ИНСТИТУТ ЗА ИКОНОМИЧЕСКИ ИЗСЛЕДВАНИЯ НА БЪЛГАРСКАТА АКАДЕМИЯ НА НАУКИТЕ
ИКОНОМИЧЕСКИ ИЗСЛЕДВАНИЯ
ECONOMIC STUDIES
Volume 27 (4), 2018

Ani Stoykova[1]
Mariya Paskaleva[2]

CORRELATION DYNAMICS BETWEEN SOUTHEAST EUROPEAN CAPITAL MARKETS

This study examines the linkages between eight South East European emerging stock markets and three reference ones during the period 2005-2015 In this study we prove that there is a weak or moderate positive correlation between the reference capital markets of Turkey, Greece and Croatia and the other examined markets. All things considered, it seems reasonable to assume that there is a strong relationship between SEE capital markets. What is more, the degree of the development of the SEE capital markets determines the linkages between them, while the reference capital markets are with weaker correlation in the group than the developing markets. The developing capital markets of the explored group are strongly determined by country-specific factors, but five of them are strongly influenced by the Greek innovations. However, the market integration is anticipated to strengthen, as a result of EU expansion, as the implementation of Strategy 2020. These countries will take profit if their capital markets are more accessible to foreign investors, reorganizing them in conditions to international law in order to defend foreign investors.
JEL: C32; E27; G15

1. Introduction

Over the last 30 years, financial markets have become more integrated mainly because of reducing the value of information, the development of electronic trading systems and the removal of the legal restrictions on international capital flows. These changes lead to a stronger interaction between the international financial markets and also expend the capital movements. What is more, according to the portfolio theory, profits from the international diversification of the financial instruments portfolio are inversely related to the correlation of returns of these financial instruments. In the context of this theory, investors are becoming more active by investing in the foreign capital markets as a part of the risk

[1] *Ani Stoykova is Assistant professor, Dr. in Faculty of Economics, Department of "Finance and accounting", South-West University "Neofit Rilski", Bulgaria, phone: +359 886330397, e-mail: ani_qankova_st@abv.bg.*
[2] *Mariya Paskaleva is Assistant professor in Faculty of Economics, Department of "Finance and accounting", South-West University "Neofit Rilski", Bulgaria, phone: +359 885390101, e-mail: m.gergova@abv.bg*

diversification strategy. The tendency for the global markets to become integrated and harmonized is a result of the increasing tendency toward liberalization and deregulation in the money and capital markets, both in developed and developing countries. Such liberalization is important to introduce structural reforms, to promote market efficiency, to estimate investment, and to create a necessary climate for promoting sustainable economic growth. As a result, in the contest of portfolio theory, there is an increase in correlations between financial markets leading to reduce the benefits of international diversification. The analysis of the capital markets integration represents an important topic in the financial area as it possesses essential practical implications for assets allocation and investment management.

Capital markets in different countries or regions may show a diversified degree of integration, harmonization and segmentation. Rational investors should arbitrage between prices of the stock assets which actually resulting in more integrated markets. Since the last financial crisis, European countries have faced various challenges: consolidating their budgets while at the same time promoting economic growth and a collapse in the gross domestic product (Stoilova, 2017). Further financial development and integration can help to improve the effectiveness of and the political incentives for structural reform.

As Ganchev (2015) emphasizes the last global financial crisis of 2007- 2008 is considered by many economists as the worst economic turmoil since the Great Depression. Over the last few years, the development of Southeast European capital markets (SEE) has attracted more local investors, especially after the financial crisis. In addition, the countries in the same geographic region and also with the same group of investors are likely to have correlated capital markets. Consequently, the issue of the co-movement of the SEE capital markets is important for the local investors and companies in the region that are making capital budgeting decisions. In this study the joint movement of the SEE capital markets is examined although there are significant differences between SEE stock markets' characteristics.

In this study we find enough evidence that SEE capital markets are correlated and integrated and therefore these markets are characterized with harmonized and homogeneous market dynamics. The degree of the development of the SEE capital markets determines the linkages between them, while the reference capital markets are with weaker correlation in the group than the developing markets. The results reveal that there is a weak or moderate positive correlation between the reference capital markets of Turkey, Greece and Croatia and the other examined markets. The results show that strength of co-movement between Bulgarian stock market and the rest markets in Southeast Europe (SEE) is strong, especially with Serbian, Romanian and Croatian markets. The developing capital markets of the explored SEE group are determined mainly by their country-specific risk. The main contribution of this paper is that it provides further evidence on stock market integration and correlations in several SEE developing capital markets and three reference capital ones, emphasizing new linkages between Greek, Croatian, Turkish capital markets and the developing SEE stock ones. All things considered, it seems reasonable to assume that there is a strong correlation between SEE capital markets.

In this paper, we analyze the joint movement of eleven financial markets of South East Europe (SEE) - Bulgaria, Croatia, Greece, Serbia, Slovenia, Turkey, Romania, Montenegro, Macedonia, Banja Luka and Sarajevo (Bosnia and Herzegovina) using correlation analysis during the period 2005-2015.

The methodological and theoretical basis of the research can be formulated in the following sequence:

1. Theoretical analysis based on previous theoretical and empirical researches;
2. Development and implementation of practical econometric models. The analysis which reflects the quantitative results of the application of econometric methodology is based on the correlation analysis and VAR;

Restrictive conditions of this research are determined in the following aspects:

1. Time range-this research is restricted in the time interval from 2005- 2015;

2. Methodological restrictions –they are set by the statistical properties of the researched data imposing the application of specific econometric tests and models giving an opportunity for the reflection. The proposed and used methodology does not claim to be the only possible and applicable when inspecting and proving the research thesis of this study.

3. *Place restrictions* – the analysis and the inspection of the research thesis are concentrated on Southeast European Capital Markets

4. Due to the aforementioned facts, conclusions drawn of this research do not engage the processes and circumstances of other markets of the category of Southeast European Capital Markets.

The paper is organized in the following way. The first section initiates with the introduction. Section 2 summarizes the literature review. Section 3 discusses the data and the research method employed. Section 4 shows the main estimation results. The final section provides a summary and conclusions.

2. Literature review

Many studies analyze the stock market co-movements among developed countries (Longin and Solnik, 1995; Forbes and Rigobon, 2002; Johnson and Soenen, 2003). Also, there are numerous studies concerning Central and Eastern Europe stock market co-movements (Kasch-Haroutounian and Price, 2001; Voronkova, 2004; Cappieollo, et al., 2006; Babetskii et al., 2007; Egert and Kocenda, 2007; Černý and Koblas, 2008; Gilmore et al., 2008; Kocenda and Egert, 2011). In comparison, the studies for the stock markets co-movements in South Eastern Europe are just a few. Kenourgios and Samitas (2011) use conventional test, regime-switching co-integration tests and Monte Carlo simulation to analyze long-run relationships among five Southeastern European (SEE) stock markets (Turkey, Romania, Bulgaria, Croatia, Serbia), the United States and three developed European markets (UK, Germany, Greece), during the period 2000–2009. The authors find enough evidence for a long-run cointegrating relationship between the SEE markets within the region and globally. Gradojevic and Dobardzic (2012) use a frequency domain approach to examine the causal relationship between the returns on major indexes of Croatia, Slovenia, Hungary and Germany and the return of the main Serbian index. The results reveal that there is a predominant effect of the Croatian and Slovenian indexes on Serbian stock exchange index across a range of frequencies. Applying GARCH models, Horvath and Petrovski (2013) examine the stock market co-movements between Western and Central Europe (the Czech Republic, Hungary and Poland) on the one hand, and South Eastern Europe (Croatia, Macedonia and Serbia) on the other hand, in the period 2006–2011. The results show that the degree of co-movements is much higher for Central Europe than for South Eastern Europe.

Stoica and Diaconașu (2013) find out the existence of more than one cointegration vectors signifies comovements and linkages for the CEE analysed markets, indicating a stationary long-run relationship. In their study, no dramatic shock was detected in stock market dynamics after the expansion of the Vienna Stock Exchange, but still the findings highlighted an increased integration between it and CEE markets in the second subperiod. Additionally, the increasing response to the arrival of price innovations from Austria is registered only in the case of EU markets.

Syllignakis and Kouretas (2010) reveal that the financial linkages between the CEE markets and the world markets increased with the beginning of the EU accession process and also conclude that the global financial crisis of 2007–2009 caused a slowdown in the convergence process. Syriopoulos and Roumpis (2009) note that the Balkan stock markets are seen to exhibit time-varying correlations as a peer group, although correlations with the mature markets remain relatively modest.

A large number of existing studies establishes that due to increasing similarity of returns of different capital markets, the benefits of international diversification of portfolios have gradually faded (Gilmore and McManus, 2004; Aggarwal and Kyaw, 2004; Darrat and Zhong, 2005; Longin and Solnik, 2001). All things considered, stronger integration of financial markets in the presence of internationalization may reduce the power and advantage of diversification; nonetheless, the dissemination of information across financial markets is vital for portfolio managers to construct optimal portfolios. It is further apparent that stock markets have become increasingly important as a source of raising funds for public companies in CEE countries (Stoica et al., 2005).

Gradojević and Djaković, (2013) find substantial causality interactions at stock returns at various frequencies between stock market indices in Croatia, Slovenia relative to the returns of Serbian index Belex 15.

In order to assess the impact of the 2008 financial crisis on the interconnection among the SEE stock markets (Macedonian, Croatian, Slovenian, Serbian, and Bulgarian) Zdravkovski (2016) finds out no evidence of cointegration between studied markets during the pre- and post-crisis periods. However, during the 2008 financial crisis, the empirical findings support the existence of three co-integration vectors. This means that the recent global financial crisis and the subsequent euro crisis strengthened the connection between the investigated stock markets. Furthermore, the analysis reveals that during periods of financial turmoil, the Macedonian stock market is positively and actively influenced by the

Croatian and Serbian markets. A significant implication of these results is that the integration between SEE stock markets tends to alter over time, particularly during stages of financial disturbances.

Analyzing the Bulgarian and Serbian capital markets, taking into account the 2008 crisis Simeonov (2015) points out that even similarities between two economies, their markets show a different reaction to the effects of the crisis. Despite the normally highly volatile capital markets the Serbian investment activity is more vital and more optimistic, than the Bulgarian, which supports the real sector and the economy, as a whole. While, the investors on the BSE-Sofia are expressively disposed to undervalue the economic activity, they have continued to behave markedly timorous since 2008. The last fact is a result partially of the naive optimism, spread by the end of 2007.

Todorov (2017) concludes that Bulgaria is characterizing by ineffective money market which stays under the equilibrium levels during stagnation. In his research he indicates about stimulating economic growth by increasing money supply and improving the efficiency of Bulgarian capital market. Studying the impact of 2008 financial crisis on the efficiency of the capital markets of Central and Eastern European (CEE) countries Tsenkov (2015) finds differences in the market reaction of two of studied markets in comparison with the rest CEE markets. The Bulgarian and the Romanian indices show a disposition for faster and more sensitive reaction to negative market impulses, typical for the Crisis Period, in contrast to a moderate incorporation of the positive market impulses specific to the Pre-crisis Period. The incorporation of the market information by Bulgarian SOFIX during Crisis Period is so accelerated that when it becomes publicly available much of the content is already included in the values of SOFIX under the form of strongly followed market trend. This type of reaction is opposite to the behavior from other CEE indices which follows more sustainable market trends during the pre-crisis period and gives much lower significance of the new market information. This market behavior has changed during the Crisis Period, demonstrating an enhanced response only to the short-term market fluctuations. During the Post-crisis Period the Bulgarian and the Romanian indices are showing a predisposition to the short-term market trends. This is opposite to the other CEE indices which tend to form and pursue longer-term market trends.

Yang et al. (2004) explores contagion effects and information transmission channels between nine stock markets – Hong Kong, Indonesia, Korea, Malaysia, Thailand, Philippines, Singapore, Taiwan and Japan) by applying VAR methodology. He tries to reveal interactions between the aforementioned markets during a crisis period. Shamurove (2005) reveals the interaction between markets in the Middle East, namely Egypt, Israel, Jordan, Lebanon, Morocco, Oman and Turkey. The applied methodology is VAR model. The results expose that none of the explored financial markets is independent.

3. Methodology

Before proceeding the econometric analysis of the returns of stock market indexes, we should analyze the graphical dynamic of the explored indexes and their return during the explored period. Their dynamic is revealed in Appendixes 1. It is proved that all graphs expose volatility clusters, especially expressed between the time period of 2007- 2009. We observe almost the same dynamic for all of the explored capital markets. Only for the Greek index ATHEX we observe more expressed volatility clusters at the end of the explored period. It may due to the sovereign debt crisis in Greece.

3.1. Augmented Dickey-Fuller (ADF) test

According to Tanchev (2016): "Before proceeding to the election of the econometric method, it is necessary to apply a test to establish the stationarity". The null hypothesis of the Augmented Dickey and Fuller (ADF) is non-stationary. The Augmented Dickey-Fuller unit root tests is performed on each series. The tests reject the non-stationary null hypothesis for the stock price index at 1 %, 5 % and 10% significance level for all monthly stock returns at level.

The Augmented Dickey-Fuller (ADF) test constructs a parametric correction for higher-order correlation by assuming that the y series follows an AR (p) process and adding p lagged difference terms of the dependent variable y to the right-hand side of the test regression:

$$(1)\ \Delta y_t = \alpha y_{t-1} + x_t^{'}\delta + \beta_1 \Delta y_{t-1} + \beta_2 \Delta y_{t-2} + ... + \beta_p \Delta y_{t-p} + \nu_t$$

3.2. Descriptive Statistics

Table I

Descriptive Statistics for SEE stock market indices

	RATHEX	RBELEX	RBET	RBIFX	RBIRS	RBIST	RCROBEX	RMBI	RMONEX	RSBITOP	RSOFIX
Mean	-0.010485	-0.003972	0.003449	-0.006677	-0.003949	0.009159	0.000679	0.004200	0.011761	-0.004325	-0.002579
Median	0.002666	0.003293	0.011076	-0.012899	-0.008940	0.007646	0.000828	-0.009416	-0.000576	0.000220	-0.000127
Maximum	0.222195	0.276658	0.236225	0.284238	0.307819	0.258045	0.329743	0.418677	0.449368	0.160444	0.310345
Minimum	-0.312754	-0.398026	-0.377969	-0.210969	-0.256846	-0.210731	-0.395540	-0.376864	-0.325570	-0.195710	-0.509278
Std. Dev.	0.096368	0.094793	0.090531	0.076111	0.068390	0.082279	0.086153	0.105123	0.114887	0.059442	0.091216
Skewness	-0.386752	-0.608950	-0.933076	0.776436	0.870484	-0.044665	-0.604120	0.793063	0.739286	-0.466496	-1.320319
Kurtosis	3.576876	6.222918	6.167721	5.705056	7.919202	3.212425	8.604285	6.651975	6.024136	4.259510	11.44921
Jarque-Bera	5.043432	59.84701	73.21697	52.69735	147.4932	0.287648	178.0342	85.86888	61.37935	11.66999	424.4611
Probability	0.080322	0.000000	0.000000	0.000000	0.000000	0.866040	0.000000	0.000000	0.000000	0.002923	0.000000
Sum	-1.363014	-0.480607	0.448319	-0.867978	-0.513333	1.190637	0.088238	0.546046	1.528968	-0.493062	-0.335241
Sum Sq. Dev.	1.197989	1.078279	1.057267	0.747288	0.603357	0.873308	0.957490	1.425567	1.702668	0.399263	1.073321
Observations	130	121	130	130	130	130	130	130	130	114	130

Source: Authors' calculations.

Table I shows the descriptive statistics of the monthly returns for each SEE stock index. We can assume that the Turkish and Montenegrin markets, offers, on average the highest return over the examined period (0,009% and 0,012% respectively). On the other hand, the mean excess return is lower in Greece, Serbia, Bosna and Herzegovina, Banja Luka, Slovenia and Bulgaria. These results confirm previously established results (Stoica and Diaconasu, 2013). The lower standard deviation values indicates that the SEE capital markets exhibit lower volatility, but the highest value is registered for Montenegro. Most of the analyzed index series (7 of the 11 SEE indices) are negatively skewed (except from Bosna and Herzegovina, Banja Luka, Macedonia and Montenegro). There is a higher probability for investors to get negative returns from Bulgaria rather than positive returns due to the highest negative skewness value (-1.32). The kurtosis values of all indices returns are larger than the value of normal distribution (the kurtosis of the normal distribution is 3), indicating that big shocks are more likely to be present for this markets. The Jarque–Bera test (test for normality) rejects normality of distribution of the analyzed markets, which means that all indices exhibit significant departures from normality.

3.3. Correlation

Correlation is any of a broad class of statistical relationships involving dependence, though in common usage it most often refers to the extent to which two variables have a linear relationship with each other.

The population correlation coefficient $\hat{\rho}(X,Y)$ between two random variables X and Y is defined as:

$$(2)\ \hat{\rho}(X,Y) = \frac{\hat{\sigma}(X,Y)}{(\hat{\sigma}(X,X).\hat{\sigma}(Y,Y))^{1/2}}$$

A correlation coefficient is a number that quantifies a type of correlation and dependence, meaning statistical relationships between two or more values in fundamental statistics

3.4. VAR methodology

The technique of Correlation Analysis is a technique, related with some of the following limitations: it estimates the contemporaneous relationship between the variables, but VAR methodology is a procedure that gives useful insights for lagged links (Patonov, 2016). The vector autoregression (VAR) is commonly used for forecasting systems of interrelated time series and for analyzing the dynamic impact of random disturbances on the system of variables. The VAR approach sidesteps the need for structural modeling by treating every endogenous variable in the system as a function of the lagged values of all of the endogenous variables in the system.

The mathematical representation of a VAR is:

$$(3)\ y_t = A_1 y_{t-1} + \ldots + A_p y_{t-p} + Bx_t + \varepsilon_t$$

where y_t is a *k* vector of endogenous variables, x_t is a*d* vector of exogenous variables, $A_1,...,A_p$ and *B* are matrices of coefficients to be estimated, and ε_t is a vector of innovations that may be contemporaneously correlated but are uncorrelated with their own lagged values and uncorrelated with all of the right-hand side variables.

Since only lagged values of the endogenous variables appear on the right-hand side of the equations, simultaneity is not an issue and OLS yields consistent estimates. Moreover, even though the innovations ε_t may be contemporaneously correlated, OLS is efficient and equivalent to GLS since all equations have identical regressors. VAR model is a parameter estimation method. Applying VAR model, we reveal possible relations between current and past values of the explored variables. We apply this model, within the framework of a vector autoregression (VAR) model, to examine the dynamics of interdependency between the reference SEE capital markets and developing SEE capital markets. The most important advantage of VAR models is that they provide an opportunity to investigate the reaction of each national stock market to its own price shocks and the price innovations from the reference capital market as well (Stoica and Diaconașu (2013).

The econometric models have undergone diagnosis analyses for testing their statistical properties, the main steps taken being:

I. Testing for stationarity of the variables;

II. Choosing the most appropriate lag length of the VAR model;

III. Testing the stability of VAR;

IV. Testing for autocorrelations, heteroskedasticity of residual terms and checking for their normal distribution.

We apply variance decomposition and impulse- response function in order to reveal market integration and interaction of SEE capital markets.

To estimate the VAR model we have defined as endogenous variables the returns of each index-the Bulgarian *SOFIX*, the Banja Luka *BIR*S, the Sarajevo *BIFX*, the Greek *Athex Composite Share Price Index (ACSP)*, the Macedonian *MBI10*, the Romanian *BET*, the Serbian *BELEX15*, the Croatian *CROBEX,* the Slovenian *SBI TOP*, the Turkish *BIST100* and the *Montenegrin* MONEX and as exogenous variables the past values (2 lags) of the same variables. The lag-length of VAR is determined by the use of information criteria – Akaike's information criteria (AIC) and Schwarz information criterion (SIC). The Akaike Information Criterion and the Schwarz information criterion (SIC) are tools to select the best model, and we chose the lag that minimizes the AIC and the SIC value. As a best model, we accept the one, in which AIC and SIC's statistics possess the lowest values (Table II).

Table II

VAR Order Selection Criteria

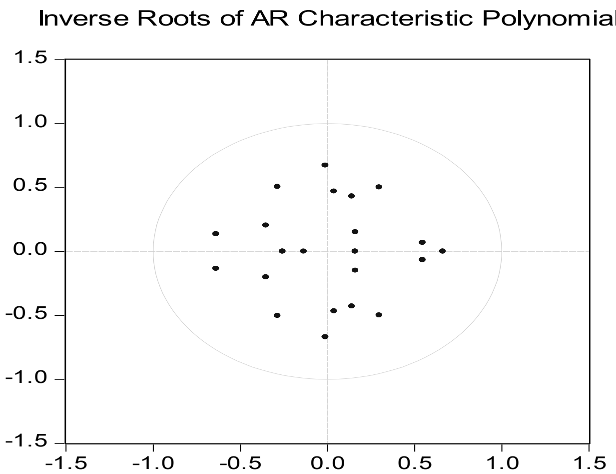
Lag	AIC	SIC
0	-29.72709	-26.45069
1	-30.56166	-27.24492
2	-31.83495*	-28.47787*
3	-29.85167	-20.45425
4	-30.64728	-18.20952
5	-30.36653	-15.88843
6	-29.49035	-13.97191
7	-30.24189	-13.68311
8	-29.16045	-16.56133

Source: Authors' calculations

The stability condition of a VAR is that the characteristic equation roots of the estimated coefficients matrix of VAR should be inside the unit circle (Graph 1). All modulus are smaller than one and this means that the system is stationary. The stability of a system assumes that the shocks are transient and disappear after a certain period of time, and their lack of steadiness implies that certain results, such as the standard errors for the impulse-response function, are not valid (Geamanu, 2014). According to tests, the estimated VAR is stationary.

Graph 1

Inverse Roots of AR Characteristic Polynomial



Source: Authors' results

In order to see if there is any autocorrelation, we use Lagrange Multiplier (Table III).

Table III

VAR Residual Serial Correlation LM Tests

Lags	LM-Stat	Probability
1	149.4488	0.0605
2	129.9325	0.2732
3	148.6294	0.0547

Source: Authors' results.

The null hypothesis that **H0: no serial correlation at lag order** his confirmed**.** This means that it does not exist autocorrelations in first, second and third order and the applied VAR model may be considered as an appropriate one to capture the dynamics and interactions between explored capital markets. The White Heteroskedasticity test to detect the existence of heteroskedasticity (the lack of a constant variance) is applied. The test results are satisfactory, the assumptions of the existence of autocorrelation and existence of homoskedasticity can be rejected at the conventional 5% significant level (Table III, Appendix II).

We apply the Lutkepol test to check the normality of the series (Appendix III). Although small number of the errors do not have a normal distribution, we chose to ignore this problem considering the appropriate models in terms of theory, and the lack of normality does not mean that the model is invalid, but only that there are other variables which explain the model (Geamanu, 2014).

3.5. Data

In this paper, we examine the co-movement of the SEE capital markets using correlation and VAR analysis. Throughout this study, it is aimed to reveal that none of the analysed markets is absolutely independent, even though the interrelationships are not so significant. The indices under examination are eleven indices represent all capital markets of South East Europe: the Bulgarian *SOFIX*, the Banja Luka *BIR*S, the Sarajevo *BIFX*, the Greek *Athex Composite Share Price Index (ACSP)*, the Macedonian *MBI10*, the Romanian *BET*, the Serbian *BELEX15*, the Croatian *CROBEX,* the Slovenian *SBI TOP*, the Turkish *BIST100* and the *Montenegrin* MONEX. The stock exchanges of SEE can be divided into two groups in the context of their development, using the stock market capitalization as a criterion (Table V). According to Stavrova (2017): "The process of global financial and economic development has reached a varying degree…" The first group contains the emerging markets – Bulgaria, Romania, Banja Luka and Sarajevo (Bosnia and Herzegovina), Serbia, Montenegro, Macedonia, Slovenia and the second one – reference capital markets – Croatia, Turkey and Greece (Table IV and Table V). Daily closing prices of eleven SEE market indices were available on the Stock Exchanges' websites of the investigated countries. The data range is 1^{st} January 2005 to 4^{th} November 2015. We use the values of the returns of the indices with a monthly frequency. We calculate the percentage change between the opening value of the index on the first working day of the month *(Vt)* and the opening value on the first working day of next month *(Vt+1),* or:

(4) $$R_t = \frac{V_{t+1} - V_t}{V_t}$$

Table IV

Analyzed stock exchanges, indices and a number of observations

Country	Stock exchange	Index
Bulgaria	Bulgarian Stock Exchange	SOFIX
Bosnia and Herzegovina	Banja Luka stock exchange	BIRS
Bosnia and Herzegovina	Sarajevo stock exchange	BIFX
Greece	Athens Stock Exchange	Athex Composite Share Price
Macedonia	Macedonian Stock Exchange	MBI10
Romania	Bucharest Stock Exchange	BET
Serbia	Belgrade Stock Exchange	BELEX15
Croatia	Zagreb Stock Exchange	CROBEX
Slovenia	Ljubljana Stock Exchange	SBI TOP
Turkey	Borsa Istanbul	BIST100
Montenegro	Montenegro Stock Exchange	MONEX

Notes for Table 1: Southeast Europe includes 10 countries: Bulgaria, Bosnia and Herzegovina (two capital markets-Sarajevo and Banja Luka), Greece, Macedonia, Romania, Serbia, Croatia, Slovenia, Turkey and Montenegro.

Source: Author's calculations.

Table V

Market capitalization of SEE capital markets for 2011

SEE capital markets	Market capitalization (US$)
Country	**2011 (billion)**
Bulgaria	8,253.25 US$
Croatia	22,558.38 US$
Greece	33,778.89 US$
Banja Luka (Bosnia and Herzegovina)	2,601.39 US$
Sarajevo (Bosnia and Herzegovina)	2,263.89 US$
Montenegro	3,509.11 US$
Romania	14,023.92 US$
Serbia	4,055.58 US$
Slovenia	6,325.86 US$
Turkey	197,074.46 US$
Macedonia	580.36 US$

Notes for Table 2: The total market capitalization of each capital market is for 2011 (approximately in the middle of the examined period 2005-2015).

Source: The websites of the SEE stock exchanges.

Table VI

Developing and reference capital markets (according to the market capitalization)

Developing SEE capital markets	Reference SEE capital markets
Bulgaria	**Greece**
Banja Luka (Bosnia and Herzegovina)	**Croatia**
Sarajevo (Bosnia and Herzegovina)	**Turkey**
Macedonia	
Montenegro	
Romania	
Serbia	
Slovenia	

Notes for Table 3: Median market capitalization is US $ 6,325.86 billion.
Source: Author's calculations.

4. Empirical results

4.1. Stationary

Before analyzing the co-movement of the SEE financial markets, the Augmented Dickey-Fuller (ADF) test is applied to examine the stationary properties of the return series. The null hypothesis of ADF test is that the series has a unit root (non-stationary process). It can be seen from the above table, the series **are stationary at level**.

Table VII

Estimating results of Augmented Dickey –Fuller (ADF) test

Country/Indices	**Parameters**		Stock index Return*
Bulgaria	**ADF statistic**		-7.597629
	Critical Values	**1%**	-3.481623
		5%	-2.883930
		10%	-2.578788
	p-value		*0.0000*
Croatia	**ADF statistic**		-10.75016
	Critical Values	**1%**	-3.481623
		5%	-2.883930
		10%	-2.578788
	p-value		*0.0000*
Greece	**ADF statistic**		-9.675144
	Critical Values	**1%**	-3.481623
		5%	-2.883930
		10%	-2.578788
	p-value		*0.0000*
Macedonia	**ADF statistic**		-6.088729
	Critical Values	**1%**	-3.600987
		5%	-2.935001
		10%	-2.605836
	p-value		*0.0000*

Montenegro	**ADF statistic**		-5.213145
	Critical Values	**1%**	-3.610453
		5%	-2.938987
		10%	-2.607932
	p-value		*0.0001*
Romania	**ADF statistic**		-9.291294
	Critical Values	**1%**	-3.481623
		5%	-2.883930
		10%	-2.578788
	p-value		*0.0000*
Slovenia	**ADF statistic**		-7.233281
	Critical Values	**1%**	-3.488063
		5%	-2.886732
		10%	-2.580281
	p-value		*0.0000*
Turkey	**ADF statistic**		-9.430183
	Critical Values	**1%**	-3.496346
		5%	-2.890327
		10%	-2.582196
	p-value		*0.0000*
Serbia	**ADF statistic**		-4.391736
	Critical Values	**1%**	-3.486551
		5%	-2.886074
		10%	-2.579931
	p-value		*0.0005*
Banja Luka	**ADF statistic**		-7.030134
	Critical Values	**1%**	-3.481623
		5%	-2.883930
		10%	-2.578788
	p-value		*0.0000*
Sarajevo	**ADF statistic**		-5.970411
	Critical Values	**1%**	-3.482035
		5%	-2.884109
		10%	-2.578884
	p-value		*0.0000*

**All of the stock index returns are stationary at level.*
Source: Authors' calculations.

4.2. Correlation analysis

In order to examine the co-movement of the SEE capital markets, the correlation analysis is applied. Analyzing the results of the correlation matrix the major conclusions for the harmonization of the examined indices in the region. The correlation matrix is presented in Table 5. The Serbian index BELEX15 registers the highest correlations with the other examined indices. In contrast, the least connected capital market in the region is that of Banja Luka, considering the lowest values of registered correlation coefficients. In addition, the Montenegrin index MONEX is relatively closely correlated with the Serbian index

BELEX15 (0.685317), the Croatian index CROBEX (0.679181) and the Macedonian index MBI10 (0.690677), which can be attributed to the existing integration between these financial markets with close and similar development and characteristics. Additionally, these capital markets face similar challenges and problems - corruption, judicial independence, law enforcement, shadow economy, a limited number of foreign investors and the issue of free movement of capital. The Croatian index CROBEX is predictably high associated with BELEX15 (0.669970), BET (0.608768), MONEX (0.679181), MBI10 (0.690677) and SOFIX (0.616263) due to the symmetric market shocks on these capital markets, and their close economic development and growth. It was proved that the index BIST100 of the reference Turkish capital market registered a low or moderate correlation with the other indices in the region, which means that the market dynamics of this market does not affect the other financial markets in SEE. In addition, the Turkish market show relatively high correlation (compared to other SEE capital markets SEE) with reference Greek capital market (0.516566).

Table VIII

Correlation matrix of examined SEE market indices

	ACSP	BELEX15	BET	BIFX	BIRS	BIST100	CROBEX	MBI10	MONEX	SBITOP	SOFIX
ACSP	**1.000000**										
BELEX15	0.450656	**1.000000**									
BET	0.642541	0.533182	**1.000000**								
BIFX	0.289116	0.658350	0.327432	**1.000000**							
BIRS	0.159478	0.536066	0.212359	0.524708	**1.000000**						
BIST100	0.516566	0.299001	0.546841	0.275759	0.167652	**1.000000**					
CROBEX	0.507915	0.669970	0.608768	0.479733	0.368159	0.481318	**1.000000**				
MBI10	0.340126	0.653152	0.385513	0.423698	0.470494	0.234876	0.600676	**1.000000**			
MONEX	0.345074	0.685317	0.310752	0.540538	0.504158	0.343549	0.679181	0.690677	**1.000000**		
SBITOP	0.536818	0.576229	0.490587	0.500012	0.287006	0.390038	0.542098	0.547407	0.467569	**1.000000**	
SOFIX	0.515429	0.603714	0.661221	0.370920	0.271405	0.406721	0.616263	0.379637	0.350571	0.549255	**1.000000**

Source: Author's calculations.

On the other hand, the countries that are not part of the European Union (EU) - Montenegro, Macedonia, Bosnia and Herzegovina (Sarajevo and Banja Luka) are characterized with moderate or low values of correlation coefficients, probably due to different market dynamics during the financial crisis of 2008. Additionally, for reference capital markets in the region, namely Turkey, Greece and Croatia is registered low or moderate positive correlation, suggesting that there are not leading and dominant financial market to influence the market dynamics of all other SEE indices. Several additions can be made here. Firstly, the Greek market is weakly correlated with all developing SEE capital markets (Macedonia, Serbia, Montenegro, Slovenia, Banja Luka, Sarajevo, Bulgaria), with the exception of the Romanian one, considering the low positive correlation coefficients. Secondly, the Turkish capital market has shown a low correlation with all emerging markets in the region. In addition, the Slovenian index is characterized by a low or moderate relationship with other SEE equity markets. A possible explanation for such weak correlation between the Slovenian capital market and the other SEE markets can be sought in the overtaking and rapid development of this market and the growth in market turnover in the last few years as a result of the introduction of new financial instruments (derivatives), attracting international portfolio investors, as well as local institutional investors.

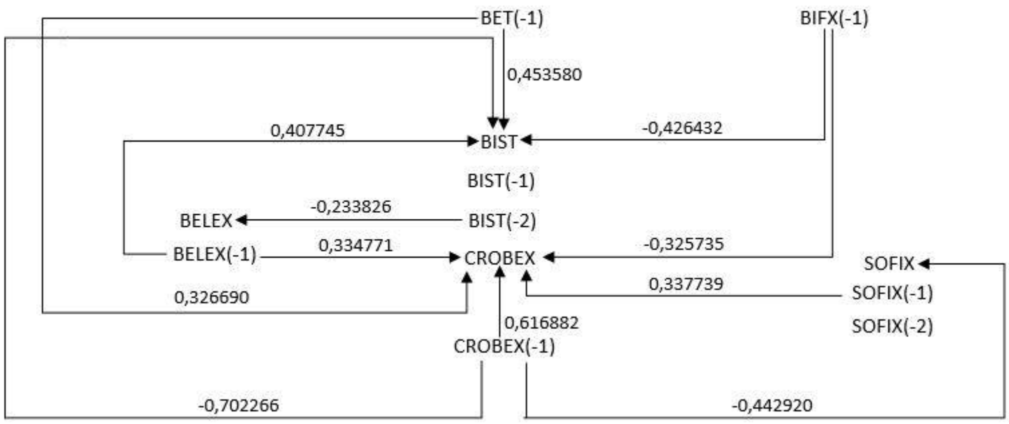
Bulgaria is relatively synchronized with other countries in the region considering the highest correlation with Serbia (0.603714), Romania (0.661221) and Croatia (0.616263). It can be assumed that this is due to the symmetrical shocks to which the Bulgarian and other capital markets are exposed, as well as to the geographic proximity between these countries and the correspondingly intensive flows of capital assets between them.

4.3. VAR model

Graph 2 and Graph 3 show the estimated results of the applied VAR model, where only statistically significant values and interrelations are exposed. Graph 2 includes the interactions between the reference and the emerging capital markets. Graph 3 exposes the statistically significant relations only between emerging markets.

Graph 2

VAR results for interactions between reference and developing capital markets



Notes: They are exposed only statistically significant relationships
Source: Authors' calculations.

For BIST returns we have found that the values of t- statistics associated with BELEX (-1), BET (-1), BIFX (-1) and CROBEX (-1) are higher than 2 (in absolute values), so it means that these observations are statistically relevant to explain the current values of BIST. Consequently, we may conclude that the returns of BELEX, BET, BIFX and CROBEX with one lag have an impact on the current of BIST returns. We observe positive influence over BIST from BELEX (-1) and BET (-1) with coefficient values equal to (0.407745) and

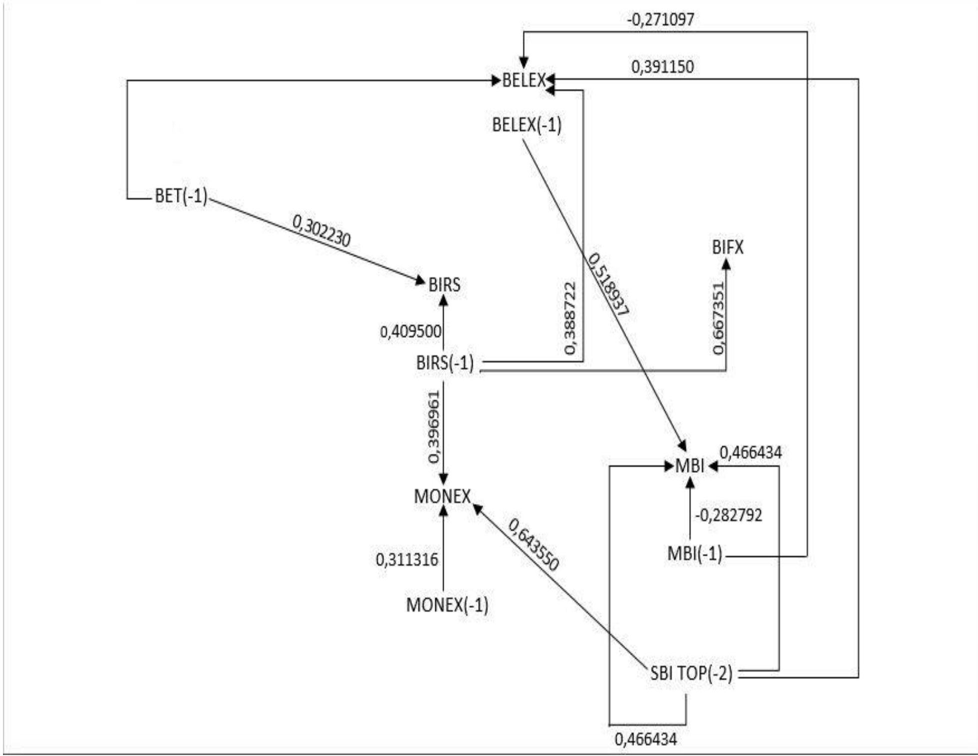
(0.453580). This means that an increase in the values of the aforementioned indexes indicates an increase in BIST values. The strongest negative interaction is revealed between the current return of BIST and CROBEX (-1). The coefficient value is equal to (-0.702266). This indicates that in average when CROBEX returns from a month before increase with 1 pp the current returns from BIST decreases 70.22%, assuming that the rest remains constant. This leads to the conclusion that the strongest negative relationship is proved between two of the reference capital markets. The coefficient value of BIFX (-1) is negative with the weight of the coefficient (-0.426432), either. This indicates for an inverse relation between BIST returns and BIFX (-1). BIST (-2) returns influence negatively to BELEX current returns with coefficient value (-0.233826). In direct comparison between both interactions reference-developing capital markets and vice versa, the current BELEX returns incorporate the information from BIST with two lags and the relation is inverse. The Turkish BIST100 incorporates the information from BELEX with one lag and the relation is straightforward. As an explanation for the aforementioned results, we may point out the higher information efficiency of Turkish BIST100. It is proved by the faster information incorporation of BELEX values and the higher value of the coefficient (0.407745).

For CROBEX returns we have found that the values of t- statistics associated with BELEX (-1), BET (-1), BIFX (-1), CROBEX (-1) are higher than 2 (in absolute values), so it means that these observations are statistically relevant to explain the current values of CROBEX. Consequently, we may conclude that the returns of BELEX, BET, BIFX, and CROBEX with one lag have an impact on the current of CROBEX. From the lag period, we should mention that CROBEX current returns incorporate the information flows from the aforementioned indexes fast. The coefficient values indicate for moderate interaction between these financial markets. CROBEX (-1) and BIFX (-1) have negative signs of their coefficients equal to (-0.616882) and (-0.325735). The strongest relation we observe for the past values of CROBEX returns for 61.68 %. BELEX (-1), BET (-1) and SOFIX (-1) influence CROBEX with the following coefficient values (0.334771), (0.326690) and (0.337739). This indicates that in average when BELEX (-1), BET (-1) and SOFIX (-1) returns from a month before increase with 1 pp the current returns from CROBEX increase respectively with 33.47%, 32.66% and 33.77% assuming that the rest remains constant. We observe a bilateral relationship between CROBEX and SOFIX. For SOFIX returns, we have found that the coefficient value of CROBEX (-1) is statistically significant. It is equal to (-0.422920). This relationship indicates for fast information incorporation of both markets with one lag. The influence of CROBEX (-1) in the returns of SOFIX is stronger than the influence of SOFIX (-1) in the current returns of CROBEX (0.337739). The Romanian BET current returns are determined by CROBEX (-1), either. The coefficient value is equal to (-0.549878) with a negative sign. This indicates that in average when CROBEX returns from a month before increases by 1pp the current returns from BET decrease 54.98%, assuming that the rest remains constant. We observe higher coefficient values of CROBEX (-1) for the Romanian BET returns than the Bulgarian SOFIX with difference equal to 12.69%.

From the exposed interactions in Graph 2, we reveal significant relations between capital markets of SEE independent of the separation of reference and developing capital markets. The results reveal that for the reference Greek capital market, we do not register significant relationships. Turkish BIST and the Croatian CROBEX are determined by the dynamic of indexes of the developing stock markets. The results of VAR model confirm the ones of the correlation test that BELEX 15 is highly correlated with the markets from the group, especially for the reference ones. The Bulgarian capital market indicates a significant bilateral relationship with the Croatian capital market. It is revealed that the Bulgarian, Romanian and Serbian capital markets are interacting with the reference capital markets from SEE group.

Graph 3

VAR results for interactions between developing capital markets of SEE group



Notes: They are exposed only statistically significant relationships
Source: Authors' calculations.

For BELEX returns, we have proved that the values of t- statistics associated with BET (-1), BIRS (-1), BIST (-2), MBI (-1) and SBI TOP (-2) are statistically significant. Consequently, we may conclude that the returns of BET, BIRS and MBI with one lag and the returns of SBI TOP and BIST with two lags have an impact on the current of BELEX returns. Positive influence we reveal for BET (-1) (0.473961), BIRS (-1) (0.388722) and SBI TOP (0.391150). These results indicate that an increase in the values of the aforementioned indexes indicates an increase in the values of BELEX. The strongest interaction is revealed between BET (-1) and BELEX with a coefficient value equal to (0.473961). This indicates that in average when BET returns from the month before increase by 1 pp the current returns of BELEX increase 47.39 %, assuming that the rest remains constant. Negative influence, we reveal for MBI (-1) and BIST (-2) with coefficient values respectively equal to (-0.271097) and (-0.233826) (Graph 1). The significant interactions confirm the results from the correlation analysis, namely The Serbian capital market is highly determined by the other markets of the SEE group. The coefficient value of BELEX (-1) is statistically significant in determining the current returns of MBI 10. Its value is equal to (0.518937). This indicates that in average when BELEX returns from the month before increase by 1 pp the current returns of Macedonian MBI increase 51.89 %, assuming that the rest remains constant.

BIRS current returns are determined by its past values BIRS (-1) and BET (-1) with positive coefficient values respectively equal to (0.409500) and (0.302230). The past values of BIRS with one lag- BIRS (-1) determine the current returns of BIFX with a positive coefficient equal to (0.667351) and the current values of MONEX with a lower coefficient value equal to (0.396961). The capital market of Banja Luka is small and limited so these characteristics may explain the lack of significant relations between BIRS and the capital markets indexes of the SEE group.

The dynamic of the Macedonian index MBI 10 is determined by the dynamic of the following indexes: BELEX (-1) (0.518937), MBI (-1) (-0.282792) and the Slovenian SBI TOP (-2) (0.466434). As we have mentioned before, the dynamic of the Serbian BELEX has the strongest influence for the MBI 10. The dynamic of the Slovenian SBI TOP (-2) is in a positive relationship with MBI 10. The Macedonian MBI incorporates the information from the Slovenian index more slowly than the information from the Serbian capital market. It is proved by the lag interdependences.

For MONEX returns, we have proved that the values of t- statistics associated with BET (-1), BIRS (-1), MONEX (-1) and SBI TOP (-2) are statistically significant. Consequently, we may conclude that the returns of BET, BIRS and MONEX with one lag and the returns of SBI TOP with two lags have an impact on the current of MONEX returns. We observe that the information from the Slovenian capital market is not incorporated in the values of the Macedonian index and MONEX returns as quickly as the information from the other statistically significant dynamic of stock market indexes. The strongest positive influence is revealed from the SBI TOP with a coefficient value equal to (0.643550). The coefficient value of the Romanian BET is positive and it is equal to (0.386703). The past values of MONEX- MONEX (-1) possess the lowest influence from the statistically significant indexes that determine the dynamic of MONEX. It is equal to (0.311316). For MONEX returns, we have proved that the dynamic of BET (-1), BIRS (-1), MONEX (-1) and SBI TOP (-2) have a positive influence for the dynamic of MONEX.

We should mention that for the Slovenian capital market we do not register significant capital markets from SEE group to determine its dynamic.

By Graph 3, we reveal the significant relations only between developing capital markets in SEE group. We prove the moderate degree of interaction between them. The dynamics of BIFX, BIRS, MBI and MONEX are not determined by the dynamic of the reference capital markets from SEE group. They interact and incorporate the information between themselves.

Table IX

Forecast Error of Variance Decomposition

Country	Days	Own	Greece	Croatia	Turkey
Bulgaria	3	36.68	25.40	3.77	0.59
	5	34.27	25.25	3.57	0.57
	10	33.50	25.21	3.60	0.61
Banja Luka	3	64.29	4.12	1.91	1.54
	5	61.49	5.53	1.80	1.56
	10	60.71	5.64	1.78	1.56
Sarajevo	3	40.19	7.83	1.33	1.33
	5	36.50	8.49	1.21	1.35
	10	35.61	8.88	1.18	1.37
Macedonia	3	38.41	1.33	5.79	1.33
	5	35.80	1.35	5.39	1.90
	10	35.04	1.37	5.29	1.90
Montenegro	3	27.28	38.41	8.39	5.68
	5	25.78	35.80	7.94	5.72
	10	25.38	35.04	7.84	5.71
Romania	3	35.04	37.62	8.99	0.05
	5	33.01	36.46	8.68	0.06
	10	32.69	36.05	8.64	0.14
Serbia	3	43.35	23.00	2.70	2.94
	5	40.76	22.08	2.63	3.32
	10	40.23	22.18	2.60	3.33
Slovenia	3	44.94	25.04	2.49	2.54
	5	43.53	25.01	2.39	2.44
	10	42.94	25.20	2.35	2.40

Source: Authors' Calculations.

Table IX provides a quantitative measure of short-run dynamic interdependences of the developing capital SEE with the reference capital markets. In this study, we apply Choleski decomposition to orthogonalise the shocks method. So, in Table IX are studied the variance decomposition results of 3-day, 5-day and 10-day horizon ahead forecast error variances of each developing stock market with the reference capital ones.

Table IX suggests that in all countries by day 3 or 5 ahead, the behaviour has settled down to a steady condition. Therefore Table IX suggests that in the most of the analysed countries, the national market price innovations account for more of the error variance while Greek, Croatian and Turkish price innovations account for less of the forecast error variance. These results confirm that the expected returns of the investment in the developing SEE stock markets are determined mainly by country-specific risk factors The implication of the low level of the interactions is that expected returns of the investment in the emerging stock markets should be determined mostly by the country-specific risk factors (Li and Majerowska, 2008; Stoica, 2013). The highest shocks that affect the series in the system is observed on the basis till 37.62% of the variation in the returns of analysed indices is caused by the Greek market. The capital markets of Banja Luka, Sarajevo and Macedonia are the ones which are weakly linked and affected by the influence of the reference capital markets. In addition, in the capital markets of Montenegro and Romania the national market price innovations do not account for more of the error variance. They are more influenced by the innovations of the Greek capital market. Bulgarian, Serbian and Slovenian capital markets are determined by their country-specific risk but they are strongly affected by the innovations of the Greek stock market. On the basis that about 0.57-8.99% of the variation in the returns of analysed indices is caused by shocks to Croatian and Turkish markets, indeed the extent of influence of the reference capital markets on the returns of the developing markets in SEE is not weak. Bulgarian and Romanian capital markets are the ones which are influenced by the Turkish innovations in a lowest degree – about 0.05-0.61%. The capital market of Banja Luka is the one which is determined by its own innovations in a stronger value – about 60.71- 64.29% compared to the others explored developing markets in SEE group. The extent of influence of the reference capital markets on the returns of the Banja Luka market is small, indicating a weak integration of Banja Luka market with the reference capital ones in the area.

The implication of the low level of the linkages is that expected returns of the investment in the explored developing stock markets would be determined mainly by the country-specific risk factors (Li and Majerowska, 2008). Five countries appear more sensitive to shocks from the Greek market.

We utilize impulse-response function to address the question of how rapidly events in one variable are transmitted to the others. The advantage of the impulse response function is that it allows "innovation accounting". The impulse response functions show how a particular variable responds to shocks to other variables in the system. In other words, an innovation in a given variable triggers a chain reaction over time in the remaining variables. The impulse response functions allow us to assess these chain reactions. Impulse- response function results can be seen in Appendix V. In these graphs, it is seen that response of series when representing one standard deviation shock of each other. Action and reaction analysis can be seen in graphs. Following a one standard deviation shock to the Greek ATHEX, BELEX and BIRS indicate an increase. They increase in short-run period. BIFX and MBI indices respond by a weak increase in short-run period. SBI TOP responds with immediate decrease, the same is the reaction of the Romanian BET. The Bulgarian SOFIX reacts by a weak increase that is followed by a sudden and strong decrease. Following a one standard deviation shock to the Croatian CROBEX, the explored developing capital markets react with a similar dynamic – sudden strong decrease in their values with a following slow increase. The exception of the aforementioned dynamic is the response of SBITOP. The Slovenian capital market reacts with a slow and smooth decrease. We should emphasize that all of the explored developing capital markets from SEE have similar reactions to the shocks and amendments in the Croatian market. Following a one standard deviation shock to the Turkish BIST, BIRS and MONEX respond with a sudden decrease followed by short-run increase. We should emphasize that Bulgarian and Romanian capital market respond very weakly to the shocks of Turkish capital market. The reaction of

BELEX, BIFX, MBI and SBI TOP is revealed by quick increase followed by a decrease in short- run period.

To conclude the results from VAR model, variance decomposition and impulse response function, we prove significant interactions between capital markets' dynamic from SEE group in two lag period. We prove a high degree of integration of the Bulgarian, Romanian and Serbian capital markets among the reference capital markets of this group of countries. It is proved fast degree of information incorporation for reference and developing capital markets from the other members of the group. We should mention that we observe less significant interactions between reference capital markets than the ones between developing. These results confirm the ones from the correlation analysis. The developing capital markets of the explored group are strongly determined by country-specific factors, but five of them are strongly influenced by the Greek innovations. However, the market integration is anticipated to strengthen, as a result of EU expansion, as the implementation of Strategy 2020. These results lead to the argument that investor can benefit, at least in the short run, from diversifying into the SEE equity markets.

5. Future research directions

In this research, we examine the interactions between the capital markets of Southeast Europe (SEE). Meaningful future directions include:

1) Applying econometric models of the ARCH and GARCH family to examine the interdependencies, volatility and spillover of the SEE capital markets (Tsenkov and Stoitsova-Stoykova, 2017; Cifarelli and Paladino, 2005; Fujis, 2005; Baur and Jung, 2006).
2) Using non-linear Granger causality test to examine the dynamic relationships between the analysed stock markets (Syriopoulos, 2007; Chong et al., 2008; Lim, 2009).
3) Estimating minimum variance portfolio for SEE emerging markets (Kohers et al, 2006).

6. Conclusion

Summing up the results of the correlation analysis, it can be concluded that SEE capital markets are highly related, which also shows co-movement in their market dynamics. The degree of development of the capital markets also determines the linkages between them, showing that the reference ones demonstrate a lower positive correlation than the developing ones. The Serbian market is most highly correlated in the group, and the least correlated – Banja Luka. One of the possible reasons for the weak connection between Banja Luka and the other examined countries is the fact that the Banja Luka market is small and illiquid and the access of foreign investors to it is very limited. The Bulgarian capital market is synchronized with the other SEE markets because of the high or average positive values of registered correlation coefficients and the stronger influence of the Greek innovations. These results are proved by the VAR analysis. It is revealed a high degree of interaction of the Bulgarian, Romanian and Serbian capital markets with the reference capital markets of this group of countries. We prove a high degree of integration of the Bulgarian, Romanian and Serbian capital markets among the reference capital markets of this group of countries. It is proved fast degree of information incorporation for reference and developing capital markets from the other members of the group. We should mention that we observe less significant interactions between reference capital markets than the ones between developing. These results confirm the ones from the correlation analysis. The developing capital markets of the explored group are strongly determined by country-specific factors, but five of them are strongly influenced by the Greek innovations. However, the market integration is anticipated to strengthen, as a result of EU expansion, as the implementation of Strategy 2020. These results lead to the argument that investor can benefit, at least in the short run, from diversifying into the SEE equity markets. All things consider, we can assume that the Southeast European capital markets are characterized with synchronicity and co-movement of stock market dynamics, which is the first step towards achieving market integration. We should be careful with the fact that the deeper financial integration corresponds to a greater cost of financial contagion, implying a concession between them. Following these conclusions: due to the revealed interdependences between the explored capital markets, foreign investors may benefit by including stocks of these countries in their investing portfolios. These countries will take profit if their capital markets are more accessible to foreign investors, reorganizing them in conditions to international law in order to defend foreign investors.

References

Aggarwal, R. and Kyaw, N. A. (2004). Equity Market Integration in the NAFTA Region: Evidence from Unit Root and Cointegration Tests. – SSRN Electronic Journal.

Babetskii, I., Komarek L., Komarkova, Z. (2007). Financial Integration of Stock Markets among New EU Member States and the Euro Area. – Czech Journal of Economics and Finance, 57(7-8), pp. 341-362. Available at: https://doi.org/10.1108/SEF-04-2012-0048.

Baur, D. and Jung, R. C. (2006). Return and volatility linkages between the US and the German stock market. – Journal of International Money and Finance, 25(4), pp. 598-613.

Cappieollo, L., Gerard B., Kadareja,A. and Manganelli, S. (2006). Financial Integration of New EU Member States. – European Central Bank Working Paper No 683.

Černý, A., Koblas, M. (2008). Stock Market Integration and the Speed of Information Transmission. – Czech Journal of Economics and Finance, 58(1-2), pp. 2-20. Available at: http://journal.fsv.cuni.cz/storage/1098_str_2_20_-_cerny-koblas.pdf.

Chong, T.L., Wong, Y.C. and Yan, K.-M. (2008). International linkages of the Japanese stock market. – Japan and the World Economy, 20, pp. 601-621.

Cifarelli, G., Paladino, G. (2005). Volatility linkages across three major equity markets: A financial arbitrage approach. – Journal of International Money and Finance, 24(3), pp. 413-439.

Darrat, A., Zhong, M. (2005). Equity Market Linkage and Multinational Trade Accords: The Case of NAFTA. – Journal of International Finance and Money, 24(5), pp. 793-817.

Egert, B., Kocenda, E. (2007). Interdependence between Eastern and Western European stock markets: Evidence from intraday data. – Economic Systems, 31(2), pp. 184-203. Available at: doi:10.1016/j.ecosys.2006.12.004.

E-Views Help System. (2016). Quantitative Micro Software, http://www.eviews.com.

Forbes, K., Rigobon, R. (2002). No contagion, Only Interdependence: Measuring Stock Market Comovements. – Journal of Finance, 57(5), pp. 2223-2261. Available at: http://dx.doi.org/10.1111/0022-1082.00494.

– Economic Studies (Ikonomicheski Izsledvania), 27 (4), p. 49-82.

Fujii, E. (2005). Intra and inter-regional causal linkages of emerging stock markets: evidence from Asia and Latin America in and out of crises. – Journal of International Financial Markets, Institutions and Money, 15 (3), pp. 315-342.

Ganchev, G. (2015). Towards Holistic Theory of Money: Overcoming twentieth century neoclassical monetary paradigm. – Economic Study, 4, pp. 3-24.

Geamănu, M. (2014). VAR analysis on Foreign Direct Investment in Romania. – Theoretical and Applied Economics, Vol. XXI (2014), 4(593), pp. 39-52.

Gilmore, C. G., McManus, G. M. (2004). The impact of NAFTA on the integration of the Canadian, Mexican and U.S. equity markets. – Research in Global Strategic Management, 10, pp. 137-151.

Gilmore, C., Lucey, B., McManus, G. (2008). The Dynamics of Central European Equity Market Integration. – Quarterly Review of Economics and Finance, 48(3), pp. 605-622. Available at: https://doi.org/10.1016/j.qref.2006.06.005.

Gradojevic, N., Dobardzic, E. (2012). Causality between Regional Stock Markets: A Frequency Domain Approach. – Panoeconomicus, 5, pp. 633-647. Available at: doi: 10.2298/PAN1305633G.

Horvath, R., Petrovski, D. (2013). International Stock market integration: Central and South Eastern Europe compared. – IOS Working Paper, No 317.

Johnson, R., Soenen, L. (2003). Economic integration and stock market comovements in the Americas. – Journal of Multinational Financial Management, 13(1), pp. 85-100. Available at: https://doi.org/10.1016/S1042-444X(02)00035-X.

Kasch-Haroutounian, M., Price, S. (2001). Volatility in the Transition Markets of Central Europe. – Applied Financial Economics, 11(1), pp. 93-105. Available at: http://dx.doi.org/10.1080/09603100150210309.

Kenourgios, D., Samitas, A. (2011). Equity market integration in emerging Balkan markets. – Research in International Business and Finance, 25(3), pp. 296-307. Available at: doi:10.1016/j.ribaf.2011.02.004.

Kocenda, E., Egert, B. (2011). Time-Varying Synchronization of European Stock Markets. – Empirical Economics, 40(2), pp. 393-407. Available at: doi: 10.1007/s00181-010-0341-3.

Li, H., Majerowska, E. (2008). Testing stock market linkages for Poland and Hungary: A multivariate GARCH approach. – Research in International Business and Finance, 22 (3), pp. 247-266.

Lim, L. K. (2009). Convergence and interdependence between ASEAN-5 stock markets. – Mathematics and Computers in Simulation, 79(9), pp. 2957-2966.

Longin, F., Solnik, B. (1995). Is the correlation in international equity returns constant: 1960-1990?. – Journal of International Money and Finance, 14(1), pp. 3-26. Available at: https://doi.org/10.1016/0261-5606(94)00001-H.

Longin, F., Solnik, B. (2001). Extreme correlation of international equity markets. – Journal of Finance, 56, pp. 649-676.

Patonov, N. (2016). Fiscal Impacts on Output in a Small Open Economy: The Case of Albania. – Scientific Annals of Economics and Business 63 (2), pp. 161-169. DOI: 10.1515/saeb-2016-0113.

Shachmurove, Y. (2005). Dynamic Linkages Among the Emerging Middle Eastern and the United States Stock Markets. – International Journal of Business.

Simeonov, S. (2015). Stock Exchange and Economic Activity Indicators – Relations and Asymmetry during the Recession in Serbia and Bulgaria, Financial Markets and the Real Economy: Some Reflections on the Recent Financial Crisis, ISBN: 978-86-6139-097-5, pp. 59-77.

Stavrova, E. (2017). Conventional and Shadow Banking Sector – Comparative aspects of the Post-crisis Period in Taim of the Currency Board- Bulgaria's Case. CBU International Conference of Innovations in Science and Education, Vol. 5, Prague, Czech Republic, pp. 453-457.

Stoica, O., Diaconasu, D. (2013). Analysis of interdependencies between Austrian and CEE stock markets. Faculty of Economics and Business Administration, Romania.

Stoica, O., Perry, M. J., Mehdian, S. (2015). An empirical analysis of the diffusion of information across stock markets of Central and Eastern Europe. – Prague Economic Papers, 24(2), pp. 192-210. DOI: http://dx.doi.org/10.18267/j.pep.508.

Stoilova, D. (2017). Tax Structure and Economic Growth: Evidence from the European Union. – Contaduría y Administración, 62, pp. 1041-1057.

Syllignakis, M. N., Kouretas, G. P. (2010). German, US and Central and Eastern European Stock Market Integration. – Open Economies Review, 21(4), pp. 607-628.

Syropoulos, T. (2007). Dynamic linkages between emerging European and developed stock markets: Has the EMU any impact?. – International Review of Financial Analysis, 16 (1), pp. 41-60.

Syropoulos, T., Roumpis, E. (2009). Dynamic correlations and volatility effects in the Balkan equity markets. – Journal of International Financial Markets, Institutions and Money, 19(4), pp. 565-587.

Tanchev, S. (2016). The Role of the Proportional Income Tax on Economic Growth of Bulgaria. – Economic Studies, 4, pp. 66-77.

Todorov, I. (2017). Bulgaria's Cyclical Position and Market (DIS) Equilibria. – Economic Studies, 5, pp. 30-64.

Tsenkov, V. (2015). Crisis influences between developed and developing capital markets – the case of central and eastern European countries. – Economic Studies, 3, pp. 71-108.

Tsenkov, V., Stoitsova-Stoykova, A. (2017). The impact of the global financial crisis on the market efficiency of capital markets of South East Europe. – International Journal of Contemporary Economics and Administrative Sciences, 7(1-2), pp. 31-57. http://www.ijceas.com/index.php/ijceas/article/view/146/pdf.

Voronkova, S. (2004). Equity market integration in Central European emerging markets: A cointegration analysis with shifting regimes. – International Review of Financial Analysis, 13(5), pp. 633-647. Available at: http://dx.doi.org/10.12775/DEM.2012.002.

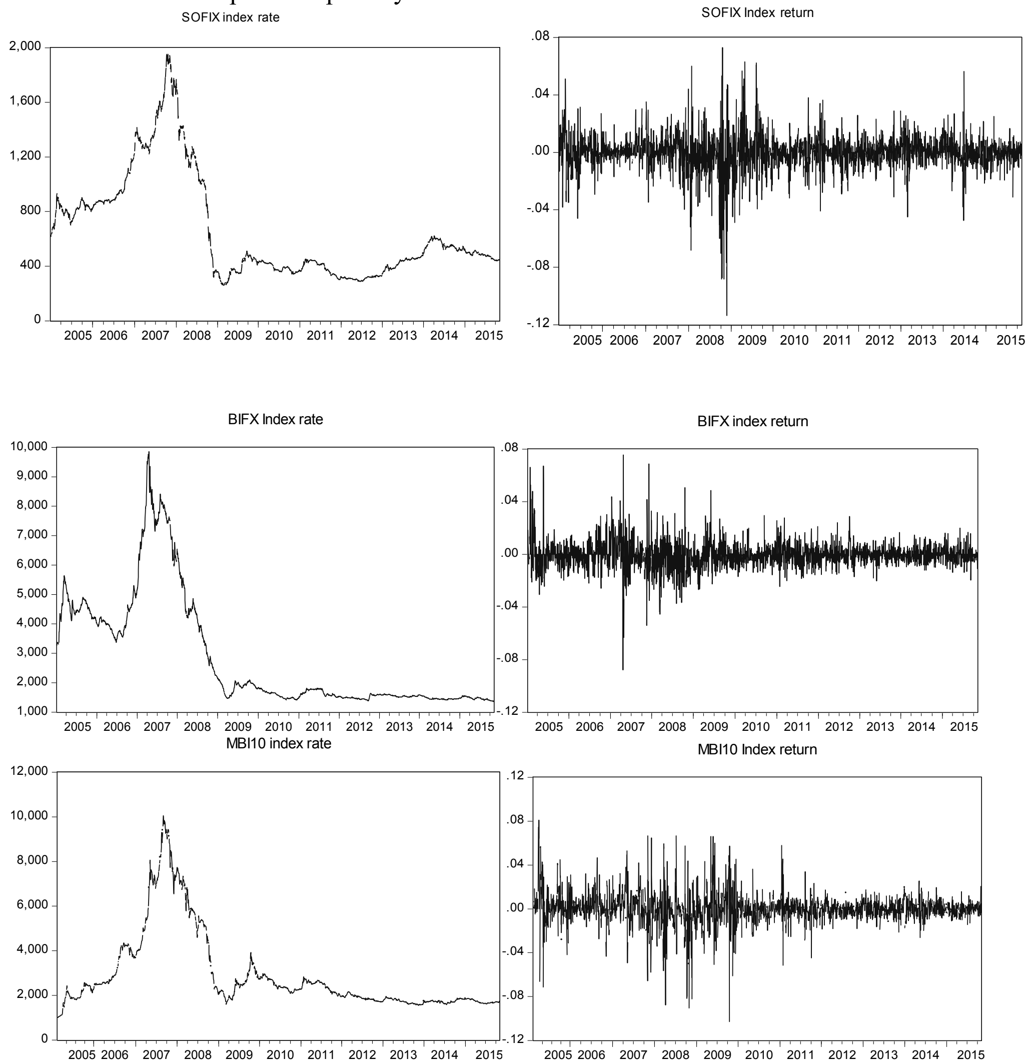
Yang, T., Lim, J. (2004). Crisis, Contagion, and East Asian Stock Markets. – World Scientific Publishing Co. and Centre for PBBEF Research, Vol. 7, N 1, pp 119-151.

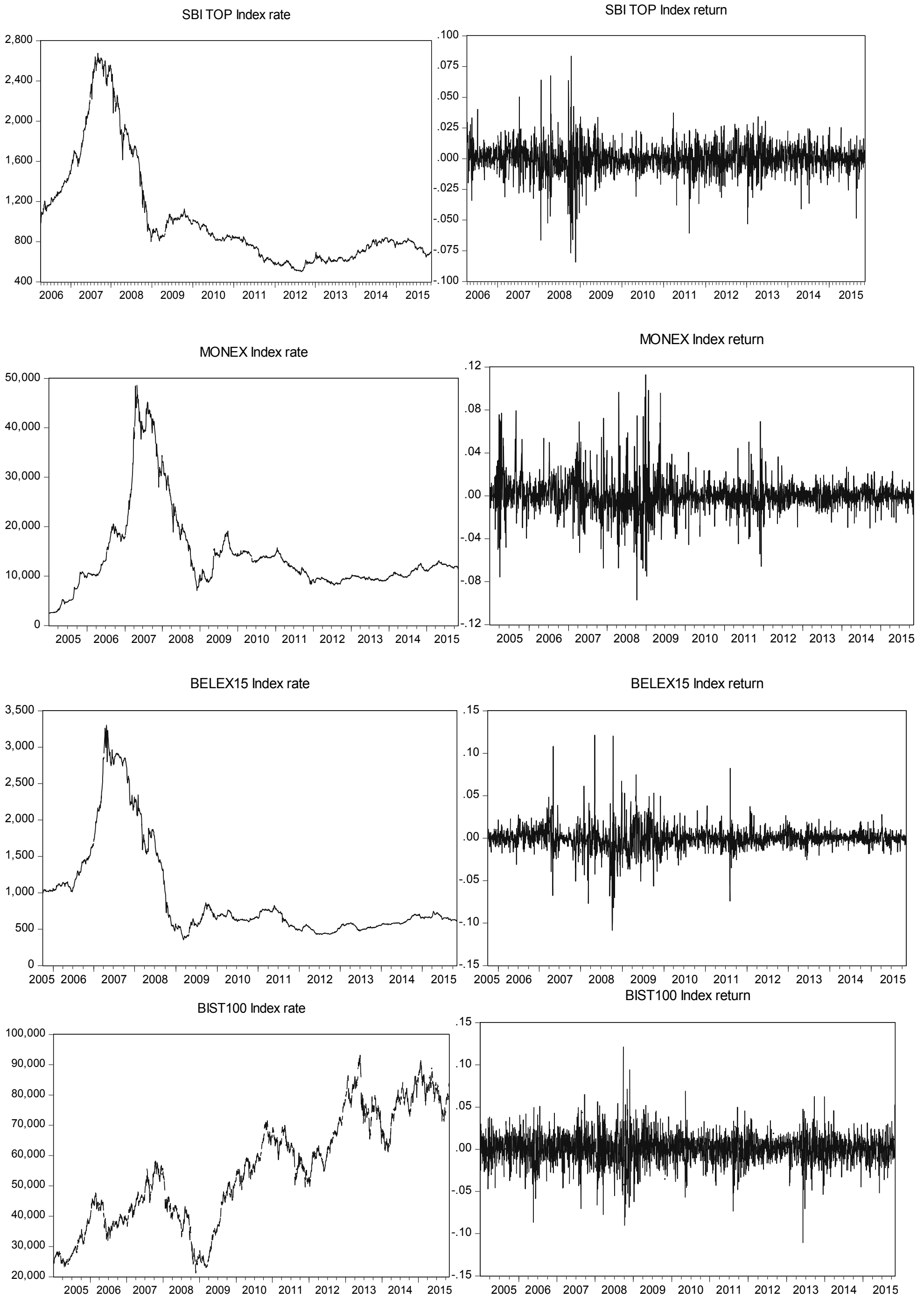
Zdravkovski, A. (2016). Stock market integration and diversification possibilities during financial crises: Evidence from Balkan countries. – MPRA Paper No 72182. Available at: https://mpra.ub.uni-muenchen.de/72182/.

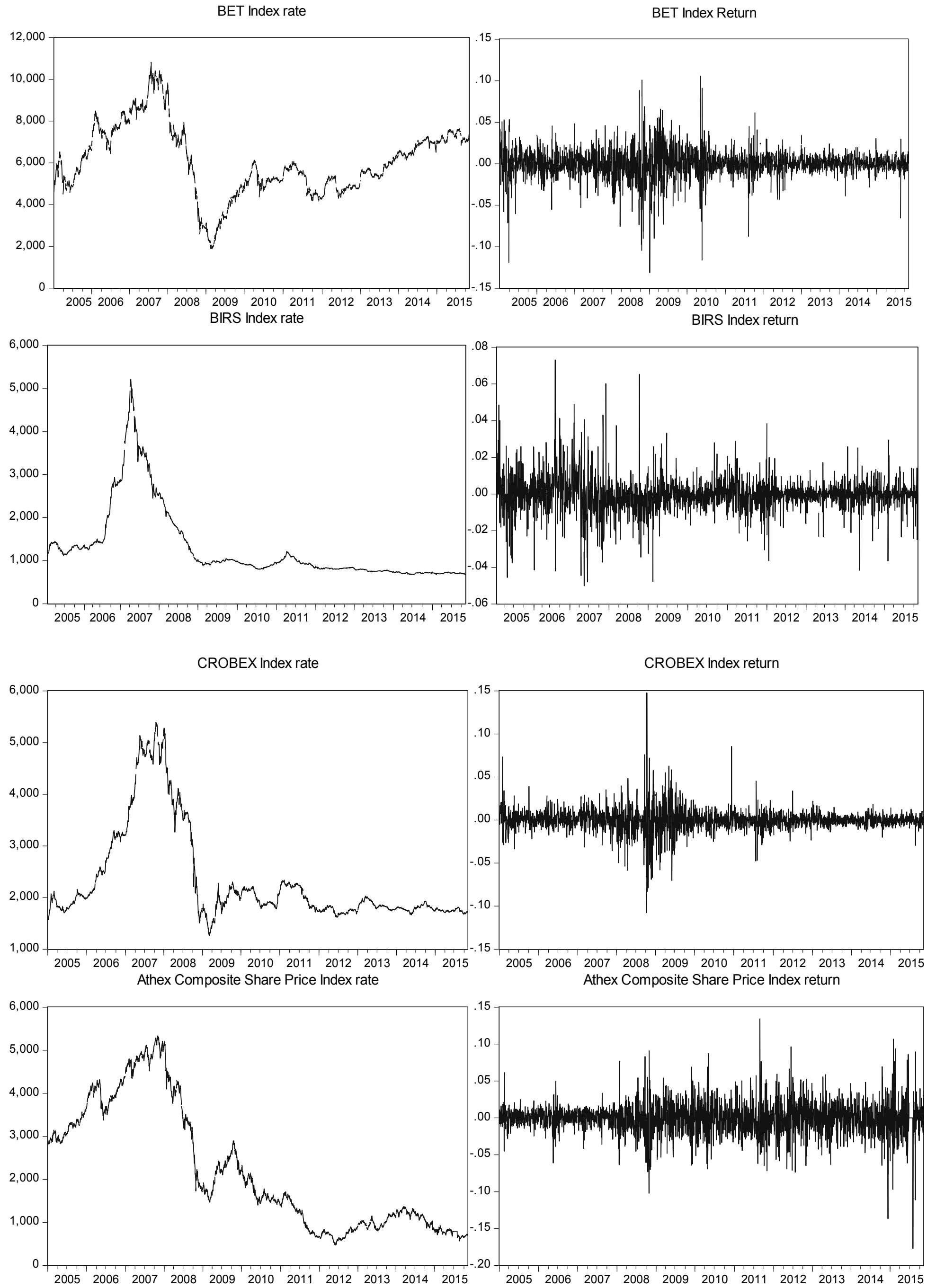
Appendixes

Appendix I

Graphs of capital dynamics and returns of the SEE indices




SBI TOP Index rate
SBI TOP Index return
MONEX Index rate
MONEX Index return
BELEX15 Index rate
BELEX15 Index return
BIST100 Index rate
BIST100 Index return


BET Index rate
BET Index Return
BIRS Index rate
BIRS Index return
CROBEX Index rate
CROBEX Index return
Athex Composite Share Price Index rate
Athex Composite Share Price Index return

Appendix II

VAR Residual Heteroskedasticity Test

VAR Residual Heteroskedasticity Tests: No Cross Terms (only levels and squares)

Sample: 1 131
Included observations: 112

Joint test:

Chi-sq	df	Prob.
3238.960	2904	0.0000

Individual components:

Dependent	R-squared	F(44,67)	Prob.	Chi-sq(44)	Prob.
res1*res1	0.479496	1.402761	0.1042	53.70358	0.1499
res2*res2	0.612141	2.403251	0.0006	68.55976	0.0103
res3*res3	0.655472	2.897028	0.0000	73.41291	0.0035
res4*res4	0.520888	1.655504	0.0307	58.33950	0.0725
res5*res5	0.301398	0.656951	0.9303	33.75661	0.8682
res6*res6	0.615517	2.437726	0.0005	68.93790	0.0095
res7*res7	0.535280	1.753926	0.0186	59.95133	0.0549
res8*res8	0.593297	2.221351	0.0016	66.44928	0.0160
res9*res9	0.582667	2.125981	0.0026	65.25867	0.0203
res10*res10	0.341932	0.791208	0.7947	38.29636	0.7138
res11*res11	0.598496	2.269833	0.0012	67.03157	0.0142
res2*res1	0.479134	1.400726	0.1051	53.66302	0.1508
res3*res1	0.548678	1.851197	0.0112	61.45190	0.0420
res3*res2	0.663635	3.004288	0.0000	74.32717	0.0029
res4*res1	0.338355	0.778700	0.8104	37.89578	0.7296
res4*res2	0.555379	1.902050	0.0086	62.20246	0.0366
res4*res3	0.456578	1.279382	0.1790	51.13675	0.2138
res5*res1	0.444343	1.217681	0.2303	49.76640	0.2546
res5*res2	0.522049	1.663219	0.0296	58.46946	0.0709
res5*res3	0.519775	1.648136	0.0319	58.21482	0.0740
res5*res4	0.659973	2.955531	0.0000	73.91701	0.0032
res6*res1	0.578361	2.088717	0.0032	64.77638	0.0223
res6*res2	0.553320	1.886260	0.0093	61.97181	0.0381
res6*res3	0.651282	2.843911	0.0001	72.94354	0.0039
res6*res4	0.412031	1.067079	0.3994	46.14742	0.3836
res6*res5	0.473062	1.367037	0.1224	52.98292	0.1662

res7*res1	0.477210	1.389968	0.1104	53.44754	0.1556
res7*res2	0.628323	2.574179	0.0002	70.37214	0.0070
res7*res3	0.614910	2.431488	0.0005	68.86996	0.0097
res7*res4	0.556625	1.911671	0.0081	62.34197	0.0356
res7*res5	0.482682	1.420774	0.0959	54.06035	0.1423
res7*res6	0.596953	2.255316	0.0013	66.85879	0.0147
res8*res1	0.456150	1.277174	0.1806	51.08876	0.2151
res8*res2	0.539420	1.783378	0.0160	60.41500	0.0506
res8*res3	0.559251	1.932138	0.0073	62.63614	0.0337
res8*res4	0.603332	2.316073	0.0009	67.57324	0.0127
res8*res5	0.480149	1.406434	0.1024	53.77669	0.1483
res8*res6	0.419860	1.102029	0.3547	47.02427	0.3497
res8*res7	0.583528	2.133528	0.0025	65.35516	0.0199
res9*res1	0.480991	1.411183	0.1002	53.87095	0.1463
res9*res2	0.582047	2.120573	0.0027	65.18930	0.0206
res9*res3	0.538872	1.779448	0.0163	60.35361	0.0511
res9*res4	0.636896	2.670917	0.0001	71.33240	0.0057
res9*res5	0.368138	0.887178	0.6603	41.23148	0.5910
res9*res6	0.502077	1.535431	0.0557	56.23263	0.1022
res9*res7	0.609830	2.379996	0.0007	68.30091	0.0109
res9*res8	0.565154	1.979037	0.0057	63.29728	0.0297
res10*res1	0.379975	0.933185	0.5914	42.55718	0.5335
res10*res2	0.609346	2.375163	0.0007	68.24673	0.0110
res10*res3	0.648180	2.805420	0.0001	72.59620	0.0043
res10*res4	0.463047	1.313140	0.1550	51.86126	0.1941
res10*res5	0.729403	4.104554	0.0000	81.69310	0.0005
res10*res6	0.551965	1.875950	0.0098	61.82005	0.0392
res10*res7	0.604597	2.328346	0.0009	67.71482	0.0123
res10*res8	0.565603	1.982656	0.0056	63.34756	0.0295
res10*res9	0.534403	1.747755	0.0192	59.85311	0.0559
res11*res1	0.643323	2.746474	0.0001	72.05214	0.0048
res11*res2	0.608855	2.370271	0.0007	68.19175	0.0112
res11*res3	0.687451	3.349228	0.0000	76.99446	0.0015
res11*res4	0.496576	1.502016	0.0654	55.61655	0.1125
res11*res5	0.414186	1.076610	0.3869	46.38886	0.3741
res11*res6	0.636431	2.665544	0.0001	71.28023	0.0057
res11*res7	0.665806	3.033688	0.0000	74.57025	0.0027
res11*res8	0.604174	2.324233	0.0009	67.66747	0.0124
res11*res9	0.635489	2.654726	0.0002	71.17478	0.0059
res11*res10	0.588700	2.179505	0.0019	65.93443	0.0177

Appendix III

VAR Residual Normality Test

VAR Residual Normality Tests
Orthogonalization: Cholesky (Lutkepohl)
Null Hypothesis: residuals are multivariate normal
Date: 07/12/18 Time: 23:41
Sample: 1 131
Included observations: 112

Component	Skewness	Chi-sq	df	Prob.
1	0.020208	0.007623	1	0.9304
2	-0.061893	0.071508	1	0.7892
3	0.294321	1.616992	1	0.2035
4	0.630592	7.422720	1	0.0064
5	1.182736	26.11215	1	0.0000
6	0.019470	0.007076	1	0.9330
7	0.092314	0.159076	1	0.6900
8	0.231360	0.999176	1	0.3175
9	-0.087757	0.143758	1	0.7046
10	0.229111	0.979852	1	0.3222
11	-0.021781	0.008856	1	0.9250
Joint		37.52879	11	0.0001

Component	Kurtosis	Chi-sq	df	Prob.
1	3.180178	0.151500	1	0.6971
2	2.881839	0.065156	1	0.7985
3	3.495285	1.144769	1	0.2846
4	3.762147	2.710718	1	0.0997
5	8.273629	129.7854	1	0.0000
6	3.161110	0.121130	1	0.7278
7	3.800355	2.989316	1	0.0838
8	2.874548	0.073445	1	0.7864
9	2.682419	0.470670	1	0.4927
10	3.483259	1.089852	1	0.2965
11	3.079431	0.029443	1	0.8638
Joint		138.6314	11	0.0000

Component	Jarque-Bera	df	Prob.
1	0.159122	2	0.9235
2	0.136664	2	0.9340
3	2.761760	2	0.2514
4	10.13344	2	0.0063
5	155.8976	2	0.0000
6	0.128207	2	0.9379
7	3.148392	2	0.2072
8	1.072620	2	0.5849
9	0.614428	2	0.7355
10	2.069704	2	0.3553
11	0.038299	2	0.9810
Joint	176.1602	22	0.0000

Appendix IV

Vector Autoregression Estimates

Vector Autoregression Estimates											
Sample (adjusted): 20 131											
Included observations: 112 after adjustments											
Standard errors in ( ) & t-statistics in [ ]											
	RATHEX	RBELEX	RBET	RBIFX	RBIRS	RBIST	RCROBEX	RMBI	RMONEX	RSBITOP	RSOFIX
RATHEX(-1)	-0.026322	0.052253	0.002605	0.032780	0.071302	0.184099	-0.030899	0.108695	0.008568	0.02862	0.069942
	(0.13990)	(0.09758	(0.11816	(0.08060	(0.07942	(0.10316	(0.09360)	(0.11158	(0.12891	(0.07496	(0.11474
	[-0.18815]	0.53548	0.02204	0.40668	-0.89776	-1.78456	[-0.33012]	-0.97415	-0.06647	-0.38179	0.60954
RATHEX(-2)	-0.021280	-0.034384	0.075185	0.00994	0.047860	0.006505	-0.032893	0.185342	0.145096	0.00129	0.042012
	(0.13928)	(0.09715	(0.11764	(0.08025	(0.07907	(0.10271	(0.09319)	(0.11109	(0.12835	(0.07464	(0.11424
	[-0.15278]	-0.35391	-0.63913	-0.12388	0.60525	-0.06333	[-0.35298]	-1.66841	-1.13049	-0.01730	-0.36775
RBELEX(-1)	0.323684	0.086425	0.116405	0.052599	0.148307	**0.407745**	**0.334771**	**0.518937**	0.263905	0.084303	0.15027
	(0.23793)	(0.16596	(0.20095	(0.13709	(0.13508	**(0.17545**	**(0.15919)**	**(0.18977**	(0.21925	(0.12750	(0.19515
	[1.36041]	0.52075	0.57926	-0.38369	1.09793	**2.32395**	**[2.10301]**	**2.73459**	1.20367	0.66122	0.77002
RBELEX(-2)	-0.100587	-0.250887	0.041658	0.170564	0.03843	0.129357	-0.063175	0.013844	0.16666	0.03257	0.126927
	(0.20233)	(0.14113	(0.17088	(0.11657	(0.11487	(0.14920	(0.13537)	(0.16137	(0.18644	(0.10842	(0.16595
	[-0.49715]	-1.77773	0.24378	-1.46315	-0.33458	0.86701	[-0.46670]	0.08579	-0.89390	0.30042	-0.76485
RBET(-1)	-0.053545	**0.473961**	0.285687	0.218055	**0.302230**	**0.453580**	**0.326690**	0.071138	**0.386703**	0.084117	0.266135
	(0.19744)	**(0.13772**	(0.16675	(0.11376	**(0.11209**	**(0.14559**	**(0.13210)**	(0.15747	**(0.18194**	(0.10580	(0.16194
	[-0.27119]	**3.44153**	1.71323	1.91685	**2.69630**	**3.11536**	**[2.47312]**	0.45175	**2.12547**	0.79507	1.64341
RBET(-2)	-0.122022	0.124473	0.065684	0.107645	0.104114	0.09080	0.023173	0.085293	0.365236	0.068477	0.039371
	(0.21636)	(0.15092	(0.18273	(0.12466	(0.12283	(0.15955	(0.14475)	(0.17256	(0.19937	(0.11594	(0.17746
	[-0.56398]	0.82479	-0.35945	0.86352	-0.84761	-0.56912	[0.16008]	0.49427	1.83192	0.59063	-0.22186
RBIFX(-1)	-0.380006	0.171469	0.077542	0.161263	0.135697	**0.426431**	**-0.325735**	0.146720	0.086845	0.142859	0.158005
	(0.21563)	(0.15041	(0.18212	(0.12424	(0.12242	**(0.15901**	**(0.14427)**	(0.17198	(0.19870	(0.11555	(0.17686
	[-1.76229]	1.14004	0.42578	-1.29802	1.10847	**-2.68181**	**[-2.25786]**	0.85312	-0.43706	-1.23638	-0.89338
RBIFX(-2)	-0.054996	0.134015	0.295301	0.161228	0.215057	0.21676	-0.034456	0.230156	0.102492	0.034248	0.060267
	(0.21848)	(0.15239	(0.18452	(0.12588	(0.12403	(0.16111	(0.14617)	(0.17425	(0.20132	(0.11707	(0.17920
	[-0.25172]	0.87941	-1.60035	1.28082	-1.73385	-1.34543	[-0.23572]	-1.32082	0.50909	-0.29254	-0.33632
RBIRS(-1)	0.200357	**0.388722**	0.239272	**0.667351**	**0.409500**	0.210293	0.355139	0.169156	**0.396961**	0.15458	0.168595
	(0.19538)	**(0.13628**	(0.16502	**(0.11257**	**(0.11092**	(0.14408	(0.13072)	(0.15583	**(0.18004**	(0.10470	(0.16025
	[1.02545]	**2.85228**	1.44998	**5.92818**	**3.69173**	1.45957	[2.71677]	1.08549	**2.20480**	1.47645	1.05204
RBIRS(-2)	0.229395	0.067426	0.052092	0.04811	0.046033	0.054237	0.056236	0.22013	0.049894	0.007567	0.167058
	(0.21555)	(0.15035	(0.18205	(0.12419	(0.12237	(0.15895	(0.14421)	(0.17192	(0.19863	(0.11550	(0.17679
	[1.06423]	0.44846	-0.28614	-0.38739	0.37617	0.34122	[0.38995]	-1.28045	-0.25120	0.06551	0.94492
RBIST(-1)	0.217779	0.127383	0.110761	0.047063	0.083191	0.014198	0.137651	0.099107	0.054267	0.101174	0.117126
	(0.16272)	(0.11350	(0.13743	(0.09375	(0.09238	(0.11999	(0.10887)	(0.12978	(0.14995	(0.08720	(0.13347
	[1.33835]	1.12230	0.80593	0.50198	-0.90052	0.11832	[1.26438]	0.76364	-0.36191	1.16031	0.87757
RBIST(-2)	-0.221164	**-0.233826**	0.049555	0.090545	0.111186	0.073452	-0.091627	0.192151	0.22754	0.047190	0.116047
	(0.15416)	**(0.10753**	(0.13020	(0.08882	(0.08752	(0.11368	(0.10314)	(0.12296	(0.14206	(0.08261	(0.12644
	[-1.43461]	**-2.17449**	-0.38059	-1.01939	-1.27038	-0.64612	[-0.88835]	-1.56278	-1.60174	-0.57125	-0.91777
RCROBEX(-1)	-0.464018	-0.152658	**0.549878**	0.015956	0.210142	**0.702266**	**-0.616882**	0.14995	0.352375	0.174133	**0.422920**
	(0.23300)	(0.16252	**(0.19679**	(0.13425	(0.13228	**(0.17182**	**(0.15589)**	(0.18584	(0.21471	(0.12485	**(0.19111**
	[-1.99148]	-0.93930	**-2.79426**	0.11886	-1.58862	**-4.08727**	**[-3.95721]**	-0.80690	-1.64119	-1.39470	**-2.21299**
RCROBEX(-2)	0.069457	0.143975	0.106570	0.141298	0.186965	0.15575	0.016695	0.055390	0.075433	0.047368	0.014112
	(0.23194)	(0.16178	(0.19589	(0.13364	(0.13168	(0.17104	(0.15518)	(0.18499	(0.21373	(0.12429	(0.19024
	[0.29946]	0.88992	-0.54402	1.05734	1.41987	-0.91063	[0.10759]	0.29942	0.35293	-0.38112	-0.07418
RMBI(-1)	-0.004463	**-0.271097**	0.045527	0.16212	0.140378	0.214451	-0.099831	**0.282792**	0.290358	0.114594	0.141078
	(0.17337)	**(0.12093**	(0.14643	(0.09989	(0.09843	(0.12785	(0.11599)	**(0.13828**	(0.15976	(0.09290	(0.14220
	[-0.02574]	**-2.24175**	-0.31092	-1.62299	-1.42621	-1.67741	[-0.86066]	**-2.04510**	-1.81746	-1.23348	0.99210
RMBI(-2)	0.086289	-0.094208	0.196319	0.048926	0.090515	0.205558	0.107874	0.053427	0.115995	0.056119	0.106386
	(0.17177)	(0.11981	(0.14507	(0.09897	(0.09752	(0.12666	(0.11492)	(0.13700	(0.15828	(0.09204	(0.14088
	[0.50236]	-0.78630	1.35325	-0.49437	-0.92820	1.62286	[0.93868]	-0.38999	-0.73284	0.60970	0.75513
RMONEX(-1)	0.143509	0.164547	0.050967	0.027902	0.133039	0.233098	0.085084	0.149525	**0.311316**	0.172478	0.103074
	(0.16697)	(0.11646	(0.14102	(0.09620	(0.09479	(0.12313	(0.11171)	(0.13317	**(0.15386**	(0.08947	(0.13695
	[0.85949]	1.41285	-0.36142	-0.29004	1.40349	1.89318	[0.76166]	1.12282	**2.02337**	1.92775	-0.75265
RMONEX(-2)	-0.162402	-0.021784	0.122029	0.080475	0.004713	0.089296	-0.076470	0.100109	0.11145	0.011100	0.008514

	(0.17427)	(0.12155	(0.14718	(0.10041	(0.09893	(0.12851	(0.11659)	(0.13899	(0.16058	(0.09338	(0.14293
	[-0.93192]	-0.17921	0.82910	-0.80150	0.04764	-0.69488	[-0.65588]	0.72026	-0.69404	-0.11887	-0.05957
RSBITOP(-1)	0.110616	0.006689	0.151752	0.014310	0.029073	0.007539	0.129033	0.153262	0.071961	0.112005	0.382414
	(0.25029)	(0.17458	(0.21139	(0.14421	(0.14209	(0.18456	(0.16745)	(0.19962	(0.23064	(0.13412	(0.20529
	[0.44196]	0.03832	0.71789	-0.09923	-0.20462	0.04085	[0.77056]	0.76776	0.31201	0.83513	1.86284
RSBITOP(-2)	0.163312	**0.391150**	0.145808	0.110917	0.169039	0.225895	0.152867	**0.466434**	**0.643550**	0.082414	0.225324
	(0.24613)	**(0.17168**	(0.20788	(0.14181	(0.13974	(0.18150	(0.16467)	**(0.19631**	**(0.22681**	(0.13189	(0.20188
	[0.66351]	**2.27832**	0.70140	0.78213	1.20971	1.24459	[0.92829]	**2.37601**	**2.83741**	0.62486	1.11613
RSOFIX(-1)	0.329405	0.055312	0.121357	0.046627	0.021675	0.021315	**0.337739**	0.173006	0.087185	0.116827	0.134873
	(0.17677)	(0.12330	(0.14930	(0.10185	(0.10036	(0.13035	**(0.11827)**	(0.14099	(0.16289	(0.09472	(0.14499
	[1.86346]	0.44859	0.81286	0.45781	0.21598	-0.16351	**[2.85573]**	1.22711	0.53524	1.23335	0.93024
RSOFIX(-2)	0.070987	-0.077482	0.094587	0.199185	0.079197	**0.314839**	-0.109989	0.105319	0.296682	0.080113	0.056546
	(0.17650)	(0.12311	(0.14907	(0.10169	(0.10020	**(0.13016**	(0.11809)	(0.14077	(0.16264	(0.09458	(0.14477
	[0.40219]	-0.62935	0.63451	1.95867	0.79036	**2.41895**	[-0.93141]	-0.74815	-1.82411	0.84704	0.39060
C	-0.012797	0.000845	0.000819	0.003230	0.002888	0.003588	-0.003756	0.00609	0.000354	0.004304	0.002174
	(0.01032)	(0.00720	(0.00872	(0.00595	(0.00586	(0.00761	(0.00690)	(0.00823	(0.00951	(0.00553	(0.00846
	[-1.24007]	0.11737	-0.09391	-0.54329	-0.49302	0.47154	[-0.54406]	-0.74004	0.03726	-0.77833	-0.25679
R-squared	0.222431	0.598312	0.283591	0.529276	0.464348	0.365868	0.520079	0.462358	0.439513	0.362875	0.385082
Adj. R-squared	0.030223	0.499018	0.106502	0.412918	0.331940	0.209116	0.401447	0.329458	0.300966	0.205384	0.233080
Sum sq. resids	0.883361	0.429783	0.630115	0.293240	0.284712	0.480350	0.395410	0.561924	0.750091	0.253648	0.594264
S.E. equation	0.099626	0.069491	0.084142	0.057401	0.056560	0.073466	0.066654	0.079459	0.091804	0.053385	0.081714
F-statistic	1.157241	6.025682	2.601400	4.548663	3.506940	2.334061	4.383961	3.478985	3.172298	2.304095	2.533397
Log likelihood	112.2600	152.6054	131.1785	174.0135	175.6662	146.3762	157.2734	137.5926	121.4182	182.1360	134.4590
Akaike AIC	-1.593928	-2.314381	-1.931760	-2.696670	-2.726181	-2.203147	-2.397739	-2.046296	-1.757468	-2.841715	-1.990339
Schwarz SC	-1.035665	-1.756118	-1.373497	-2.138407	-2.167920	-1.644884	-1.839476	-1.488033	-1.199205	-2.283452	-1.432075
Mean dependent	-0.014563	-0.004678	7.00E-06	-0.008298	-0.006420	0.007668	-0.003931	-0.004602	0.001069	-0.004749	-0.006151
S.D. dependent	0.101167	0.098179	0.089016	0.074915	0.069199	0.082609	0.086154	0.097036	0.109803	0.059888	0.093308
Determinant resid covariance (dof adj.)		5.50E-28									
Determinant resid covariance		4.38E-29									
Log likelihood		1908.492									
Akaike information criterion		-29.5623									
Schwarz criterion		-23.4214									

RATHEX = - 0.0263216621453*RATHEX(-1) - 0.0212797696839*RATHEX(-2) + 0.323684138118*RBELEX(-1) - 0.100587390452*RBELEX(-2) - 0.0535446989417*RBET(-1) - 0.122022494308*RBET(-2) - 0.380005854374*RBIFX(-1) - 0.0549958348217*RBIFX(-2) + 0.200356955916*RBIRS(-1) + 0.229394973451*RBIRS(-2) + 0.217779349583*RBIST(-1) - 0.22116428629*RBIST(-2) - 0.464017910874*RCROBEX(-1) + 0.0694567540322*RCROBEX(-2) - 0.00446261610532*RMBI(-1) + 0.0862888417865*RMBI(-2) + 0.143508593222*RMONEX(-1) - 0.162401950271*RMONEX(-2) + 0.110616269893*RSBITOP(-1) + 0.163311931272*RSBITOP(-2) + 0.329404925303*RSOFIX(-1) + 0.0709869967509*RSOFIX(-2) - 0.0127971185295

RBELEX = 0.0522525334972*RATHEX(-1) - 0.0343837287846*RATHEX(-2) + 0.0864254634225*RBELEX(-1) - 0.25088691389*RBELEX(-2) + 0.473960812779*RBET(-1) + 0.124473115471*RBET(-2) + 0.171469186748*RBIFX(-1) + 0.134015181177*RBIFX(-2) + 0.388721722109*RBIRS(-1) + 0.0674263031318*RBIRS(-2) + 0.127382936239*RBIST(-1) - 0.233826040939*RBIST(-2) - 0.152657764943*RCROBEX(-1) + 0.143974766801*RCROBEX(-2) - 0.271097207214*RMBI(-1) - 0.0942081048915*RMBI(-2) + 0.164547075258*RMONEX(-1) - 0.0217840655767*RMONEX(-2) + 0.00668949327623*RSBITOP(-1) + 0.39115004995*RSBITOP(-2) + 0.0553115169533*RSOFIX(-1) - 0.0774820658714*RSOFIX(-2) + 0.000844830955063

RBET = 0.00260462443865*RATHEX(-1) - 0.0751848988034*RATHEX(-2) + 0.116404606536*RBELEX(-1) + 0.0416584583062*RBELEX(-2) + 0.285687324341*RBET(-1) - 0.0656842546342*RBET(-2) + 0.0775415068477*RBIFX(-1) - 0.295300635024*RBIFX(-2) + 0.23927231827*RBIRS(-1) - 0.0520915811739*RBIRS(-2) + 0.110760954192*RBIST(-1) - 0.0495546249046*RBIST(-2) - 0.549878016082*RCROBEX(-1) - 0.106569702718*RCROBEX(-2) - 0.0455267989019*RMBI(-1) + 0.19631910125*RMBI(-2) - 0.0509667474335*RMONEX(-1) + 0.122029134192*RMONEX(-2) + 0.151752415902*RSBITOP(-1) + 0.145807821012*RSBITOP(-2) + 0.121357135397*RSOFIX(-1) + 0.0945868696887*RSOFIX(-2) - 0.000818513461578

RBIFX = 0.032780230549*RATHEX(-1) - 0.00994129857728*RATHEX(-2) - 0.0525992871923*RBELEX(-1) - 0.170564220576*RBELEX(-2) + 0.218055120064*RBET(-1) + 0.107645041294*RBET(-2) - 0.161263015027*RBIFX(-

1) + 0.161227528*RBIFX(-2) + 0.667350862928*RBIRS(-1) - 0.048110745484*RBIRS(-2) + 0.047062917947*RBIST(-1) - 0.0905448263111*RBIST(-2) + 0.0159558758262*RCROBEX(-1) + 0.141298008946*RCROBEX(-2) - 0.162121132718*RMBI(-1) - 0.0489255226255*RMBI(-2) - 0.0279021991801*RMONEX(-1) - 0.0804748313922*RMONEX(-2) - 0.0143097610062*RSBITOP(-1) + 0.110916510891*RSBITOP(-2) + 0.0466273842578*RSOFIX(-1) + 0.199184502108*RSOFIX(-2) - 0.00323026622536

RBIRS = - 0.0713023056057*RATHEX(-1) + 0.0478599554128*RATHEX(-2) + 0.148307269381*RBELEX(-1) - 0.0384312261356*RBELEX(-2) + 0.302230395196*RBET(-1) - 0.104114316729*RBET(-2) + 0.135696682903*RBIFX(-1) - 0.215057119463*RBIFX(-2) + 0.409499926761*RBIRS(-1) + 0.0460327977999*RBIRS(-2) - 0.0831906488178*RBIST(-1) - 0.111185895547*RBIST(-2) - 0.210141526869*RCROBEX(-1) + 0.186964844517*RCROBEX(-2) - 0.140377687097*RMBI(-1) - 0.090515079679*RMBI(-2) + 0.133039476339*RMONEX(-1) + 0.00471311540126*RMONEX(-2) - 0.0290747044313*RSBITOP(-1) + 0.169039129944*RSBITOP(-2) + 0.0216750278955*RSOFIX(-1) + 0.0791968510245*RSOFIX(-2) - 0.00288845487464

RBIST = - 0.184099317175*RATHEX(-1) - 0.00650469916287*RATHEX(-2) + 0.407745403603*RBELEX(-1) + 0.129356793573*RBELEX(-2) + 0.453579606326*RBET(-1) - 0.0908008631332*RBET(-2) - 0.426432472694*RBIFX(-1) - 0.216760566923*RBIFX(-2) + 0.21029311594*RBIRS(-1) + 0.0542366988783*RBIRS(-2) + 0.0141976890834*RBIST(-1) - 0.073452167214*RBIST(-2) - 0.702266127131*RCROBEX(-1) - 0.155750738052*RCROBEX(-2) - 0.214452798217*RMBI(-1) + 0.205557773608*RMBI(-2) + 0.233098162562*RMONEX(-1) - 0.0892960350371*RMONEX(-2) + 0.0075387173335*RSBITOP(-1) + 0.225895185144*RSBITOP(-2) - 0.0213145696017*RSOFIX(-1) + 0.314838786493*RSOFIX(-2) + 0.00358836259155

RCROBEX = - 0.0308989378931*RATHEX(-1) - 0.0328931287767*RATHEX(-2) + 0.334771462178*RBELEX(-1) - 0.0631751650499*RBELEX(-2) + 0.326689780069*RBET(-1) + 0.0231729593935*RBET(-2) - 0.325734775979*RBIFX(-1) - 0.0344561818205*RBIFX(-2) + 0.355138591845*RBIRS(-1) + 0.0562362986438*RBIRS(-2) + 0.137650762101*RBIST(-1) - 0.0916266893262*RBIST(-2) - 0.61688246088*RCROBEX(-1) + 0.0166949604*RCROBEX(-2) - 0.0998312345802*RMBI(-1) + 0.107874119291*RMBI(-2) + 0.0850844311691*RMONEX(-1) - 0.0764701223229*RMONEX(-2) + 0.129033260663*RSBITOP(-1) + 0.152866714429*RSBITOP(-2) + 0.337738881253*RSOFIX(-1) - 0.10998864498*RSOFIX(-2) - 0.00375633414038

RMBI = - 0.108694730534*RATHEX(-1) - 0.18534222961*RATHEX(-2) + 0.518936899068*RBELEX(-1) + 0.0138436293611*RBELEX(-2) + 0.0711384292522*RBET(-1) + 0.0852925289345*RBET(-2) + 0.146720045432*RBIFX(-1) - 0.230155826968*RBIFX(-2) + 0.16915554714*RBIRS(-1) - 0.220130675661*RBIRS(-2) + 0.0991072105512*RBIST(-1) - 0.192153338206*RBIST(-2) - 0.14995129421*RCROBEX(-1) + 0.0553896402624*RCROBEX(-2) - 0.282791799102*RMBI(-1) - 0.0534274463213*RMBI(-2) + 0.149525457131*RMONEX(-1) + 0.100109210997*RMONEX(-2) + 0.15326168324*RSBITOP(-1) + 0.466434104467*RSBITOP(-2) + 0.173006295139*RSOFIX(-1) - 0.105319266105*RSOFIX(-2) - 0.00609106260579

RMONEX = - 0.00856836742722*RATHEX(-1) - 0.145096066683*RATHEX(-2) + 0.263904857057*RBELEX(-1) - 0.166660768014*RBELEX(-2) + 0.386703074895*RBET(-1) + 0.365236394876*RBET(-2) - 0.0868449872346*RBIFX(-1) + 0.102492332608*RBIFX(-2) + 0.396960581016*RBIRS(-1) - 0.049894159461*RBIRS(-2) - 0.0542671953618*RBIST(-1) - 0.227541138383*RBIST(-2) - 0.352375131947*RCROBEX(-1) + 0.0754328674747*RCROBEX(-2) - 0.290358460293*RMBI(-1) - 0.115995011487*RMBI(-2) + 0.311315835154*RMONEX(-1) - 0.111450936935*RMONEX(-2) + 0.0719606872781*RSBITOP(-1) + 0.643550150922*RSBITOP(-2) + 0.0871854633383*RSOFIX(-1) - 0.296681954515*RSOFIX(-2) + 0.000354328969038

RSBITOP = - 0.0286211013562*RATHEX(-1) - 0.00129143267591*RATHEX(-2) + 0.0843028666888*RBELEX(-1) + 0.0325713851903*RBELEX(-2) + 0.0841173526929*RBET(-1) + 0.0684765381217*RBET(-2) - 0.14285931896*RBIFX(-1) - 0.0342482903283*RBIFX(-2) + 0.154581078047*RBIRS(-1) + 0.00756680511657*RBIRS(-2) + 0.101173645445*RBIST(-1) - 0.0471902302294*RBIST(-2) - 0.174134592252*RCROBEX(-1) - 0.0473679890014*RCROBEX(-2) - 0.114593718485*RMBI(-1) + 0.0561189654928*RMBI(-2) + 0.172477956391*RMONEX(-1) - 0.0110998702278*RMONEX(-2) + 0.11200489328*RSBITOP(-1) + 0.0824138890657*RSBITOP(-2) + 0.116827243527*RSOFIX(-1) + 0.0801126499481*RSOFIX(-2) - 0.00430406709793

RSOFIX = 0.0699417779094*RATHEX(-1) - 0.042012468341*RATHEX(-2) + 0.150270797152*RBELEX(-1) - 0.126927137503*RBELEX(-2) + 0.2661350387*RBET(-1) - 0.0393713205467*RBET(-2) - 0.158004899514*RBIFX(-1) - 0.0602673526211*RBIFX(-2) + 0.168595111597*RBIRS(-1) + 0.167057500673*RBIRS(-2) +

0.11712558886*RBIST(-1) - 0.116047351909*RBIST(-2) - 0.422919608065*RCROBEX(-1) - 0.0141116659714*RCROBEX(-2) + 0.141078120951*RMBI(-1) + 0.106386012568*RMBI(-2) - 0.103073981435*RMONEX(-1) - 0.00851439681808*RMONEX(-2) + 0.382414115988*RSBITOP(-1) + 0.22532445293*RSBITOP(-2) + 0.134873310843*RSOFIX(-1) + 0.0565464762179*RSOFIX(-2) - 0.002173510032

Appendix V

Impulse Response Function Results