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COMPARISON OF CAPITAL MARKETS IN BULGARIA, ROMANIA AND SLOVAKIA IN YEARS 2001-2009

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Abstract: The aim of research is evaluation of the development of stock exchanges in Sofia, Bucharest and Bratislava in the years 2000-2009. The analysis is provided for the logarithmic rates of return of main stock indexes quoted in the investigated countries, employing central tendency, dispersion and skewness measures as well as statistical inference. The research is provided for the whole period and for the sub-periods that are distinguished due to the general tendency at capital markets.

Keywords: emerging capital markets, stock index, time series analysis

INTRODUCTION

The Central and Eastern European countries have been undergoing transformation from a centrally planned economy to a market-orientated economic system since the collapse of the communist regimes in the year 1989. Privatization and activation of stock exchanges are ones of main symptoms of transformation. According to the level of capital markets development, countries in transition can be classified into four groups [Shostya et al. 2008]:

1. early reformers i.e. countries that activated stock exchanges in years 1989 – 1992: Slovenia (1989), Serbia (1989), Hungary (1990), Bulgaria (1991) Croatia (1991), Poland (1991), Slovakia (1991), and Czech Republic (1992);
2. laggards i.e. countries that activated stock exchanges in years 1993 – 1996: Kazakhstan (1993), Latvia (1993, Lithuania (1993), Kyrgyzstan (1994), Estonia (1995), FYR of Macedonia (1995), Moldova (1995), Romania (1995), and Russia (1995);

3. late reformers i.e. countries that activated stock exchanges in years 1998 – 2002: Belarus (1998), Georgia (1999), Azerbaijan (2000), Armenia (2001), and Ukraine (2002);
4. countries with no stock exchange: Albania, Bosnia & Herzegovina, Tajikistan, and Turkmenistan. However Tirana Stock Exchange[1] together with Banja Luca and Sarajevo Stock Exchanges[2] started quotations in 2002.

Among post-communist countries listed above, 10 of them became member states of European Union. Considering stock exchanges operated in these countries we notice that now we may select 3 groups of capital markets (Table 1).

Table 1. Groups of stock exchanges from transformed economies from EU states

CEE Stock Exchange Group	NASDAQ OMX	Independent stock exchanges
Prague Stock Exchange	Tallinn Stock Exchange	Warsaw Stock Exchange
Budapest Stock Exchange	Riga Stock Exchange	Bratislava Stock Exchange
Ljubljana Stock Exchange	Vilnius Stock Exchange	Bulgarian Stock Exchange
		Bucharest Stock Exchange

Source: own elaboration

In our research we consider only three stock exchanges located in Bratislava, Sofia and Bucharest since they are independent markets (together with the Warsaw Stock Exchange) among new EU states from that part of Europe. The aim of our investigation is to compare the development of stock exchanges in Sofia, Bucharest and Bratislava in the years 2000-2009. The analysis is provided for the logarithmic rates of return of main stock indexes quoted in the investigated countries, employing central tendency, dispersion and skewness measures as well as statistical inference. The research is provided for the whole period and for the sub-periods that are distinguished due to the general tendency at capital markets.

LITERATURE REVIEW

International market linkages has attracted investors and policy-makers attention. Consequently, international equity market integration is a topic often discussed in literature, especially many researchers have investigated the short-term and long-term interrelationships among worldwide financial markets. However Syriopoulos (2007) notices that despite the growing importance of the emerging Central European (CE) stock markets, the relevant body of research remains surprisingly limited. Furthermore, the empirical findings on this topic appear rather ambiguous and contradictory.

The paper [Gilmore et al. 2008] examines short- and long-term comovements between developed European Union (German and UK) stock

[1] See http://www.tse.com.al
[2] See http://www.bilberza.com, http://195.222.43.81/sase-final

markets and three Central European (Poland, Czech Republic, Hungary) markets. While Gilmore and McManus (2002) are looking for links between three major CE markets (Poland, Czech Republic and Hungary), and the USA.

Voronkova (2004) investigates the existence of long-run relations between emerging Central European stock markets (Poland, Czech Rep. and Hungary), and the mature stock markets of Europe (Germany, France, UK) and US. Long-run linkages are detected between CE emerging and mature stock markets, implying limited diversification benefits for international investor portfolios allocated to these markets.

The paper [Syriopoulos, 2007] investigates the short- and long-run behavior of major emerging Central European (Poland, Czech Republic, Hungary and Slovakia) and developed (Germany and USA) stock markets and assesses the impact of the EMU on stock market linkages. The empirical findings have important implications for the effectiveness of domestic policy decision, as the emerging Central European states have recently joined the EU and local stock markets may become less immunized to external shocks.

MacDonald (2001) studies the CE stock market indices as a group against each of three developed markets (US, Germany and UK), and concludes significant long-run comovements for each of the groupings. Poghosyan (2009) assesses the degree of financial integration for Germany with eight transformed economies being "new" European Union member states.

Serwa and Bohl (2003) investigate contagion implications for European capital markets that are associated with seven important shocks between the years 1997 – 2000. The study uses correlation analysis and compares developed European markets (Greece, Germany, UK, France, Ireland, Spain and Portugal) with major Central and Eastern European (CEE) markets (Poland, Czech Rep. Russia and Hungary). Weak evidence of increased cross-market linkages following these crises is found, whereas emerging market returns do not converge to the developed market returns. CEE stock markets are concluded to still offer considerable risk diversification opportunities.

Egert and Kocenda (2005) investigate interrelations between three CE (represented by indexes BUX, PX-50 and WIG20) and Western European (- DAX, CAC, UKX) stock markets from the mid-2003 to the early 2005. They find signs of short-term spillover effects both in terms of stock returns and stock price volatility. The paper [Egert and Kocenda 2007] relates to analysis of comovements between three developed (France, Germany, UK) and three emerging (Czech Republic, Hungary, Poland) capital markets. Employing intraday data from June 2003 to January 2006 they find a strong correlation between German and French markets as well as between these two markets and the UK stock market. By contrast very little systematic positive correlation can be detected between mature and emerging European stock markets, and also within the latter group.

Analyses concerning relations among European emerging markets can be also found in [Shostya et al. 2008, 2009 and 2010], [Birg & Lucey 2006],

[Dubinskas & Stunguiene 2010], [Kompa & Witkowska, 2011],], and [Witkowska et al. 2011], among others.

DESCRIPTION OF THE CAPITAL MARKETS

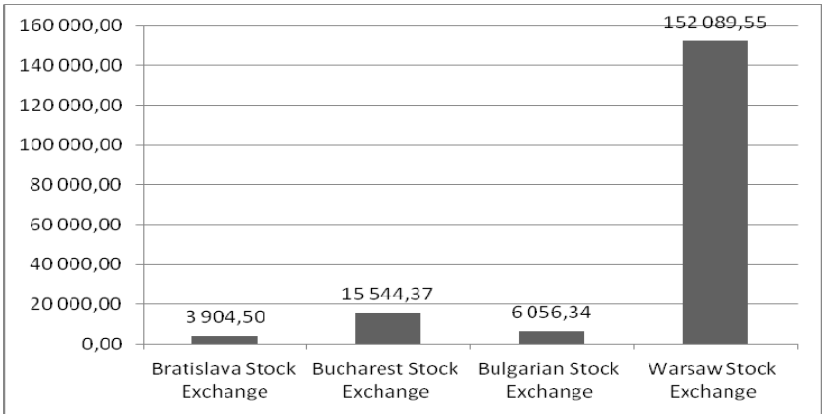
European emerging markets have been developing intensively however they still are considered as small and immature markets. It is worth mentioning that in September 2011 turnover of these capital markets (excluding Baltic market because they have been operate in frame of NASDAQ OMX Nordic group but it is very small market) was only 1.2% of total turnover in Federation of European Securities Exchanges (FESE) market. And among these seven stock exchanges 65.8% of turnover was made by the Warsaw Stock Exchange (Table 2).

Table 2. Percentage shares of traders and turnover observed in September 2011

Market Operator	Trades	Turnover	Trades	Turnover	Stock index
Bratislava Stock Exchange	0.04	0.04	0,90	2.66	SAX
Bucharest Stock Exchange	3.65	1.40	89,36	89.11	BETC
Bulgarian Stock Exchange	0.40	0.13	9,73	8.23	SOFIX
Warsaw Stock Exchange	73.97	65.76	∑ = 100.00	∑ = 100.00	WIG
CEESEG - Budapest	14.25	15.42			
CEESEG - Ljubljana	0.38	0.57			
CEESEG - Prague	7.31	16.68			
Total	100.00	100.00			

Source: own elaboration

Figure 1.Comparison of capitalization of analyses Stock Exchanges with Warsaw Stock Exchange In April 2011 [mln euro]



Source: own elaboration

Comparison of capitalization of analyzed markets and the Warsaw Stock Exchange is presented at Figure 1. It is visible that Romanian Stock Exchange is

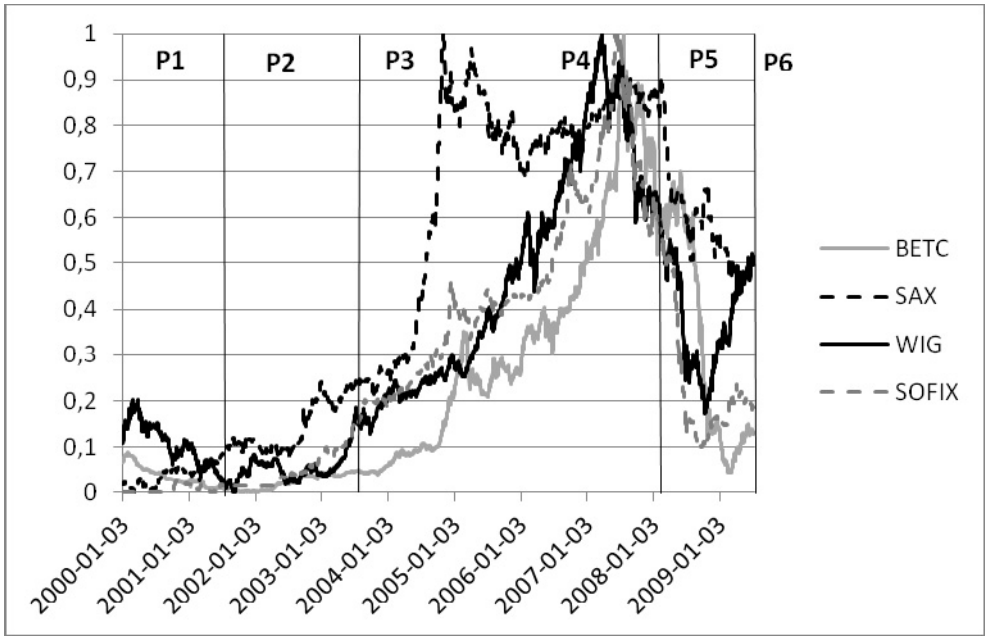
the biggest capital market (among three investigated markets) since it's share in turnover is over 89% Table 2. See also Figure 1 where it is visible that capitalization of all 3 markets is less than 17% of WSE, and capitalization of Stock Exchanges in Bucharest is 60.9%, Sofia - 23.7% and Bratislava - 15.3%.

Table 3. Characteristics of samples

Sub-period	Dates	Type of the market	Number of observations		
			BETC	SAX	SOFIX
P0	1.01.2000 - 31.12.2009	whole	2609	2435	2260
P1	1.01.2000 - 8.10.2001	bear	461	432	232[3]
P2	9.10.2001 - 3.07.2003	stagnation	453	420	426
P3	4.07.2003 - 27.10.2005	bull	605	567	573
P4	28.10.2005 - 8.07.2007	bull	441	403	422
P5	9.07.2007 - 17.02.2009	bear	422	395	395
P6	18.02.2009 - 31.12.2009	bull	227	218	212

Source: own elaboration

Figure 2.Comparison of standardized plots of main stock indexes from analyzed capital markets



Source: own elaboration

[3] Quotations at Stock Exchange in Sofia starts from 20.10.2000.

In our investigation we consider main stock indexes that are listed in Table 2. Time spam of investigation is from 1.01.2000 to 31.12.2009. During this period we distinguish 6 sub-period that are defined due to the market tendency observed at the Warsaw Stock Exchange (see Table 3 and Figure 2). Note that sub-periods P3 and P4 are both bull markets but they are distinguished to have comparable numbers of observations in all samples. It is also visible that SAX – Bratislava Stock Exchange index has different tendency than three other indexes.

RESULTS OF EMPIRICAL ANALYSIS

In our investigation we consider logarithmic rates of return from the stock indexes daily quotations and analysis is provided applying:

1. daily expected returns from the participation units – y,
2. risk measures as: standard deviation - S, and variability coefficient – V,
3. measures of asymmetry - A and concentration – K,
4. statistical parametric tests for expected returns μ_j i.e. zero returns: H_0: $\mu_j = 0$ and equality of two expected returns (obtained in different periods) i.e. H_0: $\mu_j = \mu_i$,
5. statistical nonparametric tests for: normality - Kolmogorov-Lilliefors and Jarque-Bera tests, and for randomness – runs test.

Runs test together with identifications of so called weekday effects let us verify the Efficient Market Hypothesis [Fama 1970].

We also calculated the percentage share of positive and negative returns, as well as minimal (min) and maximal (max) values for each period and stock index that inform about the Stock Exchanges performance. All results are presented in tables where bold letters denote rejection of null hypothesis at the significance level 0.05.

Bucharest Stock Exchange

We start our analysis from the biggest market presenting basic characteristics of Romanian capital market in Table 4.

As one can see returns are significantly differ from zero in all sub-periods P1 – P6 (although not for the whole period P), and they are negative for bear markets. Variability is similar in all sub-periods though it is significantly bigger for the whole period. Time series seem to be symmetric but leptokurtic, also normality tests Jarque-Bera and Kolmogorov-Lilliefors shows that distribution of logarithmic returns is not normal. Runs test shows that in the whole sample P0, and the sub-periods P3 – P5 rates of return are not random that may suggest that the market was not efficient in Fama sense. We also analyze returns from quotations each day of the week i.e. Monday, Tuesday, etc. to check if there are weekday effects. But these returns do not significantly differ from zero and from each other (Table 5). Therefore we claim that weekday effect was not observed in all investigated periods.

Table 4. Main characteristics of rate of returns: Bucharest Stock Exchange

Characteristics	P0	P1 BEAR	P2	P3 BULL	P4. BULL	P5 BEAR	P6 BULL
Positive returns [%]	50.98	39.91	53.42	55.37	57.14	44.31	57.27
Negative returns [%]	47.60	58.57	42.60	44.13	41.95	54.74	42.29
Max	0.2307	0.2307	0.0929	0.0995	0.0732	0.1451	0.1312
Min	-0.2604	-0.2604	-0.0584	-0.1048	-0.0636	-0.1577	-0.0809
Average - *y*	0.0003	**-0.0024**	**0.0019**	**0.0022**	**0.0025**	**-0.0059**	**0.0047**
Standard deviation*s*	0.0233	0.0221	0.0139	0.0191	0.0167	0.0351	0.0305
V	77.2364	-9.3437	7.4105	8.7214	6.5881	-5.9873	6.5293
A	-0.5541	-0.7353	0.7675	-0.2591	0.0050	-0.4728	0.0603
K	**14.7585**	**66.9363**	**5.3784**	**5.2764**	**2.1964**	**2.9301**	**1.1811**
Normality test *J-B*	**23682.5**	**83656.2**	**570.55**	**689.67**	**84.46**	**159.77**	**11.75**
Normality test *K-L*	**0.47**	**0.48**	**0.48**	**0.47**	**0.48**	**0.46**	**0.47**
Runs test	**-6.87**	-1.74	-1.73	**-5.25**	**-2.56**	**-2.71**	-0.45

Source: own elaboration.
Note: bold letters denote rejection of H_0 at the significance level 0.05

Table 5. Values of test statistics for two expected values

	Tuesday	Wednesday	Thursday	Friday
Monday	1.096711	0.521209	0.591209	0.51908
Tuesday		-0.65189	-0.48365	-0.63851
Wednesday			0.115853	0.004196
Thursday				-0.11059

Source: own elaboration
Note: bold letters denote rejection of H_0 at the significance level 0.05

Bratislava Stock Exchange

However Bratislava Stock Exchange is the smallest one, among three being under consideration, we notice that it does not follow the trend that is observed on bigger markets. It is visible at Figure 2, and in rows describing percentage share of positive and negative returns. It is also confirmed by expected rates of returns since only the one from P3 period is significantly bigger than zero.

Table 6. Main characteristics of rate of returns: Bratislava Stock Exchange

Characteristics	P0	P1 BEAR	P2	P3 BULL	P4. BULL	P5 BEAR	P6 BULL
Positive returns [%]	46.24	49.54	48.10	56.61	51.61	32.41	24.31
Negative returns [%]	37.00	41.44	48.57	35.63	35.24	29.37	26.61
Max	0.1188	0.0465	0.0596	0.0399	0.0407	0.0624	0.1188
Min.	-0.0958	-0.0571	-0.0882	-0.0503	-0.0423	-0.0513	-0.0958
Average - *y*	0.0005	0.0011	0.0006	**0.0019**	-0.0002	-0.0005	-0.0010
Standard deviation*s*	0.0123	0.0133	0.0151	0.0111	0.0090	0.0085	0.0173
V	23.9755	12.3302	24.7386	5.9713	-42.9343	-15.5351	-16.8215
A	**-0.1593**	-0.0893	0.0736	-0.2734	-0.6032	-0.1898	**-0.2571**
K	**10.7720**	**3.1731**	**5.1286**	**3.2236**	**5.3126**	**13.6223**	**18.1422**
Normality test *J-B*	**11712.4**	**174.09**	**442.84**	**244.55**	**479.08**	**2947.4**	**2805.1**
Normality test *K-L*	**0.48**	**0.48**	**0.48**	**0.49**	**0.49**	**0.49**	**0.48**
Runs test	**-10.20**	**-2.49**	0.84	**-2.15**	**-2.55**	**-11.53**	**-9.77**

Source: own elaboration
Note: bold letters denote rejection of H_0 at the significance level 0.05

Table 7. Values of test statistics for two expected values

	Tuesday	Wednesday	Thursday	Friday
Monday	-0.45278	-1.27945	**-1.88907**	**-1.937729**
Tuesday		-0.89139	-1.56537	-1.62099
Wednesday			-0.72336	-0.79417
Thursday				-0.08107

Source: own elaboration
Note: bold letters denote rejection of H_0 at the significance level 0.05

Analyzed time series are not normally distributed and not random for all samples but the one for P2 period. Therefore one may suppose that the market is not efficient in Fama sense. In further investigation daily rates of return are put into order due to week days to check if weekday effects are observed in the samples. Due to results of the test H_0: $\mu_j = 0$ we claim that expected value of returns for Mondays, Tuesdays and Wednesdays do not differ significantly from zero while for Thursdays and Fridays they are significantly bigger than zero [Kompa 2011]. It is also visible that returns on Thursdays and Fridays are significantly bigger than on Mondays (Table 7).

Bulgarian Stock Exchange

Looking at Table 8, we notice that rates of return in Bulgarian market significantly differed from zero in the periods denoted as P2 – P5. However the biggest variability was observed for the period P1 that is probably connected with the smal value of average returns in that period. Also for this Stock Exchange the distributions of returns are not notmal but series are not random only in selected periods, i.e.: P0, P3, P5 and P6.

Table 8. Main characteristics of rate of returns: Bulgarian Stock Exchange

Characteristics	P0	P1 BEAR	P2	P3 BULL	P4. BULL	P5 BEAR	P6 BULL
Positive returns [%]	52.79	43.97	57.75	57.77	54.03	44.05	52.83
Negative returns [%]	46.02	49.57	41.08	42.06	45.02	55.70	46.70
Max	0.2107	0.2107	0.0839	0.0511	0.0353	0.0729	0.0631
Min.	-0.2090	-0.2090	-0.1659	-0.0452	-0.0347	-0.1136	-0.0437
Average - *y*	0.0006	0.0003	**0.0022**	**0.0019**	**0.0015**	**-0.0044**	0.0022
Standard deviation*s*	0.0197	0.0380	0.0211	0.0110	0.0076	0.0217	0.0174
V	30.7779	131.3518	9.4113	5.9343	5.2009	-4.9824	7.9257
A	-0.5659	-0.0795	-0.9848	-0.0361	0.5777	-1.0339	0.7782
K	**25.1261**	**13.0452**	**11.2341**	**3.1167**	**3.8239**	**4.0816**	**1.8520**
Normality test *J-B*	**57993.3**	**1538.9**	**2232.5**	**224.5**	**269.7**	**331.8**	**48.06**
Normality test *K-L*	**0.47**	**0.45**	**0.47**	**0.48**	**0.49**	**0.48**	**0.48**
Runs test	**-5.73**	-0.20	-0.67	**-3.66**	-1.81	**-3.71**	**-2.89**

Source: own elaboration
Note: bold letters denote rejection of H_0 at the significance level 0.05

Table 9. Values of test statistics for two expected values

	Tuesday	Wednesday	Thursday	Friday
Monday	0.374769	-1.38812	0.139348	**-2.607635**
Tuesday		**-1.79046**	-0.24377	**-3.10579**
Wednesday			1.563445	-1.03215
Thursday				**-2.85111**

Source: own elaboration
Note: bold letters denote rejection of H_0 at the significance level 0.05

Rates of return significantly bigger than zero are observed only on Fridays, and they significantly differ from the ones obtained on Mondays, Tuesdays and Thursdays. Also returns on Wednesdays are significantly higher than returns on Tuesdays (Table 9).

CONCLUSIONS

Capital markets in European transformed economies are very small and immature with the exception of the Warsaw Stock Exchange, and this is the reason why the majority of Stock Exchanges in Central and Eastern and Southern Europe decided to unite and create bigger institutions as CEE Stock Exchange Group or to joint already existed stock market as NASDAQ OMX. As the result of such decisions now there are only four "independent" stock exchanges in transformed economies being state members of the European Union. Therefore in our analysis we consider Bratislava, Bulgarian and Bucharest Stock Exchanges. All analyzed stock exchanges are characterized by lack of efficiency in Fama sense.

Table 10. Values of test statistics for two expected returns

Period	Bucharest vs. Bulgarian	Bucharest vs. Bratislava	Bratislava vs. Bulgarian
P0	-0.49	-0.38	-0.21
P1	-1.00	**-2.89**	0.31
P2	-0.25	1.32	-1.27
P3	0.33	0.33	0.00
P4	1.14	**2.96**	**-2.92**
P5	-0.74	**-3.07**	**3.33**
P6	1.06	**2.44**	**-1.91**

Source: own elaboration
Note: bold letters denote rejection of H_0 at the significance level 0.05

Due to obtained results we may claim that both capital markets from Balkan region develop similarly while Bratislava Stock Exchange seems to differ from both Southern markets. That is visible in Table 10 which contains test statistics of for expected returns evaluated for pairs of Stock Exchanges. It is also proved that Bulgarian and Bucharest Stock Exchanges follow the market trends that are observed at Warsaw Stock Exchange while Slovak capital market seems not be affected by other markets.

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