Approaching the concept of national identity based on a case study regarding long - term causality and financial integration between the capital markets in Romania and Hungary

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Abstract: *The main purpose of this research article is to investigate the socio - economic implications of long - term causality and financial integration between the capital markets in Romania and Hungary. Bucharest Stock Exchange(Romania) is a frontier market and Budapest Stock Exchange is an advanced emerging market (Romania). Frontier markets are much less liquid, considerably more volatile and emphasize lower market capitalization than emerging (advanced or secondary) or developed capital markets. The empirical analysis is based on daily returns of selected stock markets major indices BET (Romania) and BUX (Hungary) for the period January 2000 until July 2017. The empirical analysis is based on Unit Root Test, Augmented Dickey-Fuller stationary test, BDS test and Granger causality test.*

Key-Words : *globalization, capital market, causality, financial integration, stock index, poverty rates, GDP*

1. Introduction

Romania and Hungary are two member states of the European Union but reveals different levels of socio-economic development. Hungary and Romania are neighbors and have a common history in some respects. The Hungarian community in Romania is particularly significant in some counties in Transylvania such as Harghita and Covasna. According to FTSE Country Classifications, data provided on March 2017, Hungary is included in the category of Advanced Emerging Markets, while Romania is included in the category of Frontier Markets. Moreover, the main categories provided by FTSE Country Classifications are the following : developed, advanced emerging, secondary emerging and frontier. Moreover, according to the official statistics of World Bank on Romania provided in April 2017, the share of Romanians at risk of poverty after social transfers increased from 22.9% in 2012 to 25.4% in 2015, while the share of the population at risk of poverty and social exclusion decreased from 43.2% in 2012 to 37.4% in 2015.

2. Applied methodology and empirical results

The empirical analysis provides a quantitative perspective on interdependencies between Romania and Hungary. The influence factors are varied and highlight very important issues. In the following figure is provided a comparative analysis between Romania and Hungary based on GDP per capita, PPP (current international $) during 1990 – 2016.

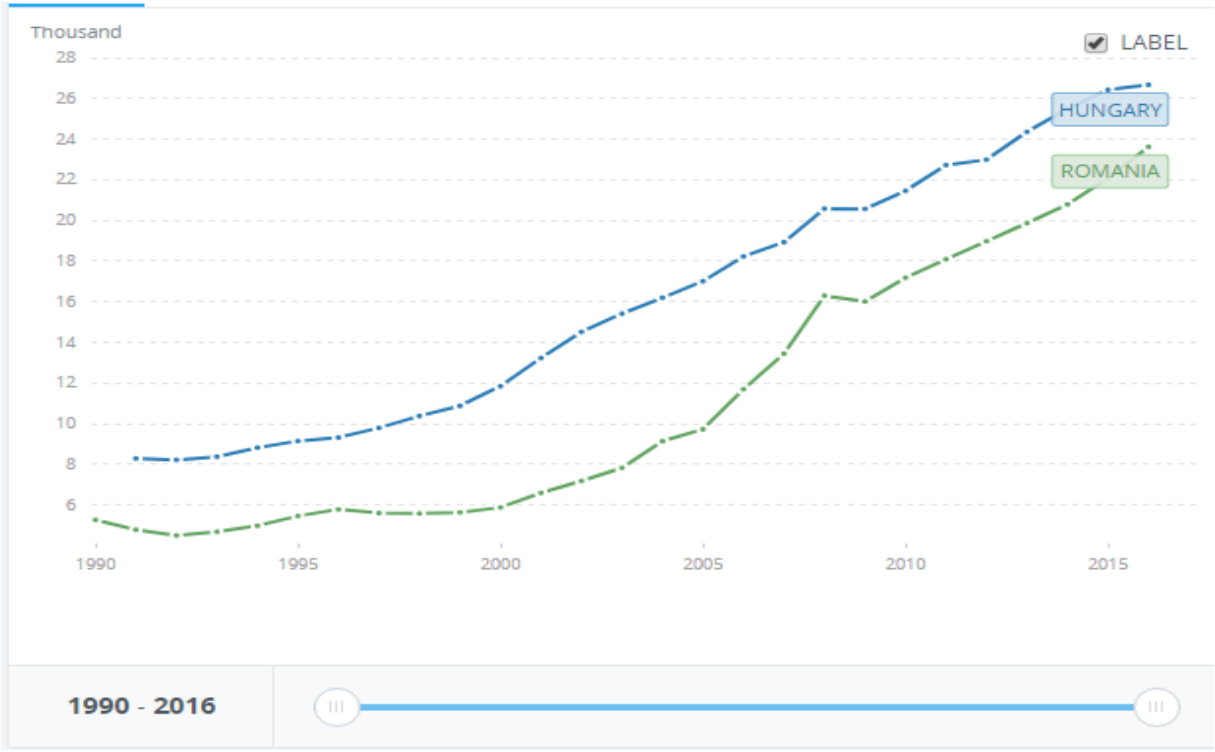

Fig. 1 Comparative analysis between Romania and Hungary based on GDP per capita, PPP (current international $) during 1990 - 2016

Source : World Bank, International Comparison Program database

Technically, official statistics suggest that Romania has one of the most significant poverty rates in the European Union considering that for the previous year 2016 the GDP in current US$ billion had the value 187.0 and the GDP per capita, ie the gross domestic product converted to international dollars using purchasing power parity rates, in current US$ had the value 9,528.

Moreover, in the following is provided a Comparative analysis between Romania and Hungary based on poverty headcount ratio at national poverty lines (% of population) during 2004 – 2014.

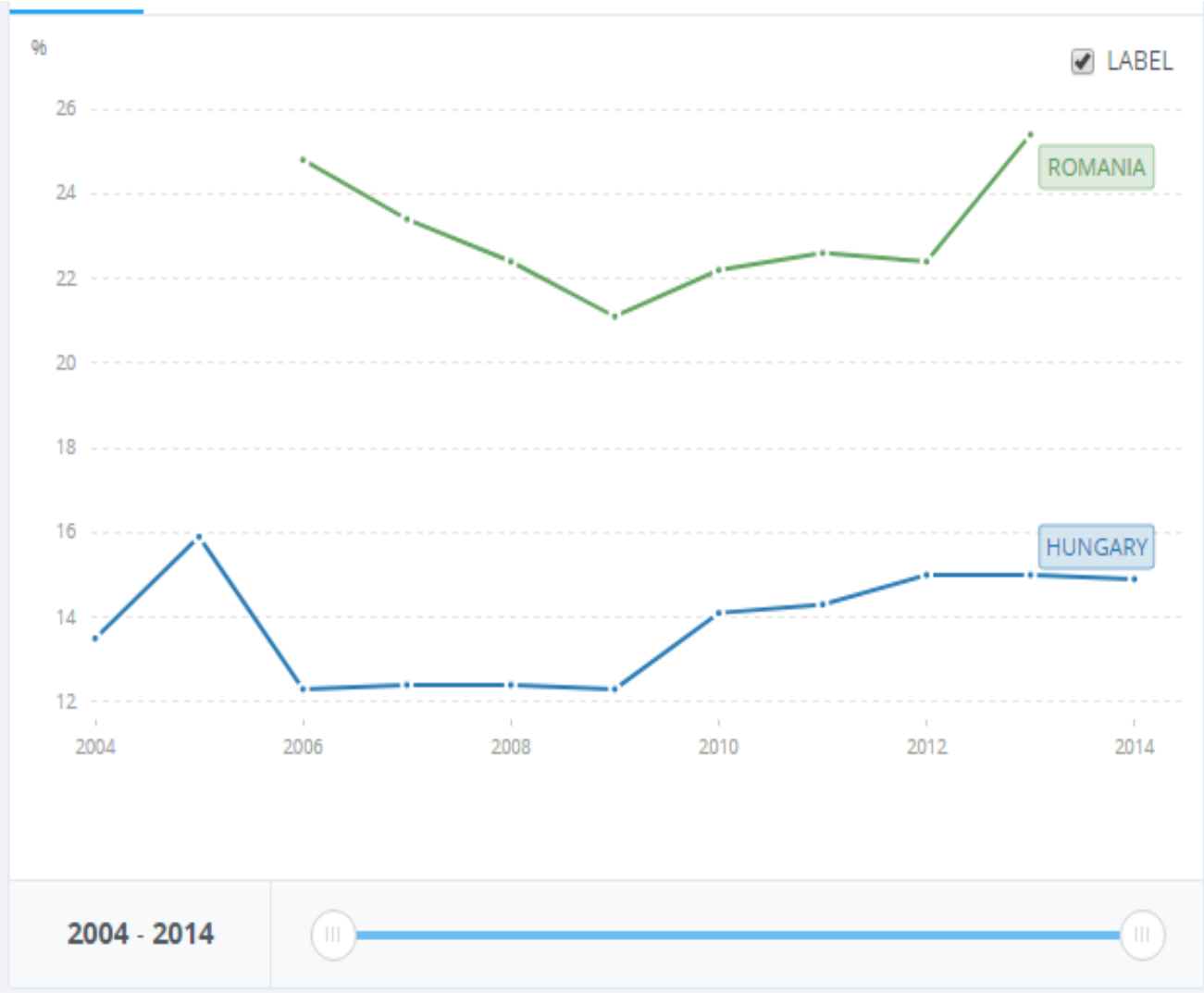

Fig. 2 Comparative analysis between Romania and Hungary based on poverty headcount ratio at national poverty lines (% of population) during 2004 - 2014

Source : World Bank, Global Poverty Working Group

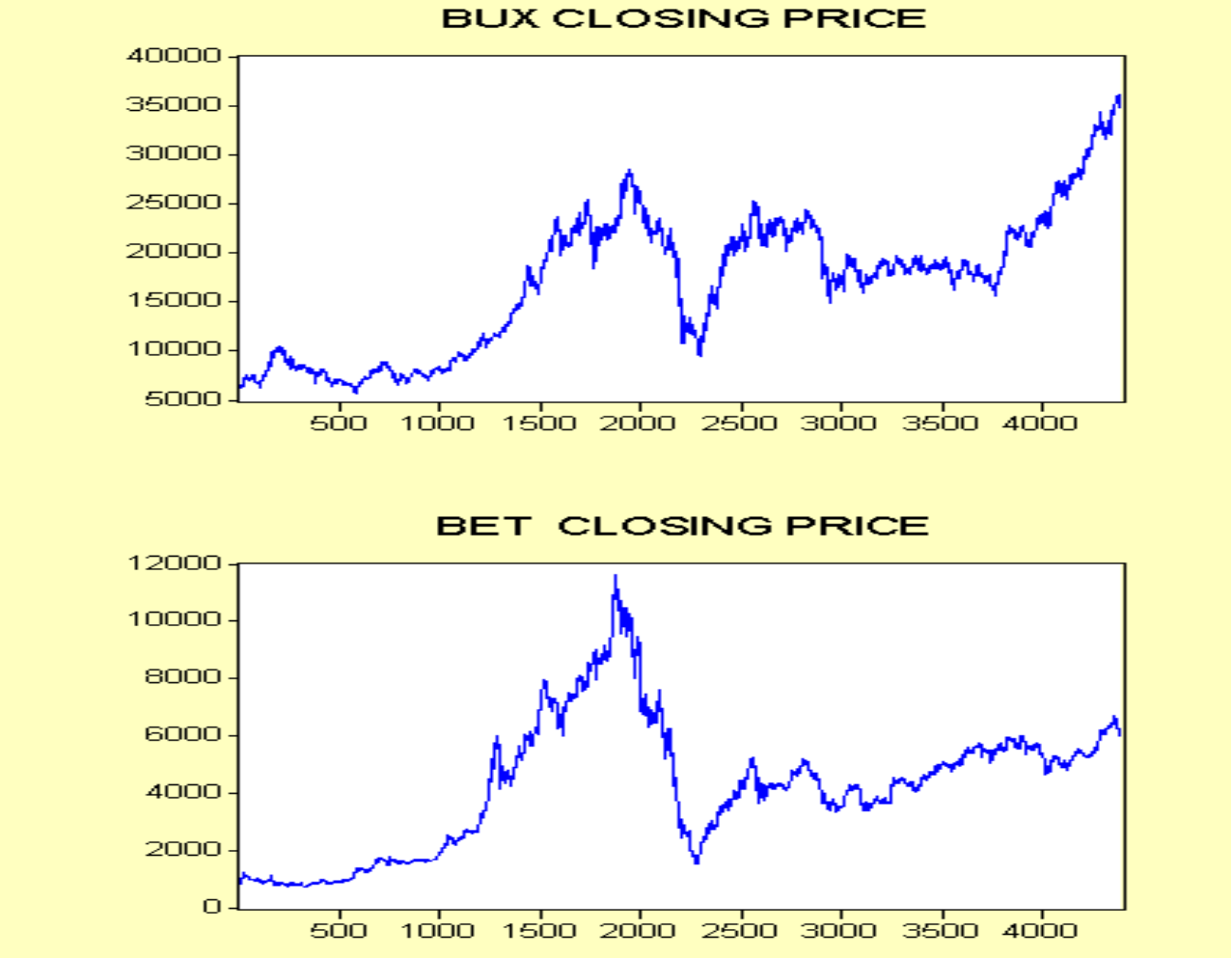

Fig. 1 : The trend of BET (Romania) and BUX (Hungary) stock indices

- individual graphics –

Source: Own computations based on selected financial data series

The continuously-compounded daily returns are calculated using the log-difference of stock markets selected indices, namely BET index (Romania) and BUX index (Hungary), as follows :

$$r_t = \ln\left(\frac{p_t}{p_{t-1}}\right) = \ln(p_t) - \ln(p_{t-1})$$

where p is the daily closing price. Data series consists of the daily closing prices for each selected index from January 2000 to July 2017 with the exception of legal holidays or other events when stock markets haven't performed any financial transactions.

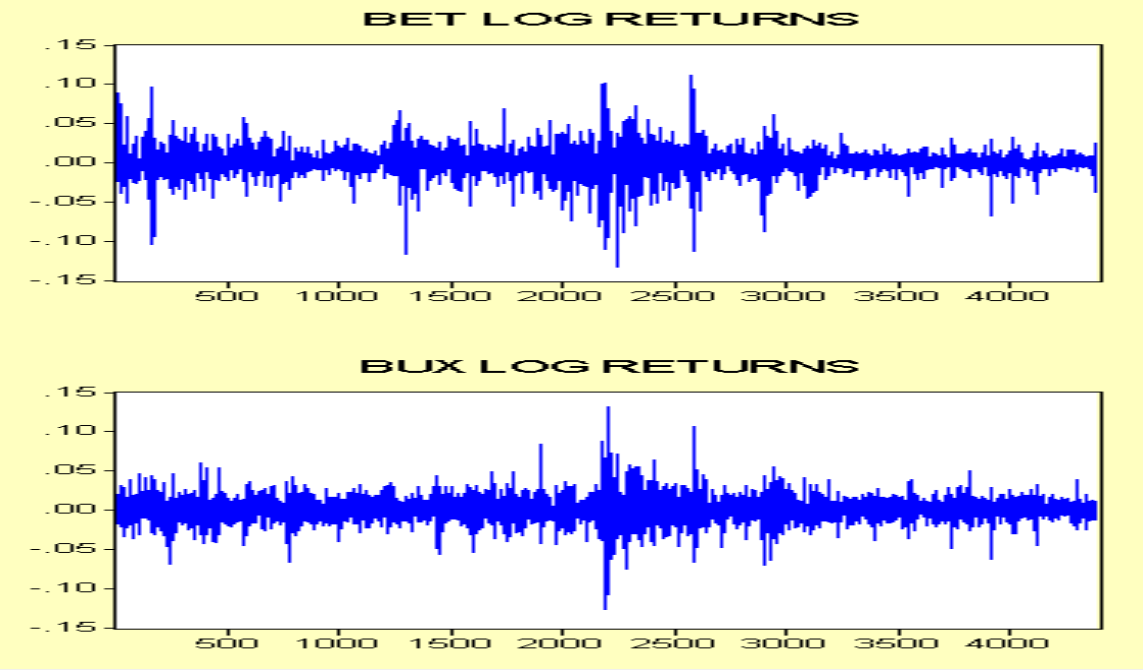

Fig. 2 : The log-returns of BET (Romania) and BUX (Hungary) stock indices

- individual graphics -

Source: Own computations based on selected financial data series

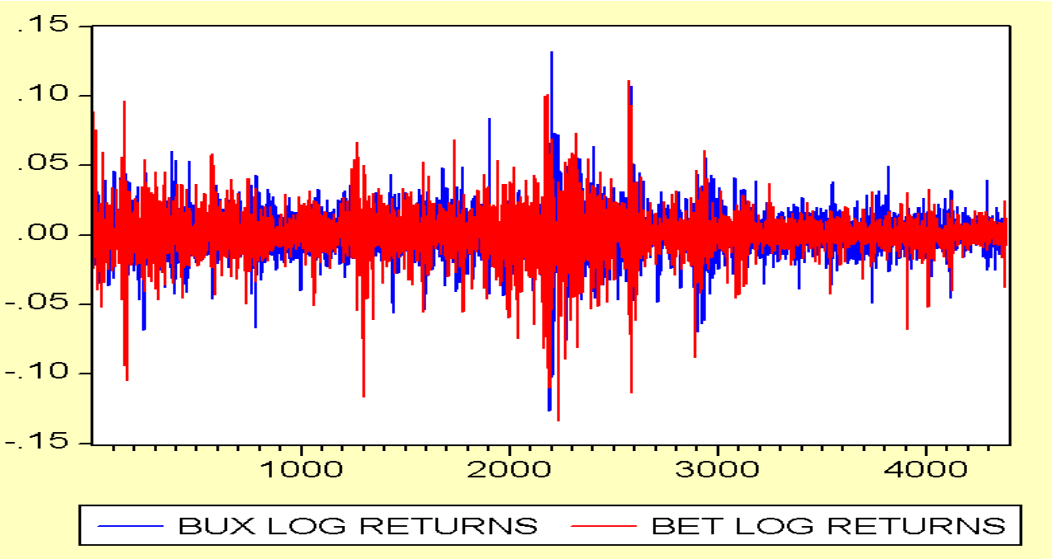

Fig. 3 : The log-returns of BET Index (Romania) and BUX Index (Hungary) - joint graphics –

Source: Own computations based on selected financial data series

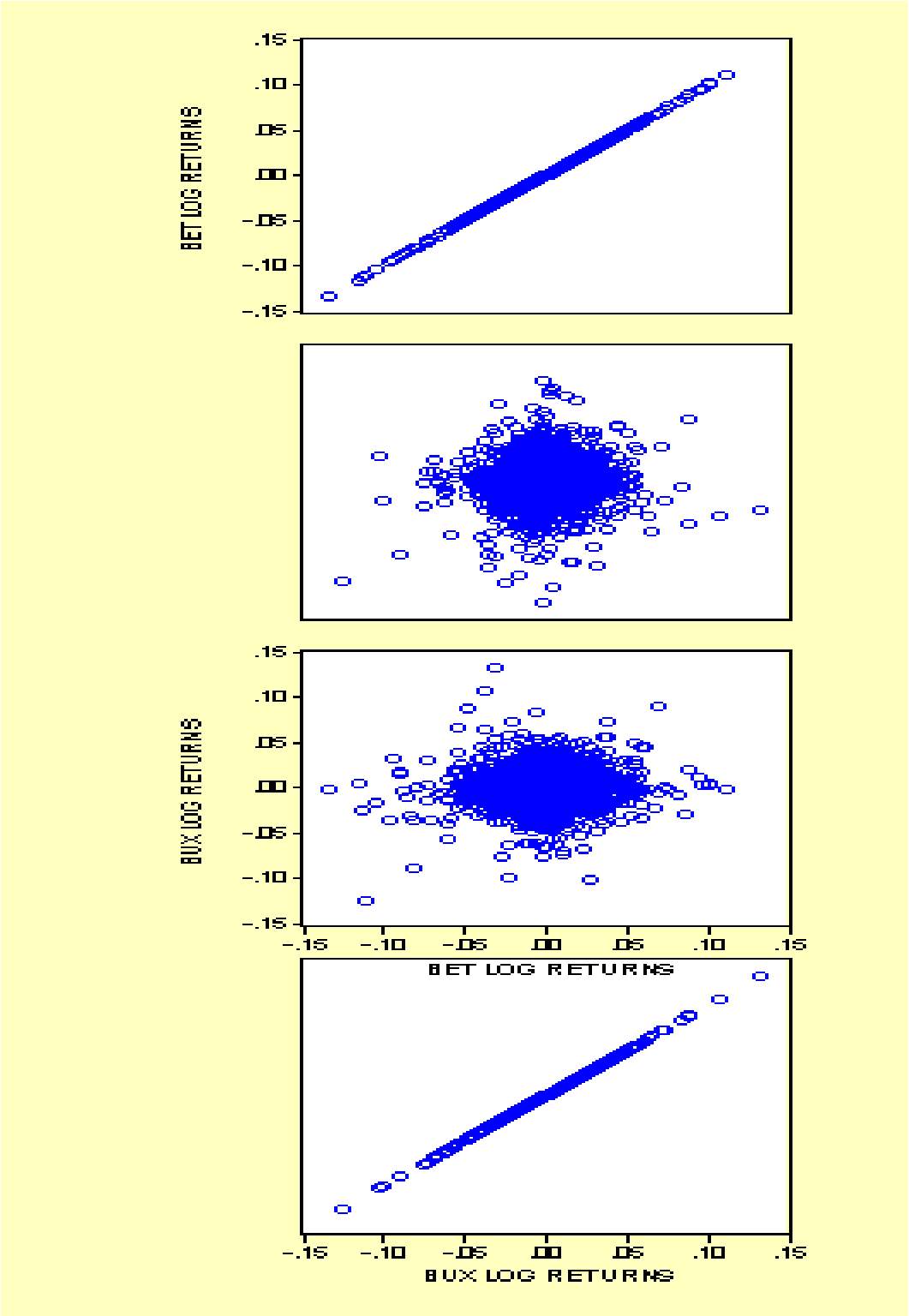

Fig. 4 : Matrix of all pairs of selected stock market indices

Source: Own computations based on selected financial data series

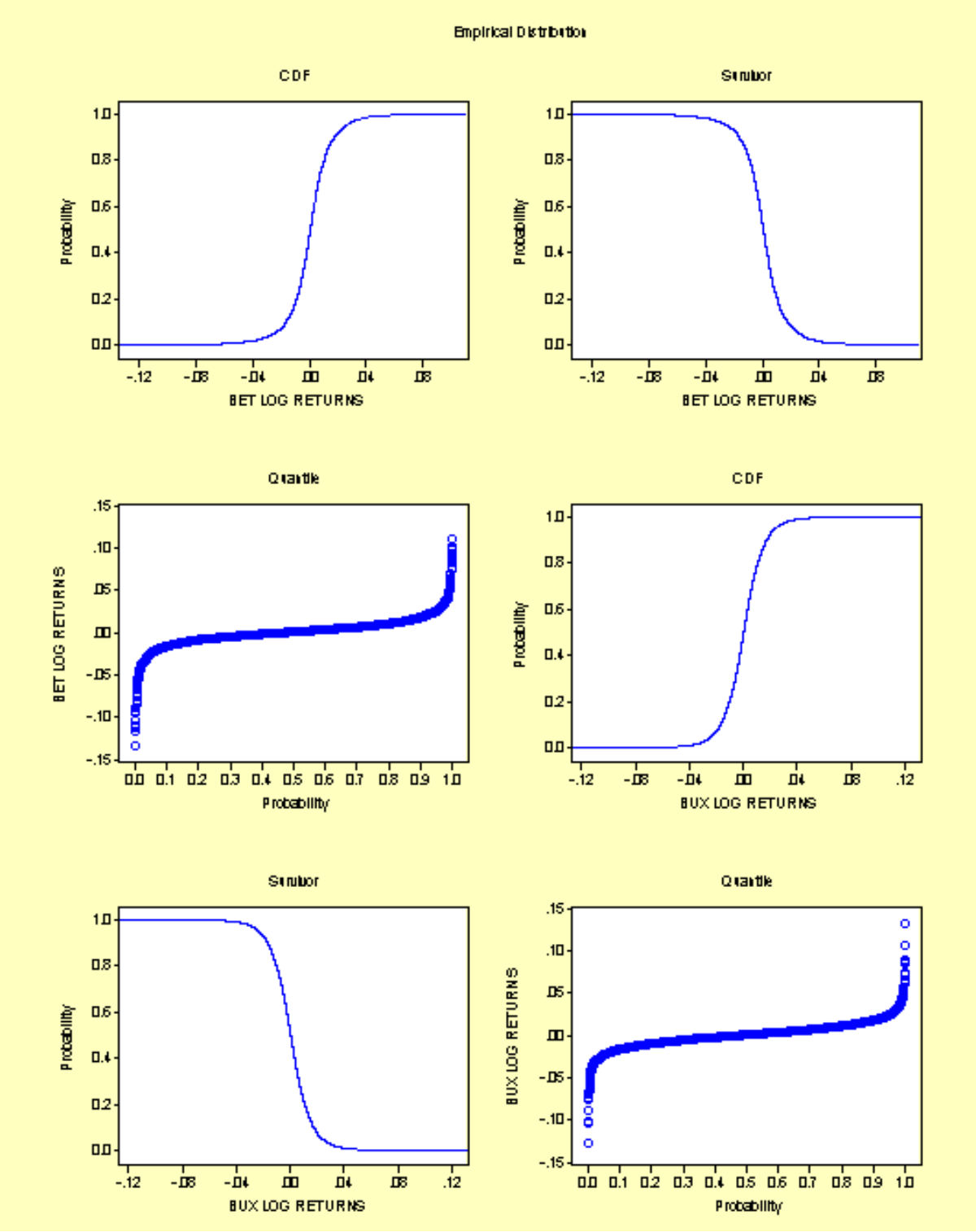

Fig. 5 : Distribution graphics CDF - SURVIVOR – QUANTILE

Source: Own computations based on selected financial data series

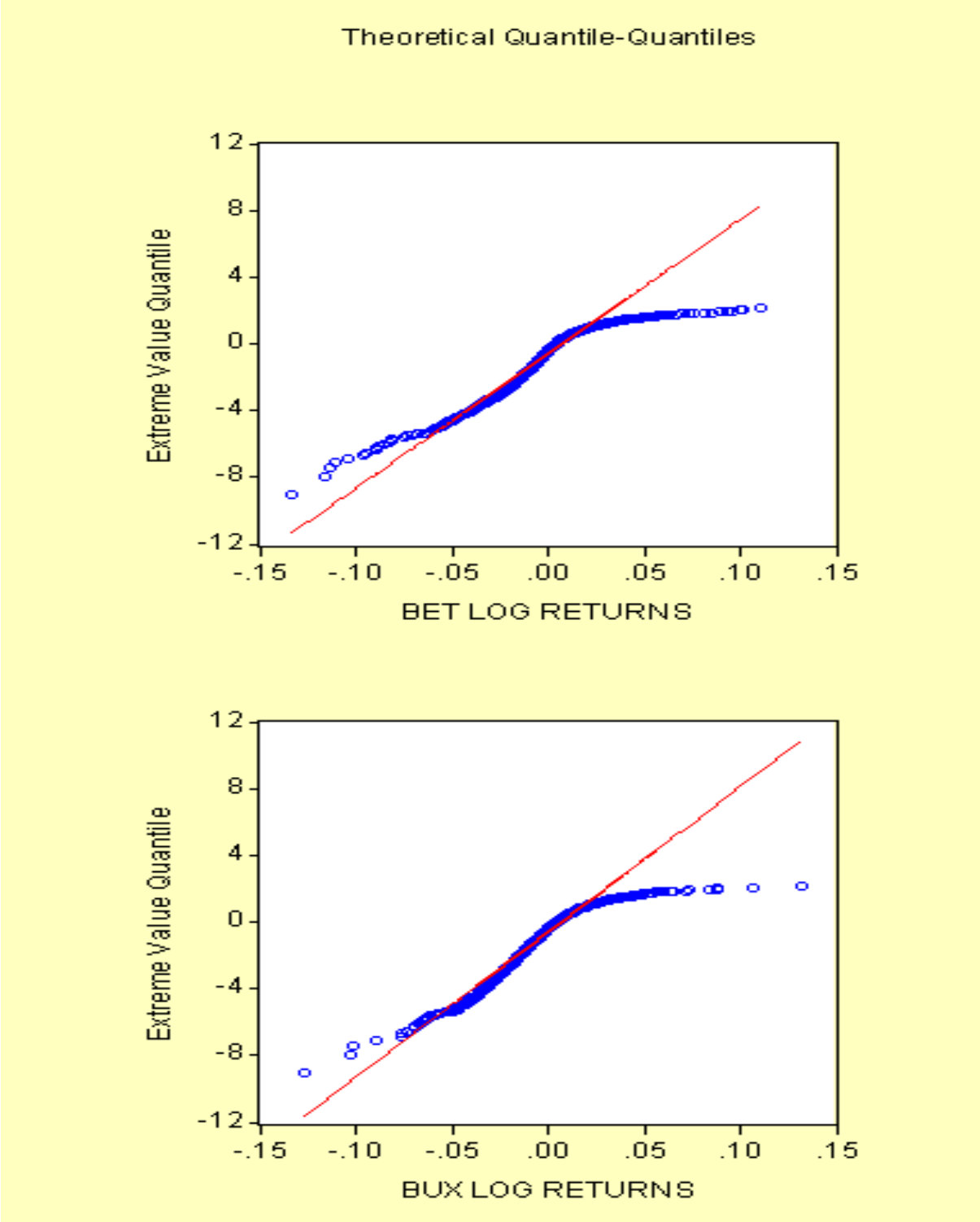

Fig. 6 : Theoretical Quantile-Quantile Plots (Extreme values)

Source: Own computations based on selected financial data series

The basic statistical characteristics of BET index (Romania) and BUX index (Hungary) stock indices are represented by the following : Jarque-Bera test's statistic which allows to eliminate the normality of distribution hypothesis, parameter of asymmetry of distribution or Skewness and Kurtosis parameter which measures the peakedness or flatness of the distribution, ie leptokurtic distribution.

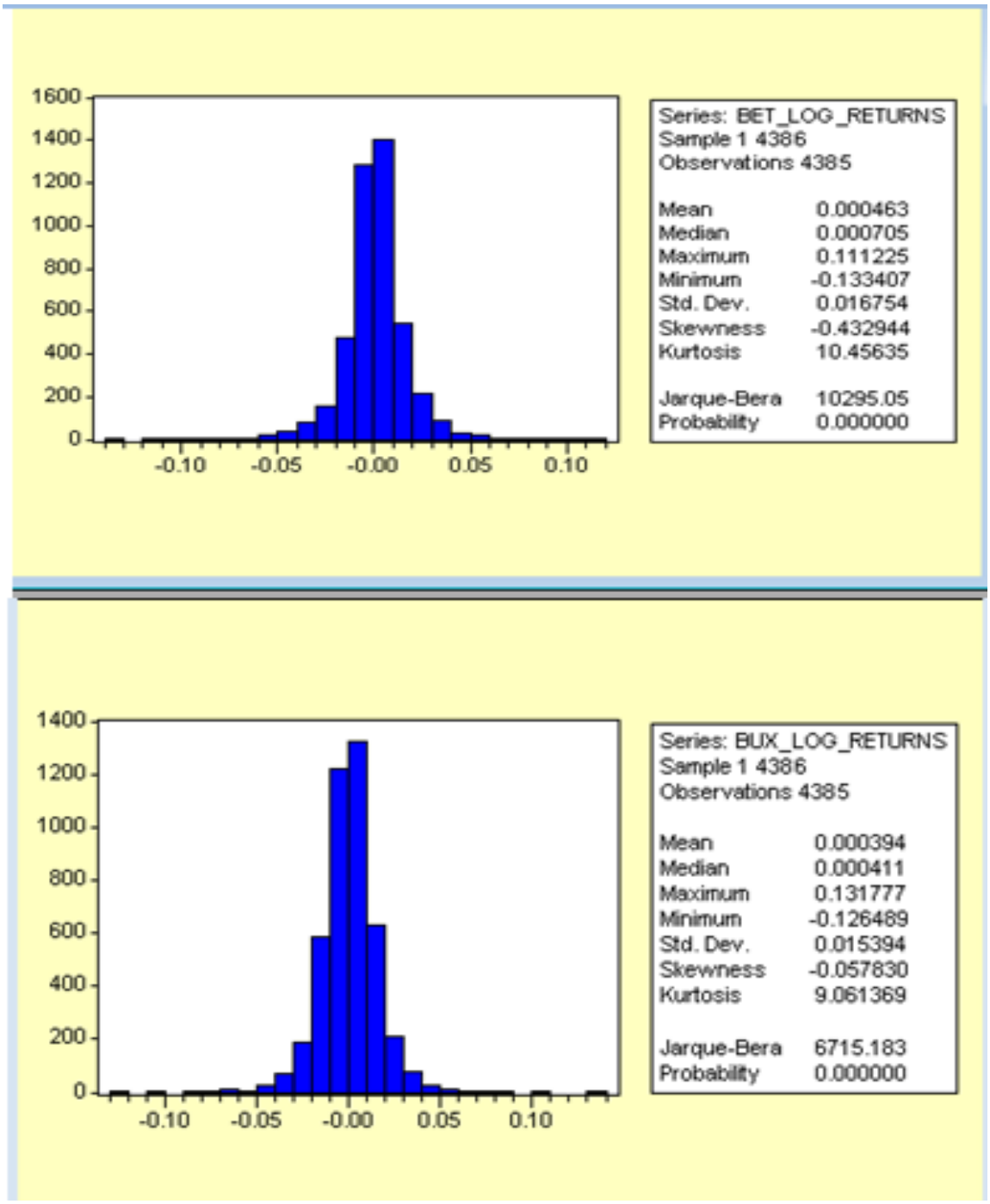

Fig.7 : Basic statistical characteristics of selected stock indices

Source: Own computations based on selected financial data series

Augmented Dickey-Fuller test was applied in order to determine the stationarity of the selected financial time series. The null hypothesis is that the selected financial time series contains a unit root and it is implicitly non-stationary. Empirical analysis based on the log-returns of the selected indices reflects the fact that $t_{test\_}ADF<t_{critic}$ (1%, 5%, 10%) so the null hypothesis H_0 is rejected and the analyzed time series is stationary. Simultaneous, it is obtain the following result : Prob (0%) < test levels (1%, 5%, 10%) so the null hypothesis H_0 is rejected and the selected financial time series is stationary.

Table 1: Augmented Dickey-Fuller (ADF) Test

Null Hypothesis: D(BUX_LOG_RETURNS) has a unit root

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-23.34988	0.0000
Test critical values:	1% level	-3.431667	
	5% level	-2.862007	
	10% level	-2.567062	

Null Hypothesis: D(BET_LOG_RETURNS) has a unit root

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-21.48076	0.0000
Test critical values:	1% level	-3.431668	
	5% level	-2.862007	
	10% level	-2.567062	

Source: Own computations based on selected financial data series

The BDS test was used in order to determine whether the residuals are independent and identically distributed. The BDS statistics converges in distribution to N(0,1) thus the null hypothesis of independent and identically distributed is rejected based on a result such as $\left|V_{m,\varepsilon}\right| > 1{,}96$ in terms of a 5% significance level. The null hypothesis was rejected in all four sample cases.

Table 2 : BDS Test

BDS Test for BET_LOG_RETURNS
Sample: 05/01/2000 to 14/07/2017

Included observations: 4386

Dimension	BDS Statistic	Std. Error	z-Statistic	Prob.
2	0.039719	0.001509	26.31547	0.0000
3	0.075013	0.002403	31.20998	0.0000
4	0.099974	0.002868	34.85238	0.0000
5	0.114010	0.002997	38.04415	0.0000
6	0.120469	0.002897	41.58382	0.0000

BDS Test for BUX_LOG_RETURNS
Sample: 05/01/2000 to 14/07/2017

Included observations: 4386

Dimension	BDS Statistic	Std. Error	z-Statistic	Prob.
2	0.015840	0.001283	12.34321	0.0000
3	0.031801	0.002035	15.62639	0.0000
4	0.043320	0.002418	17.91361	0.0000
5	0.050348	0.002515	20.01774	0.0000
6	0.052850	0.002420	21.83531	0.0000

Source: Own computations based on selected financial data series

Table 3 : Granger Causality tests

Pairwise Granger Causality Tests
Sample: 4386
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Probability
BET_LOG_RETURNS does not Granger Cause BUX_LOG_RETURNS	4384	13.0709	0.00030
BUX_LOG_RETURNS does not Granger Cause BET_LOG_RETURNS		1.09882	0.29458

Pairwise Granger Causality Tests
Sample: 4386
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Probability
BET_LOG_RETURNS does not Granger Cause BUX_LOG_RETURNS	4383	6.50628	0.00151
BUX_LOG_RETURNS does not Granger Cause BET_LOG_RETURNS		1.05514	0.34823

Source: Own computations based on selected financial data series

The Granger causality test is considering the possible relationships between two or more time series and also suggests that if X_t and Y_t are two different stationary time series variables with zero means, then the canonical causal model has the following form :

$$X_t = \sum_{j=1}^{m} a_j X_{t-j} + \sum_{j=1}^{m} b_j Y_{t-j} + \varepsilon_t$$

$$Y_t = \sum_{j=1}^{m} c_j X_{t-j} + \sum_{j=1}^{m} d_j Y_{t-j} + \eta_t$$

where ε_t and η_t play the role of two uncorrelated white-noise series, namely $E[\varepsilon_t \varepsilon_s] = 0 = E[\eta_t \eta_s]$ for $s \neq t$ and on the other hand $E[\varepsilon_t \varepsilon_s] = 0$ for $\forall t, s$. The concept of causality requires that in the case when Y_t is causing X_t some b_j is different from zero and vice versa, ie in the case when X_t is causing Y_t some c_j is different from zero. A special case implies that causality is valid simultaneously in both directions or simply a so-called "feedback relationship between X_t and Y_t".

Considering the Probability values obtained on the Granger causality test, the empirical evidence provides some interesting results based on the very long period of time, ie January 2000 to July 2017. Considering that the null hypothesis is rejected if the F-value exceeds the critical F value at the selected level of significance (5%) or if the P-value is lower than the α level of significance, appears that Granger causality runs one way, from Hungary to Romania, but not the other way considering the fact that null hypothesis of no Granger causality is rejected.

3. Conclusions

The behavior of emerging capital market, and even more so in the case of frontier market is characterized by certain stylized facts such as : volatility clustering, non-stationarity of price levels, leverage effect, heteroskedastic log returns, time variation, unpredictability, fat-tailed distribution, chaos, deviations from normal distribution, high risk, high profit opportunities, atypical movements.

Practically, frontier markets are much less liquid, considerably more volatile and highlighting lower market capitalization than emerging (advanced or secondary) or developed capital markets. Thereby it is also obvious the difference of socio-economic progress between Romania and Hungary. Hungary's nominal GDP per capita is also significantly higher than in the case of Romania.

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