Stock Market Integration Among Balkan Countries

Kadir Karagoz
Faculty of Economics and Administrative Sciences
Karaelmas University of Zonguldak – TURKEY
kkaragoz3@hotmail.com

Suzan Ergun
Faculty of Economics and Administrative Sciences
Inonu University of Malatya – TURKEY
sergun@inonu.edu.tr

Abstract
Most of the empirical studies on financial market integration in Europe have focused on either overall European markets or transition economies. Some studies tackled with the subject from the Central and Eastern European Countries (CEECs) point of view, so studies specifically on Balkan markets are quite scarce.
In this paper we aim to investigate financial integration among four emerging (plus Greek) stock markets in the Balkans by using multivariate co-integration technique. In the paper it is also examined that integration between these developing markets and developed markets represented by the US, UK and Japan. To this end we first conducted unit root test and found that all five Balkan markets are nonstationary in their levels, but become stationary when differenced one time. In the next step the co-integration relationship is examined. Results of the co-integration reveal that there is at least one co-integration equation between Balkan stock markets indices which verifies the stock market integration in the region.

Keywords: Stock market integration, Balkan countries, Co-integration.

JEL Classification Codes: C22, E44, G15

Introduction

Accelerated phase of globalization and rapid spread of information technology across worldwide is helping the countries by bring the closer to each other, opening up their economies, enhancing trade and merging financial markets. The volume of trade and mobility of capital flows have been increased. Investors are able to diversify their portfolios more than ever by investing their capital almost allover the world (Mohsin and Qayyum, 2005). Technological developments in electronic payment and communication systems have substantially reduced the arbitrage opportunities across financial centers, thereby easing the cross border mobility of funds. As may be expected, financial markets tend to be better integrated in developed countries. At the same time deregulation in developing market economies has led to removal of restrictions on pricing of various financial assets, which is one of the pre-requisites for market integration (RCF, 2006; 285).

Beginning with the pioneering study of Kasa (1992), who found that there is a common trend driving the developed markets, a large

literature has emerged focusing to measure and test the level of integration between the mature stock markets. But, in recent years a few studies have been conducted on interdependencies among emerging markets. As Chen *et al.* (2002) stressed, emerging markets provide a useful separate data source to investigate the market integration hypothesis given their low correlation with developed markets. Hence, the potential data-snooping biases are reduced.

The notion of "financial integration" means the abolishment of the limitations which stem the capital flows in financial markets and a process of which capital mobility has advanced. As financial and capital markets are liberalized and continue to open, international stock prices tend to co-move closer and integrate than before. Many factors may contribute and led to acceleration of the integration process. Vasila (2003) counts some of these factors as; deregulation or liberalization of markets and the activities of market participants, technological advance, economies of scale, changing equity cultures, international diversification of portfolios etc.

However, an integrated regional stock market will be more appealing to investors from outside the region who would find investment in the region easier and or more justifiable. As shares become more liquid and transaction costs fall, fund managers become increasingly willing to take positions in the stock markets (Click and Plummer, 2005). As Stubos and Tsikripis (2005) stressed out, as a part of economic integration, financial integration may help to reduce political risk, promote economic stability and increase the size of local markets, contributing therefore, to investment activity.

The co-movement and integration of international stock markets is estimated by employing various techniques, such as cross-market correlation coefficients, investment restrictions, asset pricing models and some econometric techniques. The common factor for most of these approaches is the "law of one price". That is, when transaction costs and taxes are not taken into account, identical securities should carry the same price across all stock markets where such securities are traded. In other words, if two or more stock markets are integrated then the identical securities should be priced identically within both markets and investors will be able to allocate capital where it is the most productive (Marashdeh, 2005; Click and Plummer, 2005).

Among Balkan stock markets Romania, Bulgaria, Turkey and Croatia are attracted the attention as being most developed, in terms of capitalization, turnover and number traded securities (Kenourgios and Samitas, 2009). On the other hand, Greece, Bulgaria and Romania are EU member countries in Balkans region.

Most of the empirical studies on financial market integration in Europe have focused on either overall European markets or transition economies. Some studies tackled with the subject from the Central and Eastern European Countries (CEECs) point of view, so studies specifically on Balkan markets are quite scarce. Samitas *et al.*(2008) is one of a few studies which examine the long-run interrelationships among Balkan stock markets. Using conventional co-integration methods, they concluded that there is a time-varying co-integrating relationship among Balkan stock markets and between Balkan and developed markets. They also found that a regime shift appeared for all Balkan markets in year 2001, which suggests a higher extent of

these markets to global environment. Moreover, owing to Monte Carlo tests they assert that their findings reveal some implications for international portfolio diversification, the smooth EU accession of Balkan economies and their long-run growth prospects.

In a recent paper Syriopoulos and Roumpis (2009) investigated the presence of time-varying co-movements, volatility implications and dynamic correlations among major Balkan (Romania, Bulgaria, Croatia, Turkey, Cyprus, Greece) and leading mature (Germany and the US) equity markets. To these ends they have employed a number of conditional correlation models, i.e. constant conditional correlation model, dynamic conditional correlation and asymmetric dynamic conditional correlation model. At the first stage, they found that there is one co-integrating vector in the sample equity markets whereas the developed markets have a significant long-term impact on the region's equity market behaviour. On the basis of conditional correlation models they obtained the evidence which confirm, in most cases, the absence of any constant correlation between the equity markets under study, whereas asymmetric correlations were also detected in some cases. Constructing a universal portfolio with varying mature-emerging asset weights, they also performed a sensitivity analysis depending on the estimated dynamic conditional correlation variance-covariance matrix and compared it with alternative models. Their finding suggests that the estimated conditional variances were gradually decreasing, whenever the Balkan equity markets were included in the universal portfolio.

In this paper we aim to investigate financial integration among five stock markets in the Balkans by using multivariate co-integration technique. In the paper it is also examined that integration between these developing markets and developed markets represented by the US, UK and Japan. In this way, it would be possible to identify the markets which are regionally and/or internationally integrated, and diversification potentials offered by the equity markets in the Middle East region. Moreover, this will provide opportunity for to test the contagion effect of a possible crisis between developed and emerging markets. The rest of the paper is planned as follows: in the next section, an overview on financial market development in the Balkan countries is given. Following that section, matter of measurement is tackled and then brief information on the employed methodology and data issue are discussed. The paper comes to an end with presentation of the empirical results and conclusion in the last section.

Financial Development in Balkan Region

Most of the countries in the Balkan region were adopted socialist regime. After the collapse of socialist block each country has launched liberalization program and experienced a distinctive process of transition to market economy. In former socialist economies the financial sector was completely adjusted to the requirements of centrally-planned management of economy. Concentration of scarce financial resources and their allocation was carried out through a monobank system, which along with the central bank as a formal supreme monetary authority, comprised several specialized state owned banks. In such a system specialized financial institutions had a significant role. They did not act independently and the allocation of credit resources was performed according to the rules established by the central banking authority (Golubović and Golubović, 2005).

The common characteristic of the Balkan transition countries is that, in the first phase of transition, they avoided any radical reform of their financial sector. At the outset, reform of the financial sector advanced more in terms of quantity rather than quality. The number of financial institutions quickly multiplied through privatization of the banks and establishment of new institutions. In some countries financial sector was immediately opened up to foreign investors as well (Stubos and Tsikripis, 2005;13). These countries undertook partial changes like transformation of the monobank system into two-tired banking system in which private banks take the responsibility for transaction with citizens and economic subjects. Among these ex-socialist countries Bulgaria was the first country that performed changes in the traditional socialist banking system. The banking sector domination in Balkan countries was limiting the possibilities to change the term structure of deposits in order to secure long-term placement. The experience of these countries pointed out that the financial market could not develop spontaneously rather it requires state intervention which should create necessary conditions for its normal functioning. Despite considerable efforts during 90s the depth of the financial market in the Balkan countries is insufficient (Golubović and Golubović, 2005).

As being another component of the financial system the Balkan stock markets have a brief history compared to mature markets of Europe and US. These markets started in the mid 80s and mid 90s with a small number of stocks, many of which were illiquid. During 2000-2006, stock prices in Balkan markets increased on average over 70% in dollar terms, which is quite high compared to the 15% of MSCI world market return. Among the Balkan stock markets Turkey, Romania, Bulgaria and Croatia are considered the most developed, in terms of capitalization, turnover and market return (Samitas *et al.*, 2008). On the other hand the financial sector in the Western Balkans has improved significantly in recent years. This owes to comprehensive reforms by governments and the support of international financial institutions like the IMF, the World Bank, and the EBRD. The turbulence associated with banking crises, hyperinflation, and pyramid savings schemes have been left behind. Regulatory frameworks have been modernized and financial supervision has been strengthened. The share of bad loans has been reduced dramatically. Privatization has helped to reduce state ownership in banking down to less than 20 percent in most countries and has attracted foreign banks into the market. Branch networks are being expanded and a range of new financial products, such as mortgages and leasing, are being introduced. Thanks to these developments, financial intermediation grew at double-digit rates and central banks have even been forced to introduce specific measures to control, for example, rapid expansion of consumer credit and foreign exchange exposure of the financial system (World Bank, 2008).

Measuring and Testing Stock Market Integration

To test and measure for financial integration, both fields of international macroeconomics and international finance have developed different but related methodologies. In international macroeconomics, much work has utilized interest rate parity conditions to test for financial integration of money markets, while much of the international finance literature has employed a capital asset pricing model (CAPM). Regarding the empirical implementation of these

concepts, various econometric methodologies have been suggested over the years. Early attempts to test for international linkages of equity markets have mostly focused on VAR models and generally found rising cross-market correlations and growing regional interdependence. More recent research on financial market integration has been conducted in a GARCH framework in order to take into account the existence of ARCH effects in data of higher frequency.

Meanwhile, the issue of time-varying nature of financial integration is ignored in general. Although comparing different sub-periods may yield a roughly idea for long term changes, the degree of integration may often change frequently and exhibit high volatility (Fratzscher, 2001). For instance, correlation across markets is found to be higher during phases of a financial crisis, real and policy shocks in the individual countries, and hence failure to account for that may lead to misleading interpretations (Forbes and Rigobon, 1999; Pungulescu, 2009). Therefore, to depend only on correlations does not give an appropriate way of assessing interrelationship among markets.

As Beine and Candelon (2007) pointed out, using average correlations over a particular period might be suited for identifying factors, such as distance or language similarity that influence only the cross-sectional differences in stock returns but do not vary over time. However, it prevents the sound investigation of the role of factors that vary not only across countries but also over time. In this respect, the study of the impact of reforms which aim at liberalizing trade flows or financial investments requires the use of a time varying measure of cross-country correlation.

Irzinger and Haiss (2006) introduce another classification of theoretical frameworks which can be used to try to explain inter-market relationships. This classification is made with respect to three theoretical paradigms, namely transaction cost economies, agglomeration theory, and institutional economics. First two paradigms represent economic explanations, whereas institutional theory corresponds to the notion of behavioral disciplines.

Empirical Analysis

Data and Variables

We were intended to include all Balkans countries, but due to the lack of data and that some countries have not created stock markets, the sample covered only 5 of Balkans countries besides of 3 representative developed markets, namely Bulgaria, Croatia, Greece, Romania, Turkey, Japan, the US and UK. These developed markets are among the largest stock markets in the world and play a vital role in their economies. Especially the US is the largest economy in the world and most of the countries from the Balkan region have a strong economic relationship with the US.

The stock market data used in this paper are gathered from Morgan Stanley Capital International (MSCI). Instead of to use local stock price indices we preferred to use the MSCI indices for several reasons. First, these indices are constructed on a consistent basis by MSCI, so it makes cross-country comparison more meaningful. Second, these indices are value-weighted reflects a substantial percentage of total market capitalization which could minimize the problem of serial

correlation in returns result from non-synchronous trading. Third, MSCI indices are widely employed in the literature on the basis of the degree of comparability and avoidance of dual listing (Maghyereh, 2004; 30).

All data is transformed into natural logarithm prior to analysis. In order to examine the linkages among these stock markets, daily values of the stock price indices have been used. The sample period for this study spans from January 2, 2006 to March 31, 2009 (i.e. 847 observations for each index). Following the common practice, all indices are expressed in respective local currency to evade problems associated with transformation due to fluctuations in cross-country exchange rates and also to avoid the restrictive assumption the relative purchasing power parity holds.

Table 1: Summary statistics of the stock market indices

	BUL	*CRO*	*GRE*	*ROM*	*TUR*	*JAP*	*UK*	*USA*
Mean	6.449	6.694	7.235	6.669	6.429	6.775	7.438	7.096
Median	6.593	6.783	7.349	6.806	6.467	6.884	7.434	7.140
Max.	6.952	7.082	7.570	7.077	6.820	7.045	7.609	7.300
Min.	4.868	5.969	6.238	5.236	5.788	6.064	6.945	6.469
Std.Dev.	0.562	0.299	0.334	0.406	0.231	0.257	0.153	0.184
Skew.	-1.736	-0.887	-1.612	-2.013	-0.833	-1.375	-1.491	-1.616
Kurtosis	4.691	2.606	4.420	6.277	3.122	3.687	4.198	4.640
J – B	526.22	116.68	438.04	951.14	98.453	283.63	364.30	463.45
p	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sum	5462.3	5669.9	6128.4	5649.0	5445.3	5738.1	6299.9	6010.6
Sum Sq. Dev.	266.34	75.597	94.552	139.33	45.236	56.076	19.772	28.565
N	847	847	847	847	847	847	847	847

Descriptive statistics are given on Table 1 (above). It is seen from the table that the sample stock indices are not normally distributed, which is verified with the Jarque – Bera statistic. All stock indices are close to each other. Bulgarian stock market has largest standard deviation, while Turkey's has the lowest (among developing markets). Among developed markets UK and US has lower standard deviations compared with Japan. On the other hand, only the Croatian stock market has not an excess kurtosis (< 3).

Table 2 shows the pair-wise correlations between the indices under investigation during the observed period. The followings can be deduced: Generally, the correlations are high, which is a preliminary evident for the existence of interdependency among the various markets. It is remarkable that the Croatian stock exchange shows low correlations in comparison with all other markets. The developed markets seem quite highly correlated with each other.

Table 2: Pair-wise correlations among stock indices

	BUL	*CRO*	*GRE*	*ROM*	*TUR*	*JAP*	*UK*	*USA*
BUL	1.000							
CRO	0.848	1.000						
GRE	0.987	0.826	1.000					
ROM	0.971	0.806	0.965	1.000				
TUR	0.899	0.730	0.933	0.879	1.000			
JAP	0.943	0.733	0.944	0.923	0.844	1.000		
UK	0.969	0.828	0.979	0.953	0.908	0.954	1.000	
USA	0.980	0.865	0.980	0.963	0.912	0.921	0.980	1.000

Empirical Results

Prior to testing for co-integration, we determine the order of co-integration of the market indices and ensure that it is equal for all series. Augmented Dickey-Fuller and Phillips-Perron (PP) unit root tests are used to test for the nonstationarity of the series. ADF test procedure is most popular technique while PP test is less restrictive and provides an alternative way for checking the stationarity feature of a time series. To determine the appropriate number of lag length the Akaike Information Criterion (AIC) is employed. However, it would not have made any differences even if we had chosen Schwarz Bayesian Information Criterion (SBIC) because both the AIC and SBIC suggested the same lag length. Table 3 shows the results of the ADF and PP tests. The unit root test statistics reveal that each series is nonstationary in log levels but stationary in log first differences. Thus, we note that all regional index series are integrated of order one, I(1), in the sample period.

Table 3: Results of ADF and PP unit root tests

	ADF			PP		
	lags *(k)*	$\tau(\rho)$	p	lags *(k)*	$z(t_\alpha)$	p
lnBUL	5	-1.876	0.058	7	0.084	0.997
lnCRO	2	-1.424	0.854	4	-1.389	0.864
lnGRE	0	-1.462	0.135	5	-1.365	0.160
lnROM	0	-1.471	0.132	8	-1.397	0.151
lnTUR	0	-0.786	0.376	10	-0.797	0.371
lnJAP	0	-1.364	0.160	16	-1.612	0.101
lnUK	4	-0.964	0.299	20	-1.021	0.277
lnUSA	2	-1.210	0.208	15	-1.110	0.243
Δ*lnBUL*	4	-12.675	0.000	7	-30.975	0.000
Δ*lnCRO*	1	-21.730	0.000	2	-25.336	0.000
Δ*lnGRE*	0	-27.443	0.000	4	-27.474	0.000

ΔlnROM	0	-28.650	0.000	8	-28.703	0.000
ΔlnTUR	0	-27.788	0.000	10	-27.761	0.000
ΔlnJAP	0	-29.011	0.000	14	-29.343	0.000
ΔlnUK	3	-14.122	0.000	17	-31.940	0.000
ΔlnUSA	1	-25.141	0.000	12	-33.998	0.000

Co-integration may exist for variables despite variables are individually nonstationary. This means a linear combination of two or more time series can be stationary and there is a long-run equilibrium between them. Thus the regression on the levels of the variables is meaningful and not spurious. Since the series are integrated of order one, the number of significant co-integrating vectors is tested by using the maximum likelihood based λ-max and λ-tarce statistics introduced by Johansen (1991) and Johansen and Juselius (1990). In a set of *m* series, if there are *r* co-integrating vectors, then there are (*m-r*) common stochastic trends.

Results of Johansen's co-integration test are presented below (Table 4). From the table, it is evident that the trace statistics and maximum eigenvalue reject the null hypothesis of no co-integration relationship at the 5% level. Therefore, one co-integrating relation ties the movements of all Balkans and three developed stock indices together in the long run. This implies that international portfolio diversification will be less effective among these five stock markets in the long-run because investment risk cannot be diversified away. This result confirms Samitas *et al.* (2008), in which a significant long-run interdependence has been found among Balkans stock markets.

The normalized co-integrating vector on Bulgaria is reported below. The estimates reveal that the Bulgarian stock market is positively related to Croatian, Greek, Romanian and Turkish indices. Both the standard errors and t-statistics are reported therein, which show all coefficients are statistically significant except of Turkey.

Table 4: Results of Unrestricted Co-integration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Probability
None *	0.0831	169.6131	143.6691	0.001
At most 1	0.0353	96.545	111.7805	0.307
At most 2	0.0284	66.282	83.937	0.466
At most 3	0.0218	41.988	60.061	0.616
At most 4	0.0136	23.400	40.175	0.740

Note: * denotes rejection of the hypothesis at the 0.01 level

The normalized co-integration equation is reported below (normalized on *BUL*). The estimation indicates that the Bulgarian stock index is positively related to other regional indices. All variables are statistically significant at 1 % level of significance (except Turkey) and contribute to the long-run relationship.

$$BUL_{t-1} = 44.663 + 1.210\ CRO_{t-1} + 4.776\ GRE_{t-1} + 0.963\ ROM_{t-1} + 0.316\ TUR_{t-1}$$

Std. error	(0.157)	(0.480)	(0.220)	(0.290)
t-statistic	[-7.729]	[-9.942]	[-4.377]	[-1.088]

In a set of co-integrated variables, the short term causal relations among these variables should be examined within an error correction model (VECM) framework. For our sample, five-variable VECM can be written as follow:

$$\Delta X_{it} = \Phi_{ij} + \sum_{l=1}^{p} \Phi_{ij,l} \Delta X_{,,t-l} + \sum_{m=1}^{4} \sum_{l=1}^{p} \Phi_{i+m,j,l} \Delta X_{i+m,j,t-l} + \delta EC_{t-1} + \varepsilon_t$$

i = 1, 2, …, 5 , j = 0, 1, 2, …, 5 , and t = 1, 2, …, 83

where $\mathbf{\Phi}_{ij}$ is a constant term and $\mathbf{\Phi}(L)$ is a 5 × 5 polynomial matrix of coefficients to be estimated. p is degree of polynomial, EC_{t-1} is the vector of error correction term which represents the deviations from long-run equilibrium and δ represents the response of the dependent variable to departures from equilibrium. ε_t is a vector of error term which is white-noise.

Granger (1988) points out that in a VECM there are two channels of causality: one through the lagged values of explanatory variables and the other through the error correction term, EC_{t-1}. The joint hypothesis of the lags of each variable is tested by the F-statistics and the coefficient of the lagged error term is tested by the t-statistics. Since all indices are co-integrated, the causality among the indices can be tested through both ways. The estimates of VECM and causal relations are given below.

Table 5: Vector Error Correction Estimates

Error Correction	*Δ(BUL)*	*Δ(CRO)*	*Δ(GRE)*	*Δ(ROM)*	*Δ(TUR)*
EC_t	0.0077 *	0.0150 *	0.0244 *	0.0120 *	0.0239 *
$\Delta(BUL_{t-1})$	-0.1631 *	-0.0656 **	-0.1097 *	-0.1079 **	-0.1066 *
$\Delta(BUL_{t-2})$	0.1541 *	0.0727 *	0.0086 *	0.1257 *	0.0022
$\Delta(CRO_{t-1})$	0.1611 *	0.0939 *	-0.0029	0.0474	0.0764
$\Delta(CRO_{t-2})$	-0.1765 *	-0.1279 *	-0.1091 *	-0.1315 **	-0.0388
$\Delta(GRE_{t-1})$	0.0941 **	0.1081 *	-0.0052	0.2211 *	-0.0478
$\Delta(GRE_{t-2})$	0.0419	-0.0516	-0.0069	-0.0092	-0.0014
$\Delta(ROM_{t-1})$	0.0391	0.0290	0.0531 ***	-0.0299	0.0419
$\Delta(ROM_{t-2})$	-0.0337	-0.0514 **	-0.0126	-0.0262	-0.0167
$\Delta(TUR_{t-1})$	0.0901 **	-0.0054	0.0170	-0.0139	0.0238
$\Delta(TUR_{t-2})$	0.0142	0.0095	0.0012	-0.0265	0.0033
C	-0.7287 *	-1.2033 *	-2.1585 *	-1.0452 *	-1.9875 *
JAP_t	0.0111	0.0095	-0.0197 **	0.0041	-0.0144
UK_t	0.0893 *	0.0868 *	0.2238 *	0.0937 *	0.1634 *
US_t	-0.0018	0.0695 *	0.0882 *	0.0450	0.1224 *
R-squared	0.151	0.182	0.233	0.097	0.140

F-statistic	10.553	13.185	17.951	6.370	9.642
Log likelihood	2150.4	2373.2	2262.3	2015.4	2069.9
Akaike AIC	-5.060	-5.588	-5.325	-4.740	-4.870

Note: */**/*** denotes the significance at 1% / 5% / 10% respectively.

From Table 5, following causalities can be extracted:

CRO ↔ GRE, BUL ↔ GRE, BUL ↔ TUR, ROM ↔ GRE, ROM ↔ CRO, BUL ↔ CRO,

BUL → ROM

These results reveal that much of the relationships are in bidirectional nature. The stock market which is least casually related is of Turkey. Among developed markets, UK's is the most related market compared to Japan and US markets.

Conclusion

Beginning with the pioneering study of Kasa (1992), who found that there is a common trend driving the developed markets, a large literature has emerged focusing to measure and test the level of integration between the mature stock markets. But, in recent years a few studies have been conducted on interdependencies among emerging markets.

Most of the empirical studies on financial market integration in Europe have focused on either overall European markets or transition economies. Some studies tackled with the subject from the Central and Eastern European Countries (CEECs) point of view, so studies specifically on Balkan markets are quite scarce. This paper aims to full this gap modestly via to investigate the relationship among five Balkans stock market, namely of Bulgaria, Croatia, Greece, Romania and Turkey. To this end multivariate co-integration technique has been used. In the paper it is also examined that integration between these developing markets and developed markets represented by the US, UK and Japan.

The results of ADF unit-root tests reveal that each stock index is nonstationary over time, but becomes stationary in its first difference. Johansen co-integration test points to at least one co-integration relationship among Balkan markets, which verifies the stock market integration in the region.

The results of VECM reveal that much of the pair-wise relationships between Balkan markets are in bidirectional nature. The stock market which is least casually related is of Turkey. Among developed markets, UK's is the most influential market compared to Japan and US markets.

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