0.016	21981.	0.000
.|******|	.| |	31	0.860	-0.005	22615.	0.000
.|******|	.| |	32	0.855	-0.006	23242.	0.000
.|******|	.| |	33	0.850	-0.007	23862.	0.000
.|******|	.| |	34	0.845	0.034	24476.	0.000
.|******|	.| |	35	0.840	0.023	25084.	0.000
.|******|	.| |	36	0.836	0.003	25686.	0.000

Autocorrelation coefficients' method for the first difference

Date: 11/15/10 Time: 18:28

Sample: 1 821

Included observations: 821

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
.|* |	.|* |	1	0.129	0.129	13.675	0.000
.| |	.| |	2	0.042	0.026	15.135	0.001
.| |	.| |	3	0.016	0.007	15.335	0.002
.| |	.| |	4	0.001	-0.003	15.336	0.004
.| |	.| |	5	0.068	0.069	19.165	0.002
.| |	*| |	6	-0.057	-0.076	21.903	0.001
.| |	.| |	7	-0.051	-0.039	24.042	0.001
.| |	.|* |	8	0.059	0.076	26.971	0.001

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<tr><td>.| |</td><td>.| |</td><td>9</td><td>0.028</td><td>0.017</td><td>27.642</td><td>0.001</td></tr>
<tr><td>.| |</td><td>.| |</td><td>10</td><td>-0.036</td><td>-0.054</td><td>28.742</td><td>0.001</td></tr>
<tr><td>.| |</td><td>.| |</td><td>11</td><td>0.028</td><td>0.047</td><td>29.389</td><td>0.002</td></tr>
<tr><td>.| |</td><td>.| |</td><td>12</td><td>0.014</td><td>0.012</td><td>29.548</td><td>0.003</td></tr>
<tr><td>.| |</td><td>.| |</td><td>13</td><td>0.022</td><td>-0.000</td><td>29.956</td><td>0.005</td></tr>
<tr><td>.| |</td><td>.| |</td><td>14</td><td>0.040</td><td>0.039</td><td>31.320</td><td>0.005</td></tr>
<tr><td>.| |</td><td>.|* |</td><td>15</td><td>0.072</td><td>0.083</td><td>35.725</td><td>0.002</td></tr>
<tr><td>.| |</td><td>.| |</td><td>16</td><td>0.056</td><td>0.020</td><td>38.347</td><td>0.001</td></tr>
<tr><td>.| |</td><td>.| |</td><td>17</td><td>0.046</td><td>0.025</td><td>40.115</td><td>0.001</td></tr>
<tr><td>.| |</td><td>.| |</td><td>18</td><td>-0.010</td><td>-0.012</td><td>40.198</td><td>0.002</td></tr>
<tr><td>.| |</td><td>.| |</td><td>19</td><td>0.047</td><td>0.045</td><td>42.038</td><td>0.002</td></tr>
<tr><td>.| |</td><td>*| |</td><td>20</td><td>-0.060</td><td>-0.087</td><td>45.116</td><td>0.001</td></tr>
<tr><td>.| |</td><td>.| |</td><td>21</td><td>-0.011</td><td>0.015</td><td>45.218</td><td>0.002</td></tr>
<tr><td>.| |</td><td>.| |</td><td>22</td><td>-0.028</td><td>-0.022</td><td>45.880</td><td>0.002</td></tr>
<tr><td>.| |</td><td>.| |</td><td>23</td><td>0.005</td><td>0.012</td><td>45.900</td><td>0.003</td></tr>
<tr><td>.| |</td><td>.| |</td><td>24</td><td>-0.003</td><td>-0.019</td><td>45.907</td><td>0.005</td></tr>
<tr><td>.| |</td><td>.| |</td><td>25</td><td>0.007</td><td>0.026</td><td>45.944</td><td>0.007</td></tr>
<tr><td>.| |</td><td>.| |</td><td>26</td><td>0.026</td><td>0.016</td><td>46.530</td><td>0.008</td></tr>
<tr><td>.| |</td><td>.| |</td><td>27</td><td>-0.012</td><td>-0.031</td><td>46.645</td><td>0.011</td></tr>
<tr><td>.| |</td><td>.| |</td><td>28</td><td>-0.013</td><td>-0.016</td><td>46.799</td><td>0.014</td></tr>
<tr><td>.| |</td><td>.| |</td><td>29</td><td>0.020</td><td>0.034</td><td>47.156</td><td>0.018</td></tr>
<tr><td>.| |</td><td>.| |</td><td>30</td><td>0.027</td><td>0.004</td><td>47.789</td><td>0.021</td></tr>
<tr><td>.| |</td><td>.| |</td><td>31</td><td>0.017</td><td>0.003</td><td>48.026</td><td>0.026</td></tr>
<tr><td>.| |</td><td>.| |</td><td>32</td><td>0.022</td><td>0.022</td><td>48.459</td><td>0.031</td></tr>
<tr><td>*| |</td><td>*| |</td><td>33</td><td>-0.077</td><td>-0.086</td><td>53.576</td><td>0.013</td></tr>
<tr><td>.| |</td><td>.| |</td><td>34</td><td>-0.043</td><td>-0.044</td><td>55.142</td><td>0.012</td></tr>
<tr><td>.| |</td><td>.| |</td><td>35</td><td>-0.029</td><td>-0.001</td><td>55.884</td><td>0.014</td></tr>
<tr><td>.| |</td><td>.| |</td><td>36</td><td>0.047</td><td>0.073</td><td>57.825</td><td>0.012</td></tr>
</table>

For BET-FI were obtained similar results to other two indexes, so that we can conclude based on this method that the BET-FI series is integral of 1 order.

7. Conclusions and considerations

Following statistical tests applied to stock indexes BET, BET-C and BET-FI, we can take the following conclusions:

- applied statistical tests to detect random-walk type behavior led to the rejection of hypothesis behavior of these daily series of stock indices.
- have not obtained sufficient evidence to support the efficient market hypothesis in weak form, for the daily stock indices.

From a statistical viewpoint, the test results do not confirm the random-walk hypothesis of stock indices value and the instantaneous returns are autocorrelated for certain lags .Even in cases when the normality hypothesis of the instantaneous returns can not be dismissed, autocorrelation coefficients are found to be significantly different from zero for one or more of lags from 1 to 10. They may suggest using past information to obtain abnormal returns. Under these conditions, using models based on the efficiency hypothesis seems unspecified in order to obtain useful results.

The statistical tests performed for each of the stock indexes indicate the fact that the evolution of the training is independent from one period to another (autocorrelation coefficients are significantly different from zero), which invalidates the efficiency hypothesis of weak form market.

In these circumstances, the logical conclusion would be possible to obtain abnormal gains. However, the reduced liquidity of Romanian capital market and the existence of significant transaction costs and differentiated, can reduce or even eliminate the possibility of such gains.

We specify that regardless of the conclusions we reached in this worksheet, they will be confirmed by further analysis of the companies listed on the Bucharest Stock Exchange, taking into account the analysis of weekly data to eliminate the effect of random influences.

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References

Dragotă, V., Dragotă, M., Dămian, O., Mitrică, E., (2003), *Gestiunea portofoliului de valori mobiliare*, Ed. Economică, Bucureşti.

Dragotă, V., Mitrică, E., (2004), *Emergent capital markets` efficiency: The case of Romania*, European Journal of Operational Research, 155, issue 2, pg. 353-360.

Fama, E., (1970), *Efficient Capital Markets: a Review of Theory and Empirical Work*, Journal of Finance, 25 may.

Grossman, S., Stiglitz, J., (1980), *On the Impossibility of Informationally Efficient Markets*, The American Economic Review, vol 70, issue3, June 1980, pg. 393-408.

Pecican, Ş., (2006), *Econometrie*, Ed. C.H. Beck, Bucureşti.

Stancu, I., (2003), *Finanţe*, Ed. Economică, Bucureşti.

Tudorel, A., Regis, B., (2008), *Econometrie*, Ed. Economică, 2008.

Voineagu, V., Pele.D., (2008), *Testing Market Efficiency via Decomposition of Stock Return. Aplication Romanian Capital Market*, Romanian Journal of Economic Forcasting, nr. 3, pg. 63-79.

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