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Analyzing the Relationships between Borsa Istanbul and The Balkan Stock Markets by Using The Method of Var: Evidence From Selected Stock Markets

Borsa İstanbul ile Balkan Hisse Senedi Piyasalari ArasIndaki İlişkilerin Var Metodu Kullanılarak Analiz Edilmesi: Seçilmiş Hisse Senedi Piyasalarindan Kanıtlar

Cumhur ŞAHİN
Assistant Prof. Dr., Bilecik Şeyh Edebali Üniversitesi Bozüyük Vocational School, (cumhur.sahin@bilecik.edu.tr)

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ABSTRACT

For the purpose of reducing the risks of the portfolio, the activities of international investors in various countries' stock markets have increased as a result of the increasing level of integration since the 1980s of the financial markets. The aim of this study is to determine the level of interaction and integration between the stock markets of nine Balkan states and three developed countries. In this context, the weekly closing values of the indexes representing these countries' stock markets from January 2012 to January 2015 are analyzed. The results of the study indicate that, Turkey and the other countries' stock markets do not liaise with each other; therefore, in the case of investments in the Balkan security markets, the risk of the portfolio can be reduced through the diversification of the international portfolio and a higher income shall be provided.

Anahtar Kelimeler: *Balkanlar, finansal piyasalar, Var*

ÖZ

Portföy risklerini azaltmak amacıyla 1980'li yıllardan itibaren finansal piyasalar arasındaki bütünleşmenin bir neticesi olarak uluslararası yatırımcıların farklı ülkelerin hisse senedi piyasalarındaki faaliyetlerinde artışlar görülmektedir. Bu çalışmanın amacı, dokuz Balkan ülkesi ile üç gelişmiş ülke hisse senedi piyasaları arasındaki etkileşim ve bütünleşme düzeyinin belirlenmesidir. Bu bağlamda sözkonusu ülkelerin hisse senedi piyasalarını temsil eden endekslerin 2012 Ocak ile 2015 Ocak dönemi için haftalık kapanış değerleri analiz edilmiştir. Çalışmanın sonuçları göstermektedir ki, Türkiye ile diğer ülke hisse senedi piyasaları birlikte hareket etmemektedir, bu nedenle, Balkan menkul kıymet piyasalarına yatırım yapılması durumunda, uluslararası portföy çeşitlendirmesi aracılığıyla portföy riskinin azaltılması ve daha yüksek getiri elde edilebilecektir.

1. INTRODUCTION

Since 1980s, it can be seen that both national and international financial markets have integrated, and geographical barriers have become less important and restrictions on capital flows have been decreased. Thus, financial globalization has increased during this period. Risk – return relations .are very important and crucial concepts in the finance literature. Rational investors try to minimize the risks of their assets in order to maximize their returns. Markowitz' (1952)'s ground-breaking study reveals that the diversification of the instruments in the investors' portfolios, and also the negative correlations between these instruments, serve to minimize the risk. According to the modern portfolio theory, investors should evaluate their assets on the international market in order to minimize systematic risks. Therefore, the co-integration of the stock markets is crucial in terms of reducing the risk of the portfolio.

2. LITERATURE REVIEW

There are many studies on the co-integration and integration between stock markets in the finance literature. Shacmurove (1996), Neaime (2002), Bayri and Güloğlu (2005), Efendioğlu and Yörük (2005), Mandacı and Taşkın (2005), Taştan (2005), Ceylan (2006), Kargın (2008), Korkmaz and Çevik (2008), Gözbaşı (2010), Yorulmaz and Ekici (2010), İbicioğlu and Kapusuzoğlu (2011), Evlimoğlu and Çondur (2012), Akal (2013), Çelik and others (2013), Samırkaş and Düzakın (2013) are among the studies on the co-integration relationship between Turkey and other countries' stock markets.

There are also many studies on the co-integration and integration in the Balkan stock markets in the literature. Some of these are mentioned below:

In Onay's (2006) study, in which the long-term financial integrations between the EU and the USA and the Bulgarian, Romanian, Croatian and Turkish stock markets were analyzed, it can be seen that there is no co-integration between the aforementioned countries and the EU and the USA stock markets. In this study, in which the long-term financial integration between the stock markets of the EU, USA, Bulgaria, Romania, Croatia and Turkey were analyzed, it was determined that there was no co-integration between the mentioned countries and the EU and USA stock markets (Onay, 2006).

Syriopoulos and Roumpis (2009) revealed that the financial markets of the Balkan states have a strong relationship with each other, but their correlation with developed countries is greater (Syropoulos and Roumpis, 2009).

In his study, Syriopoulos (2007) proves that when the before and after period of the European Monetary Union was analyzed, it was seen that especially in the post-monetary union period, the interaction increased between the Balkans and other eastern Europe countries' stock markets and the stock markets were highly correlated, and also these countries' stock markets were affected from the developed countries' stock markets, the USA in particular (Syropoulos, 2007).

In the study of Stoica and Diaconaşu (2011), the interaction between the Balkan States comprised of Bosnia-Herzegovina, Bulgaria, Croatia, Macedonia, Romania, Serbia, and Slovenia, as well as eastern and central European countries' stock markets such as Poland, the Czech Republic and Hungary was analyzed. Also, it was observed that the interaction between Austria and these countries' stock markets, have a mutual and positive relationship in the long term, but these countries are more reactive to the Austrian stock market (Stoica and Diaconaşu, 2011).

In the study, which Progonaru and Apostol (2000) analyzed, regarding the relationship between the stock markets in Romania and other eastern and central European countries and developed countries, it was determined that the Romanian stock market had a low correlation with eastern and central European countries' stock markets, but it was close to developed countries' stock markets (Pogonaru and Apostol, 2000).

In Drakos and Kutan's study (2001), it can be observed that the Turkish and Greek stock markets have a mutual dependence in both the short and long term and are affected by developed countries' stock markets (Drakos and Kutan, 2001).

In the study of Samitas and Kenourgios (2011), the integration between the Balkan state's stock markets and the USA's, England's and Germany's stock markets was analyzed for the period of 2000 to 2006. It was concluded that the Balkan states have strong relationships between themselves as well as these three developed countries in the long term (Samitas and Kenourgios, 2011).

In the study of Syllignakis and Kouretas (2010) that utilized the Johansen co-integration tests, it was determined that the relationship between central and eastern Europe countries' financial markets, which are mostly composed of the Balkan states, and the global market has increased in line with the enlargement process of the European Union (Syllignakis and Kouretas, 2010).

In the study of Horvath and Petrovsk (2012) that analyzed the common action between the Czech Republic and Central Europe, which is composed of Hungarian and Polish, Croatian, Serbian, Macedonian, and developed countries' stock markets, it was concluded that the level of integration between Central European countries with developed countries' stock markets is much higher than the Balkan states through the results acquired from the multivariate GARCH models, which were used from the period of 2006 to 2011. On the other hand, it was determined that the level of integration and correlation between Croatia and developed countries' stock markets was much higher, while with the Serbian and Macedonian stock markets it was almost zero (Horvath and Petrovski, 2012).

The study, which Onay (2006) analyzed, concerned the long-term financial integration between the candidate countries for the European Union and the EU, and USA stock-exchange markets, and it was concluded that the level of integration between Bulgaria, Romania and the EU, the USA is much higher than Turkey and Croatia, through the analysis results acquired from the Johansen co-integration tests (Onay, 2006).

In the study of Guidi and Ugur (2014), the integration between Southeastern European countries and developed countries, and the static and dynamic co-integration between the Romanian, Bulgarian, Slovenian, Croatian and German, English and USA stock markets was analyzed for the period of 2000 to 2013 were researched. It was determined that the new member states in the European Union had a tendency to co-integrate with the German and English stock markets; however, no tendency was observed for the USA (Guidi and Ugur, 2014).

In the study, in which the causality between regional stock-exchange markets was researched by Gradojević and Dobardžić (2013), the relationship between the Serbian, Croatian, Slovenian, Hungarian and German stock markets was analyzed. In this study, the daily closing data for the period of October 4, 2005 to August 18, 2009 relating to these stock markets were used. When the data were analyzed, it was determined that while the Hungarian and Croatian stock markets had an effect on the Serbian stock market, the Serbian and Slovenian stock markets had a bivious reciprocal causality **(**Gradojević and Dobardžić, 2013).

In the study, which Dobardžic and others (2012) have analyzed, the common action of the financial markets from the emerging and developed economies, the Serbian, German, Hungarian, Croatian, and Slovenia stock markets, were examined. The period of this data was 2005 to 2009. Not dissimilar to the Slovenia and Croatia stock markets, a significant correlation between Serbian and German stock markets was observed and it was proven through Granger causality tests that Germany had the highest correlation to the Serbian stock market (Dobardžic, Dobardžic and Brničanin, 2012).

In the study, which Patev and Kanaryan (2002) analyzed, the behavior and characteristics of the Balkan stock markets and daily values of Greek, Turkish, and Romanian stock markets in the period of September 22, 1997 to May 31, 2002 were examined. When these data were analyzed through the model of VAR, no significant relationship and integration was observed between these three Balkan countries. Further results observed were that the Turkish stock market had the highest market risk, the volatility risk of the Greek stock market was very high, and the Romanian is the least open stock market to external effects. In addition, at least something could be said regarding the integration of the Turkish and Greek stock markets but the Romanian stock market was completely out of the integration. In other words, as an interesting situation, it was totally closed to external effects (Patev and Kanaryan, 2002)

In the study, which Samitas and others (2008) analyzed, the integration and behavioral characteristics of the emerging Balkan states' security markets, the relationship between other stock markets with their own domestic markets, and developed stock markets were examined. The daily closing values were observed for the period of January 2000 to February 2006 and the data related to the Romanian, Bulgarian, Serbian, Macedonian, Turkish, Croatian, Albanian, Greek, USA, German and English stock markets were analyzed. The Johansen co-integration tests were used. As a result of the analysis, a significant positive and strong relationship between the Greek and Romanian, Bulgarian, Serbian and Macedonian stock markets was observed, as well as a strong and positive relationship between the German and Croatian, Turkish and Albanian stock markets (Samitas, Kenourgios and Paltalidis, 2008).

In the study, which Karagöz and Ergun (2010) analyzed, the integration of the stock-exchange markets between the Balkan states', Bulgarian, Greek, Turkish, Croatian, and Romanian stock markets were examined, as well as the USA, English and Japanese developed country stock markets. The daily closing values were observed for the period of January 2, 2006 to March 31, 2009. The Johansen co-integration tests were used. When these data were analyzed, it was concluded that the Balkan states had a bivious relationship, Turkey had the least interaction with the others among all the Balkan stock markets, and England had the highest effect on these stock markets among all the developed countries' stock markets (Karagöz and Ergun, 2010).

3. METHODOLOGY

In this study, indices representing the stock markets in Turkey, Bosnia Herzegovina, Greece, Bulgaria, Serbia, Romania, Macedonia, Montenegro, and Croatia as Balkan countries, and the New York stock market which is one of the most important stock markets in the world, and stock markets in Germany and Italy, which have close economic ties with the Balkan States were investigated. The weekly closing values of the BIST–100 index of the Turkish stock market, the Sarajevo 30 index for Bosnia Herzegovina, the ASE index for the Greek stock market, the SOFIX index for the Bulgarian stock market, the BELEX 15 index for the Serbian stock market, the BET index for the Romania stock market, the MIB 10 index for the Macedonian stock market, the MONEX 20 index for the Montenegron stock market, the CROBEX index for the Croatian stock market, the S & P 500 index for the USA stock market as a global stock market, the DAX index for the German stock market, and the FTSE MIB index for Italian stock market were analyzed regarding the period of January 2012 through January 2015. The reason for choosing these indices is that they are the ones that best reflect the overall performance of stock markets in the countries in which they are located.

The time series of the mentioned values was taken. The co-integration and VAR methods were used in relation to the time series. The first issue to be considered in the time series analysis was the stability of the variables since the time series of economic and financial variables frequently contain a trend or seasonality, which may lead to a violation of the principle that the series are stable (Yurdakul and Akçoraoğlu, 2003). Stability can be defined as the mean and variance of the discussed time series being independent from time. In cases where the time series are unstable, the estimated econometric models may give misleading results. For this reason, generally a unit root test (stability test) is applied to the relevant time series in the econometric analysis carried out with the time series. Therefore, an Augmented Dickey-Fuller (ADF) test was used in order to check whether the time series specified in this work contains any unit root (stability) and the results of the unit root test are given below.

The following models were proposed for the ADF test:

$$\Delta Y_t = \gamma Y_{t-1} + \sum_{i=2}^{m} \beta_i \Delta Y_{t-i+1} + \varepsilon_t \quad (1)$$

$$\Delta Y_t = \alpha_0 + \gamma Y_{t-1} + \sum_{i=2}^{m} \beta_i \Delta Y_{t-i+1} + \varepsilon_t \quad (2)$$

$$\Delta Y_t = \alpha_0 + \gamma Y_{t-1} + \beta_i + \sum_{i=2}^{m} \beta_i \Delta Y_{t-i+1} + \varepsilon_t \quad (3)$$

τ values obtained with this test were compared with the table values calculated by Dickey-Fuller and in this way the $\gamma = 0$ hypothesis was tested. The null hypothesis indicates that the series is not stable, but does have a unit root $(H_0 : \gamma = 0)$ while the alternative hypothesis suggests it is stable, which means it does not have any unit roots (Yılmaz, 2005).

Alternatively, the Philip Perron test takes into consideration the existence of unknown forms of the autocorrelation and conditional heteroscedasticity in the error term and uses a non-parametric correction for the serial correlation. In that case, the statistics are converted in order to remove the effects of the serial correlation on the asymptotic distribution of the test statistics. Statistics greater than their critical value in both tests causes the rejection of the null hypothesis of the unit root (Günaydın, 2004).

In the study, the Philip Perron likelihood test introduced by Johansen and Juselius (1990) was used to test the long-term relationships between the Balkan states' stock markets and the BİST 100 national index. Moreover, the Var (Vector Autoregressive) model was also used. This model is a simple multidimensional time series prediction model that is defined by all the variables involved in the model upon the lagged values of themselves and other variables. The time series prediction model interpretation and the structural interpretation of the Var model are known as the standard Var model and the structural Var, respectively, (Temurlenk, 1989).

The simple Var model for the two variables such as y and x can be stated as follows:

$$y_t = a_1 + \sum_{i=1}^{p} b_{1i} y_{t-i} + \sum_{i=1}^{p} b_{2i} x_{t-i} + v_{1t} \quad (4)$$

$$x_t = c_1 + \sum_{i=1}^{p} d_{1i} y_{t-1} + \sum_{i=1}^{p} d_{2i} x_{i-t} + v_{2t} \quad (5)$$

where, "p" is the lag length and "v" is the normally distributed random error terms, which have a mean value of zero; there was no autocorrelation or constant variance.

The lag lengths of variables are extremely important in making predictions by the Var model. Accordingly, lag lengths of each index are calculated as follows before the prediction of the Var model:

T: Number of Observations

k: Number of Parameters

l: Logarithmic Likelihood function

Criteria	***Formula***	
Akaike Information Criterion (AIC)	$-2\left(\frac{1}{T}\right)+\frac{2k}{T}$	*(6)*
Schwarz Information Criterion (SIC)	$-2\left(\frac{1}{T}\right)+\frac{k\log(T)}{T}$	*(7)*
Hannan-Quinn Information Criterion (HQ)	$-2\left(\frac{1}{T}\right)+\frac{2k\log(\log(T))}{T}$	*(8)*

The Granger Causality test will be used to specify the internal-external differences between the variables in making the predictions with the Var model. The Var model results can only be reliable provided that that the error terms to be obtained from the model are distributed around a constant mean value. Accordingly, the tests can be performed for the error terms after the prediction is made by the Var model. The data sets were investigated in terms of the stability with the ADF test before the causality relationships between the stock markets are presented with the Var model. The results are in Table 1 below:

Table–1: ADF Unit Root Test Results

	Share Indices	Level [I(0)]		First Difference [(1)]	
		t-statistics	Prob	t-stat	Prob
ADF Results	**Bosnia**	-3,471454	0,1244	-3.471719*	0
	Bulgaria	-3,472813	0,6339	-3.472813*	0,0028
	Croatia	-3,471719	0,1875	-3.471719*	0
	Germany	-3,473096	0,9294	-3.473096*	0
	Greece	-3,471454	0,4745	-3.471719*	0
	Italy	-3,471454	0,5864	-3.473096*	0
	Macedonia	-3,471454	0,3112	-3.471719*	0
	Montenegro	-3,471454	0,7671	-3.472259*	0
	Romania	-3,471454	0,7108	-3.471719*	0
	Serbia	-3,474567	0,9316	-3.474567*	0,0014
	Turkey	-3,471454	0,2463	-3.471719*	0
	USA	-3,471454	0,7811	-3.471719*	0

Note: The ADF critical values were obtained from the MacKinnon (1991) Critical values.
* 0.90, 0.95, and 0.99 confidence interval level

When the ADF test results were examined, it could be seen that the statistics of the level values were smaller than the critical value in terms of the absolute values, which means the series contains the unit roots in their levels. The unit root tests performed again following the differences of the data set included in the analysis were taken, and consequently it became evident that all the variables were made stable. The Johansen Co-integration (1990) test was used in order to check whether any long-term relationship existed between the Balkan states' stock markets and the USA, Germany, and Italy.

Table–2 Johansen Co-integration Test Results

TURKEY-USA-GERMANY						
Ho	**Ha**	**Eigenvalue**	**Trace Stat**	**%5 Critical Value**	**Max Stat**	**%5 Critical Value**
r=0	r >1	0.022314	3.817063	15.49471	3.565564	14.2646
r≤1	r >2	0.001590	0.251499	3.841466	0.251499	3.841466
TURKEY-BOSNIA AND HERZEGOVINA-MONTENEGRO						
Ho	**Ha**	**Eigenvalue**	**Trace Stat**	**5% Critical Value**	**Max Stat**	**5% Critical Value**
r=0	r >1	0.022090	4.108275	15.49471	3.551666	0.9034
r≤1	r >2	0.003495	0.556609	3.841466	0.556609	0.4556
TURKEY-CROATIA-MACEDONIA						
Ho	**Ha**	**Eigenvalue**	**Trace Stat**	**5% Critical Value**	**Max Stat**	**%5% Critical Value**
r=0	r >1	0.031018	8.597363	15.49471	5.009905	14.2646
r≤1	r >2	0.022310	3.587458	3.841466	3.587458	3.841466
TURKEY-BULGARIA-GREECE						
Ho	**Ha**	**Eigenvalue**	**Trace Stat**	**5% Critical Value**	**Max Stat**	**5% Critical Value**
r=0	r >1	0.020683	4.852758	15.49471	3.302152	14.2646
r≤1	r >2	0.009766	1.550606	3.841466	1.550606	3.841466
TURKEY-ITALY-SERBIA						
Ho	**Ha**	**Eigenvalue**	**Trace Stat**	**5% Critical Value**	**Max Stat**	**5% Critical Value**
r=0	r >1	0.024344	5.050549	15.49471	3.893984	14.2646
r≤1	r >2	0.007293	1.156565	3.841466	1.156565	3.841466

TURKEY-ROMANIA						
Ho	**Ha**	**Eigenvalue**	**Trace Stat**	**5% Critical Value**	**Max Stat**	**5% Critical Value**
r=0	r >1	0.008772	1.400938	3.841466	1.400938	3.841466

Note: Trace and Max. Eigenvalue test results show according to 0.05 significance level values of MacKinnon (1991) that no co-integrated vector is found between the variables.

The Johansen co-integration test results presented in Table 2 demonstrate that the stock markets in Turkey and other countries do not act in concert in the long-term and therefore they can be used in international portfolio diversification. Although the existence of a long-term relationship is not mentioned, short-term causal relationships that may occur between the countries are additionally analyzed according to the Granger Causality test and the results of the established Var model.

The Var model was applied to the stable data as BİST-100 and other stock markets are first-order integrated and there were no long-term relationships between them and the studies were performed with the Granger Causality test. First of all, the optimal lag lengths were specified for each model separately in order to make up the Var model accurately, and the Granger Causality test was applied to present the internal-external difference between the variables.

Table–3: Results of the Bivariate Granger Causality Test

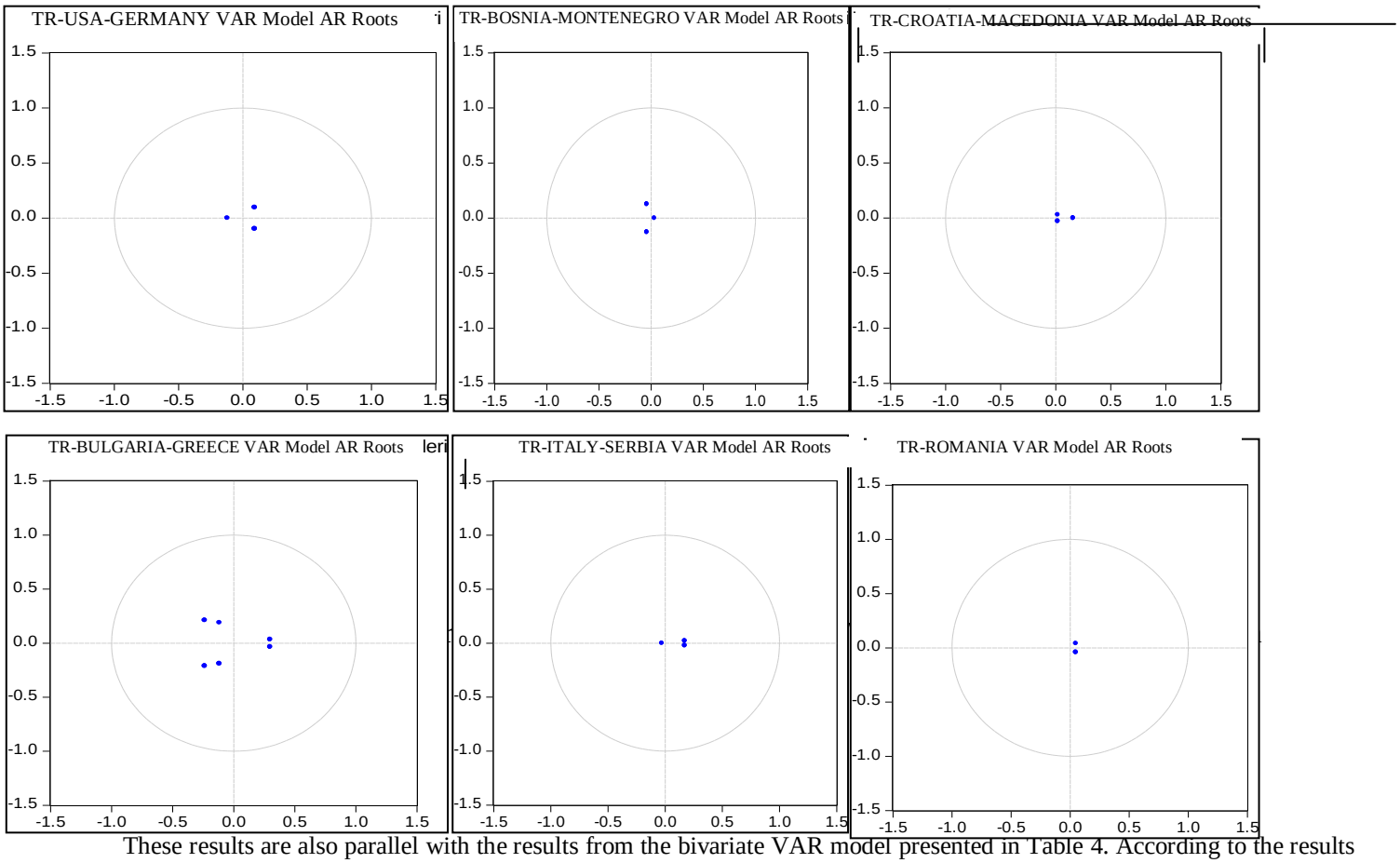
Causality Between the Variables	F Statistics	P Value
The USA is not the Granger Cause of TURKEY	0.29045	0.5907
TURKEY is not the Granger Cause of the USA	0.04033	0.8411
GERMANY is not Granger Cause of TURKEY	0.00087	0.9766
TURKEY is not the Granger Cause of GERMANY	0.5964	0.4411
BOSNIA is not the Granger Cause of TURKEY	1.85738	0.1749
TURKEY is not the Granger Cause of BOSNIA	4.2357	0.0412*
MONTENEGRO is not the Granger Cause of TURKEY	3.30636	0.0709**
TURKEY is not the Granger Cause of MONTENEGRO	0.48771	0.486
CROTIA is not the Granger Cause of TURKEY	0.18184	0.6704
TURKEY is not the Granger Cause of CROATIA	1.8145	0.1799
MACEDONIA is not the Granger Cause of TURKEY	0.12718	0.7219
TURKEY is not the Granger Cause of MACEDONIA	0.0362	0.8493
BULGARIA is not the Granger Cause of TURKEY	3.03302	0.0511**
TURKEY is not the Granger Cause of BULGARIA	0.31999	0.7266
GREECE is not the Granger Cause of TURKEY	4.79794	0.0095*
TURKEY is not the Granger Cause of GREECE	0.80945	0.447
ITALY is not the Granger Cause of TURKEY	0.0507	0.9506
TURKEY is not the Granger Cause of ITALY	2.09485	0.1266
SERBIA is not the Granger Cause of TURKEY	0.99181	0.3733
TURKEY is not the Granger Cause of SERBIA	2.94847	0.0554**
ROMANIA is not the Granger Cause of TURKEY	0.01276	0.9102
TURKEY is not the Granger Cause of ROMANIA	1.00913	0.3167

(*, denotes significance level at % 5, **, denotes significance level at % 10)

According to the results of the Granger Causality test given in detail in Table 3, it can be seen that a one-way relationship exists from TURKEY (BIST 100 index) to Bosnia at a significance level of 0.10 with the Bosnia stock market with the BIST100 index, and a Granger Cause from Montenegro to BIST 100 at a significance level of 0.10, from Bulgaria to BIST100 at a significance level of 0.10, from Greece to BIST100 at a significance level of 0.05 and from BIST100 to Serbia. It was proved that no short-term causal relationship exists with the stock markets from other countries.

The unit circle locations of the inverse roots of the AR characteristic polynomial of the estimated Var model can be seen in Figure 1. When the root in the figure is considered, all of the roots being inside the circle indicate that the established Var model does not pose any problem with respect to stability.

Figure 1. AR Characteristics



These results are also parallel with the results from the bivariate VAR model presented in Table 4. According to the results of the test performed for the error terms obtained from the VAR model, it is shown with the J-B test results that the error terms are distributed normally for each model. According to the results of the LM test carried out in order to test the existence of the autocorrelation in error terms, it was also demonstrated that no autocorrelation existed in the error terms, and no heteroscedasticity was found between the error terms according to the results of the White test. All of these diagnostic test results show that the VAR model satisfies the entire hypothesis.

Table–4 Bivariate and Trivariate Var Model Results

DEPENDENT VARIABLES							
	D(TUR)	**D(USA)**	**D(GER)**		**D(TUR)**	**D(BOS)**	**D(MON)**
D(TUR(-1))	0.05652*	0,000277	0,01457	**D(TUR(-1))**	0,065098	-0.000272*	-0,005233
	-0,08637	-0,00095	-0,0071		-0,08021	-0,00022	-0,00658
	[0.65438]	[0.29144]	[2.04981]		[0.81158]	[-1.24226]	[-0.79496]
D(USA(-1))	9,347283	-0.086559*	-1.421197**	**D(BOS(-1))**	34,33528	-0.034203*	3,19303
	-10,7662	-0,11854	-0,8862		-29,6522	-0,08084	-2,43348
	[0.86820]	[-0.73018]	[-1.60377]		[1.15793]	[-0.42310]	[1.31212]
D(GER(-1))	-0,767543	-0,0036	0.093051*	**D(MON(-1))**	0.11836**	-0,00321	-0.081677*

	-1,42657	-0,01571	-0,1174		-0,96816	-0,00264	-0,07945
	[-0.53803]	[-0.22947]	[0.79246]		[0.12225]	[-1.21454]	[-1.02797]
C	197.3677*	4,894388	29,1386	**C**	224.4305*	-0.041681*	19,10138
	-189,766	-2,08947	-15,62		-187,393	-0,51087	-15,3789
	[1.04006]	[2.34241]	[1.86553]		[1.19764]	[-0.08159]	[1.24205]
R-squared	0,008921	0,010165	0,04025	**R-squared**	0,013443	0,02049	0,01796
J-B (Chi-sq)		84,65199		**J-B (Chi-sq)**		102,104	
LM(F-stat)		7,285624		**LM(F-stat)**		5,16578	
White Test (Chi-sq)		51,3454		**White Test (Chi-sq)**		43,5944	
	D(TR)	**D(CRO)**	**D(MAC)**		**D(TUR)**	**D(BUL)**	**D(GRE)**
D(TUR(-1))	0.061408*	-0,00024	0,00154	**D(TUR(-1))**	-0.007069*	0,00019	0,002525
	-0,08082	-0,00081	-0,0011		-0,081	-0,00036	-0,00205
	[0.75977]	[-0.28932]	[1.37970]		[-0.08727]	[0.53324]	[1.23027]
D(CRO(-1))	2,697646	0.122557*	0,01606	**D(TUR(-2))**	0,043153	-9.71E-05	-0,001233
	-7,92037	-0,07966	-0,1096		-0,0771	-0,00034	-0,00195
	[0.34060]	[1.53850]	[0.14645]		[0.55970]	[-0.28223]	[-0.63081]
D(MAC(-1))	1,145844	0,096695	0.012709*	**D(BUL(-1))**	-51.75825**	-0.050723*	-0,18575
	-5,76704	-0,058	-0,0798		-18,3335	-0,0818	-0,46461
	[0.19869]	[1.66709]	[0.15919]		[-2.82316]	[-0.62007]	[-0.39980]
C	219,5421	0,334784	-0,8905	**D(BUL(-2))**	-4.546251*	0,02436	0,795771
	-187,574	-1,88654	-2,5966		-17,9371	-0,08003	-0,45456
	[1.17043]	[0.17746]	[-0.34294]		[-0.25346]	[0.30442]	[1.75063]
R-squared	0,005019	0,031258	0,01275	**D(GRE(-1))**	10.54818*	0.048654*	-0.057641*
					-3,22076	-0,01437	-0,08162
J-B (Chi-sq)		28,57681			[3.27506]	[3.38568]	[-0.70620]
LM(F-stat)		9,444387					
White Test (Chi-sq)		34,13508		**D(GRE(-2))**	6.419648*	0.005171*	-0,000287
					-3,46195	-0,01545	-0,08773
					[1.85435]	[0.33478]	[-0.00327]
	D(TUR)	**D(ITA)**	**D(SER)**				
D(TUR(-1))	0.055444*	0.041525**	0.000641*	**C**	253.5721*	1,12648	-0,909676
	-0,08849	-0,01985	-0,0003		-182,094	-0,81248	-4,61465
	[0.62655]	[2.09170]	[1.90394]		[1.39253]	[1.38646]	[-0.19713]
D(TUR(-2))	0,059267	0.004209*	-0.000428*	**R-squared**	0,121347	0,07699	0,033681
	-0,09048	-0,0203	-0,0003				
	[0.65504]	[0.20734]	[-1.24198]	**J-B (Chi-sq)**		120,9	
				LM(F-stat)		6,09633	
D(ITA(-1))	0,059167	0.012245*	0,00201	**White Test (Chi-sq)**		114,485	
	-0,39173	-0,08788	-0,0015				
	[0.15104]	[0.13934]	[1.34806]				
					D(TUR)	**D(ROM)**	
D(ITA(-2))	-0,10293	-0,08593	0,0006	**D(TUR(-1))**	0.065143*	0,01141	

	-0,39321	-0,08821	-0,0015		-0,08122	-0,00396	
	[-0.26177]	[-0.97409]	[0.39911]		[0.80209]	[2.88019]	
D(SER(-1))	-5,496429	-2,72158	0.220151*	**D(ROM(-1))**	-0,162091	0.03368*	
	-21,446	-4,81117	-0,0816		-1,61913	-0,07899	
	[-0.25629]	[-0.56568]	[2.69679]		[-0.10011]	[0.42638]	
D(SER(-2))	12,82417	0,529685	0.108818*	**C**	221.2346*	13,1925	
	-20,8819	-4,68462	-0,0795		-188,531	-9,1976	
	[0.61413]	[0.11307]	[1.36900]		[1.17346]	[1.43434]	
C	181,2187	23,9766	0,69509	**R-squared**	0,004116	0,05546	
	-190,974	-42,843	-0,727				
	[0.94892]	[0.55964]	[0.95618]	**J-B (Chi-sq)**		20,1271	
				LM(F-stat)		3,90032	
R-squared	0,009794	0,039901	0,13897	**White Test (Chi-sq)**		16,5439	
J-B (Chi-sq)		146,6103					
LM(F-stat)		17,13056					
White Test (Chi-sq)		77,2506					

Note: () indicates the standard error values, [] indicates the t-statistics values. The Jarque-Bera Normality Test Statistics (J-B), the Serial Correlation LM test statistics, and the Heteroscedasticity White Test Statistics related with the error terms obtained from the Bivariate and Trivariate Var model are found separately under the Var prediction model along with their symbols.

* indicates a significance level of 0.10, ** indicates a significance level of 0.05.

CONCLUSION

It is an undeniable fact that the interaction between the international financial markets has increased in conjunction with the globalization phenomenon that emerged in the 1980s. This situation offers new opportunities for international investors in particular. It is clear that investors diversifying the portfolio with international financial assets will provide a much better risk-return combination compared to a portfolio consisting of only domestic financial assets. More clearly, by means of diversifying their portfolios, international investors will provide higher returns at the same risk level while, similarly, they will be able to obtain the same expected rate of return with a lower risk. For this aim, the level of convergence between markets in global and regional terms needs to be known. Therefore, studies analyzing the convergence level of the markets have a particular importance in the globalizing financial markets environment. An important subdimension of this research area is analyzing convergence of regional markets. Balkan region is an important alternative for diversification aims. In analyzing the convergence of developing regions' markets, it is a common way to study the convergence of markets in the region, and that of between developed markets and regional markets.

In this work, indices representing the New York stock market in the USA, which is one of the most important stock markets in the world, and the stock markets of Germany and Italy, which have close economic relations with the Balkans as well as the stock markets of 9 countries in the Balkans were investigated. When the data of the mentioned stock markets are analyzed, it can be seen that the stock markets in Turkey and other countries do not act in concert in the long-term.

According to the results of the Granger Causality test driven, a one-way relationship exists from Turkey (BIST100) to Bosnia, and a Granger Cause from Montenegro to BIST 100, from Bulgaria to BIST100, from Greece to BIST100 and from BIST100 to Serbia. It was proved that no short-term causal relationship exists with the stock markets from other countries.

Therefore, investing in different Balkan region security markets would offer sound diversification opportunities. Portfolio risk may be reduced by investments made at security markets in the Balkan States, and higher relative returns may be achieved by way of portfolio diversification.

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