RELATIONSHIP BETWEEN OIL PRICES, EXCHANGE RATES, STOCK MARKETS AND INDUSTRIAL PRODUCTION: AN ANALYSIS OF EMERGING COUNTRIES

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SİBEL SOYLU

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_____

Prof. Dr. Yaşar Kondakçı
Director

I certify that this thesis satisfies all the requirements as a thesis for the degree of Master of Business Administration.

_____

Prof. Dr. Nuray Güner
Head of Department

This is to certify that we have read this thesis and that in our opinion it is fully adequate, in scope and quality, as a thesis for the degree of Master of Business Administration.

_____

Assist. Prof. Dr. İlkay Şendeniz Yüncü
Supervisor

Examining Committee Members:

Prof. Dr. Uğur Soytaş (METU, BA) _____

Assist Prof. Dr. İlkay Şendeniz Yüncü (METU, BA) _____

Assist Prof. Dr. Başak Tanyeri (Bilkent Uni., BA) _____

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Name, Surname: SOYLU, Sibel

Signature :

ABSTRACT

RELATIONSHIP BETWEEN OIL PRICES, EXCHANGE RATES, STOCK MARKETS AND INDUSTRIAL PRODUCTION: AN ANALYSIS OF EMERGING COUNTRIES

SOYLU, Sibel

MBA, Department of Business Administration

Supervisor: Assist. Prof. Dr. İlkay Şendeniz Yüncü

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It has been a widely investigated issue in the literature that many factors affect the financial and economic development of a country. Extensive regions are covered through the various researches and many variables are utilized to explain whether there exists any connection between the selected variables or not. The aim of this paper is to analyze and interconnect the relationship between the exchange rates, real stock returns, crude oil prices and industrial production level for emerging countries. Toda Yamamoto Augmented VAR for Granger non-causality methodology is followed to determine the linkages and make inferences about the results. VAR variables. Monthly data is used covering the period between January 1990 and

December 2016. The results show that there exists a significant causal relationship between production and crude oil prices. It is also evidenced that causality from exchange rates to manufacturing indices can be used to explain the dynamics of the economy of emerging countries. Only causality relation from exchange rates to stock returns is exhibited to be a meaningful relation to interpret the results. Weak causal linkage from stock market returns to industrial production is observed for emerging countries, opposite direction relation is found to be insignificant.

Keywords: Crude Oil, Real Stock Return, Wald test, Manufacturing

ÖZ

PETROL FİYATLARI, DÖVİZ KURLARI, HİSSE SENEDİ PİYASALARI VE ENDÜSTRİYEL ÜRETİMLER ARASINDAKİ İLİŞKİ: GELİŞMEKTE OLAN ÜLKELER ANALİZİ

SOYLU, Sibel

Yüksek Lisans, İşletme Bölümü

Tez Yöneticisi: Dr. Öğr. Üyesi İlkay Şendeniz Yüncü

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Ülkelerin ekonomik ve finansal gelişmelerini etkileyen sebepler, kapsamlı bir şekilde literatürde araştırılan bir konu olmuştur. Geniş bölgeler, çeşitli araştırmalar üzerinden ele alınmıştır ve seçilen değişkenler arasında herhangi bir bağ olup olmadığını açıklamak için birçok değişken kullanılmıştır. Bu çalışmanın amacı, gelişmekte olan ülkeler için döviz kurları, reel hisse senedi getirisi, petrol fiyatları ve endüstriyel üretimler arasındaki ilişkiyi incelemek ve değişkenler arasında bağlantı kurmaktır. Bağlantıyı belirlemek ve sonuçlar hakkında çıkarımlar yapmak için nedensel olmayan Granger yöntemiyle Toda Yamamoto Genişletilmiş Vektör Oto Regresyon (VAR) yöntemi takip edilmiştir. Vektör Oto Regresyon (VAR) denklemleri, değişkenler için

nedensellik ilişkisinin yönünü belirlemek için kullanılmıştır. Ocak 1990 ve Aralık 2016 tarihleri arasındaki periyodu kapsayan aylık veri kullanılmıştır. Sonuçlar, üretim ve ham petrol fiyatları arasında anlamlı bir nedensellik ilişkisi olduğunu göstermektedir. Döviz kurlarından imalat sanayi endekslerine olan nedenselliğin gelişmekte olan ülkelerin ekonomik dinamiklerini açıklamak için kullanılabileceği belirtilmiştir. Sadece döviz kurlarından hisse senedine piyasası getirilerine olan nedensellik, sonuçları yorumlamak için anlamlı bir ilişki olarak izah edilmiştir. Gelişmekte olan ülkeler için hisse senedi piyasası getirilerinden endüstriyel üretime zayıf bir nedensellik bağı gözlemlenmiştir, ters yöndeki ilişki anlamlı bulunmamıştır.

Anahtar Kelimeler: Ham Petrol, Hisse Senedi Piyasası Getirisi, Wald test, Üretim

To my family for their support and love

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LIST OF ABBREVIATIONS

ADF	Augmented Dickey Fuller
AIC	Akaike Information Criterion
ASE	Athens Stock Exchange Index
BIC	Bayesian Information Criterion
BIST100	Istanbul Stock Exchange Index
BOIL	West Texas Intermediate Brent Crude Oil Prices
BUX	Budapest Stock Exchange Index
COLCAP	Colombian Stock Exchange Index
CUSUM	Cumulative Sum
DFGLS	Dickey Fuller Generalized Least Squares
DCC	Dynamic Conditional Correlation
ECM	Error Correction Model
EQN	Equation
EXC	Exchange Rate
FRBSL	Federal Reserve Bank of St. Louis
FTSE/JSE	Johannesburg Stock Exchange Index
GDP	Gross Domestic Product
GMM	Generalized Method of Moments
HAC	Heteroscedasticity and Autocorrelation Consistency
IBRX	Brazil Stock Exchange Index

IGPA	Chile Santiago Stock Exchange Index
IMOEX	Moscow Interbank Currency Exchange Index
INF	Inflation Rate
IRF	Impulse Response Function
JCI	Jakarta Stock Exchange Composite Index
KOSPI	Korean Composite Stock Exchange Composite Index
MEXBOL	Mexican Stock Exchange Index
MI	Manufacturing Index
MSCI	Morgan Stanley Capital Income
NSE (NIFTY50)	National Stock Exchange of India Index
OECD	Organisation of Economic Co-operation and Development
OIL	West Texas Spot Crude Oil Prices
PCOMP	Philippines Composite Stock Exchange Index
PP	Phillips Perron
PX	Prague Stock Exchange Index
RSR	Real Stock Return
SC	Schwarz Information Criterion
SHCOMP	Shanghai Stock Exchange Composite Index
SMI	Stock Market Index
SVAR	Structural Vector Autoregression
VAR	Vector Autoregression
WTI	West Texas Intermediate
WIG20	Warsaw Stock Exchange Index

CHAPTER 1

INTRODUCTION

Oil market is a powerful market affecting the economic and financial movements or decisions of a country. A considerable number of studies pays attention to the effect of oil prices on macroeconomic variables that are determined to have a potential influence. One of the bridge of the crude oil prices with the macroeconomic variables is pointed with the relationship between oil price and exchange rates in the literature. The effect of the oil prices on exchange rates can be analyzed with the explanation that any disruption accounting for the change in exchange rates can drive financial pressure for oil-dependent countries. Besides to this effect, trade balance of a country can be induced with the exchange rate fluctuations and this balance can be reflected in the local currency balance as indicated in the analysis of Fratzscher et al (2014). Moreover, supply and demand chain are formed according to these fluctuations and directly affects the production processes of countries. In this sense, Industrial production costs also appear to be a distinctive factor linking oil prices to manufacturing indices.

Additionally, the relationship between production processes and the return to its movements in stock market is also investigated in the literature. Since consumer demands are associated with the production in the sectors and reflect the economic state of a country, industrial production holds as a leading indicator for economic growth. So, economic and financial performances can be linked by using the variables of industrial production and real stock returns. Drobetz (2000) anticipates that not only industrial production provides information about the economic development of a country but also the future expectations of cash flows are formed according to the production level. This claim enables to predict and interpret the stock

returns. Studies carried out by Fama (1990) and Schwertz (1990) also support the idea of this interaction between stock returns and industrial production. Therefore, the validity of the claim of the significant causal relation between industrial productions and stock market returns reexamined with other variables, which are added to the analysis in this paper.

Relationship between stock market returns and exchange rates can be viewed also an important instrument to measure the development of a country since exchange rate fluctuations can change the dynamic of the economy to take precautions or lead to alter an investment decision. According to the changes encountered in exchange rate levels, foreign investors may overview their investment decisions to generate economic opportunities that are supported by foreign equities. For emerging countries, holding investment opportunities is worth to consider and providing attractions for foreign investors is a crucial issue to raise economic prosperity. Understanding how stock market returns and exchange rates of an emerging country affect each other remains an important concept to be conducted. It can be also presumed that the production level of a country may have a significant effect on stock market returns due to the close relationship between production and stock market returns.

The aim of this study is to combine relationships between the variables investigated in numerous studies formerly. According to economic theory, it is not sufficient to explain a change in a dependent variable with one exogenous variable. Extending the study with the addition of a variable can strength the analysis and provide accuracy to explain the insight dynamics of a country. Moreover, each variable completes inferences as a result of empirical research and analysis can have a tendency to be incomplete if a variable is extracted from the analysis.

Emerging countries can perform more enthusiastic efforts to pursue economic or financial opportunities than developed countries. Although developed countries have more stable balances, emerging countries can exhibit a more sustainable and unsteady state in the case of a shock due to their unsettled balances. Observations on the effect of a change in one variable can reveal the dependence to the other variable more readily and relationships between the variables can be examined more conveniently for emerging economies. Moreover, part of the relationships between

the variables are studied in the literature and there exist no study that fully conducts the variables for emerging countries. This paper can complete the gap by combining different disciplines and by providing inferences of the empirical results of the relationships between crude oil prices, exchange rates, stock returns and industrial production.

Emerging countries are chosen with monthly basis data covering from January 1990 to December 2016. Relations between exchange rates, oil prices, stock market returns, and industrial production are presumed to have close bindings and each causal relation is estimated to determine the direction. Toda Yamamoto Wald test procedure is followed for this framework. To complete the analysis between variables Impulse Response Function tool of Eviews is used and graphics are plotted to support the inferences obtained from the results.

The findings of this research are expected to be in line with the studies demonstrated and suggested formerly but give a more complete understanding. Empirical results give an opportunity to make inferences about the economic development or financial development of an emerging country. Direction of the causal relations between the variables can reveal the state of a country.

This thesis is organized into five chapters. Chapter 2 covers the literature review by providing extensive region researches conducted before. Chapter 3 includes the data selection and the methodology employed to investigate the relations. Chapter 4 provides the results of the determined model constructed with the data. Evaluation of the results is included by relating the outcomes with each other. Finally, Chapter 5 concludes this study by summarizing observations.

CHAPTER 2

LITERATURE REVIEW

Numerous studies are conducted especially concentrating on the relationships between energy prices, stock market prices, exchange rate and economic activity regarding the dynamics of the determined research area. Researchers paid appreciable attention to both in the short-run and long-run effects of the variables along with the specified time intervals. Several empirical methodologies adopted and adjusted to tackle with the relationships between the defined variables. Regions are extensively investigated for the purpose to find out the relationship of the variables by estimating with panel data and mostly time series analysis. A summary of the related studies conducted about relationships is presented in Appendix Table A.1.

2.1 Stock market and exchange rate relationship

Changes in exchange rate levels can be a leading factor for investment decisions depending on the close relationship between these two variables. Indeed, all these depending arguments can affect the economic development opportunities to be supported. It is important, especially for emerging countries, to be considered due to the growth motivations both financially and economically.

Several studies have been devoted to give a proof of the potential bridge between the stock market activities and exchange rates. Although there exists a consensus ascertaining that there is a relationship between stock market and exchange rates which are mutually affecting both ways, other attained results show that there is no

Representing with this purpose, Islami and Welfens (2013) investigate the relationship between stock markets and exchange rates for four accession countries, which are Poland, Czech Republic, Slovenia, and Hungary. To examine the short-run relationships, VAR model is established and long-run relation is tested by Johannsen cointegration approach. Depending on the countries analyzed, either short-term or long-term relationship or both appear as the result of the estimations. Alternatively, similar variables are examined by Huang and Yang (2000) pointing out the significance of the relationship between stock markets and exchange rates. Asian flu data are established by testing with Granger causality and Impulse response analysis. Their results are showing that stock market changes affect exchange rates or the reverse case is observed for the variables.

Abidin, Walters, Lim, and Banchit (2013) oppositely proclaim that stock markets and exchange rates do not have a long-run relationship for Asia-Pacific countries. Their findings are employed with time series analysis and Engel-Granger's two-step methodology implying that although variables are not cointegrated, in the long-run they might have poor linkage.

In literature, not only the changes in the stock markets and exchange rates relationship but also the volatility changes are investigated. Sensoy and Sobaci (2014) intensify their study in accordance with volatility shifts for Turkey. VAR model and dynamic conditional correlation model indicate the empirical results that a positive relationship between stock markets and exchange rates appears. Another volatility issue is discussed by Hajilee and Nasser (2014) examining the relationship between exchange rate volatility and stock market development for emerging countries. Engle-Granger cointegration test in this study shows that both in the short term and in the long-term two variables have consistent results with the former paper implying that the relationship between two variables occurs significantly.

Abouwafia and Chambers (2015) enrich the literature by investigating the bridge of monetary policy, exchange rates, and stock. Their methodology used in the paper is structural vector autoregression (SVAR) covering the Middle East region mainly considering five important countries, Kuwait, Oman, Saudi Arabia, Egypt, and Jordan. They mainly find that for the chosen countries, monetary policy and exchange rate shocks affect stock market prices significantly in the short term.

2.2 Stock market and industrial production, economic activity relationship

More extensively considering, rather than the stock market and exchange rate, researchers also conduct the linkage between the stock market and industrial production in which economic growth and financial development are included. Production processes and the return to its movements in the stock market remains to be a debatable concern since consumer demands are associated with the production in the sectors and reflect the economic state of a country. Therefore, industrial production holds as a leading indicator of economic growth and gives an insight into an economy. Selected variables for this study of which manufacturing indices and real stock returns are used to measure the bridge between industrial production and stock markets.

The stock market and industrial production are associated with the research of Tsagkanos and Siriopoulos (2015) for the North and South Euro-zone. South Euro-zone consists of Spain, Portugal, Italy, Greece, and North Euro-zone countries are constructed as Germany, Belgium, Finland, Austria in their paper covering the period of January 2, 2004 and December 30, 2013. Their data frequency is monthly in the determined period. In order to get the empirical results, they use threshold cointegration approach established both in the framework of panel and aggregate. Equilibrium speed of the stock prices and industrial production in the case of a shock differs in each method but achieved in the long-run. In the panel context, North Euro-zone is observed to be adjusted symmetrically but South of the Euro-zone is observed to have an asymmetric adjustment.

Bridge between industrial production and the stock market is emphasized also in the study of Chang and Pinegar (1989). They established Granger causality method to find the relationship after analyzing each variable seasonally. Their examination spans the monthly data of January 1958 and December 1985. Their findings indicate that stock returns for large scale firms can lead to seasonal real growth in the long-run. Whereas the effect of the stock returns for small firms remains in the short run.

Cavenaile and Gengenbach (2014) provide evidence of the relationship between stock markets, economic growth and bank development for five developing countries namely Malaysia, Nigeria, Mexico, Philippines, and Thailand. They establish the methodology of panel testing which is different from methodologies in other papers in the literature. So as to determine the order of integration, they use panel unit root testing and they concentrate on Groen and Kleinbergen estimation for cointegration examination. Moreover, they utilize Toda and Philips framework to detect the long-run causality relationship. Their analysis draws a conclusion stating that there is a cointegration relation in the long-run between economic growth and financial development including the stock market and bank development. Causality between the variables is defined from financial development to economic growth.

From this viewpoint, Yu, Hassan, and Sanchez (2012) support the existence of the linkage between financial development, stock markets, and economic growth. They set out a broad country scope to analyze the relation through the panel estimation framework. Each country group, which they defined, has its own long term or short-term result interpretation.

2.3 Oil prices and stock market relationship

For oil-dependent countries, it is crucial to consider the impact of fluctuations in oil prices and their reflections on the financial decisions about investments. Since oil prices affect the dynamics of the country by forming the future cash flows of the energy firms, the relationship between crude oil prices and stock markets is essential to consider while evaluating the investment decisions. Many research papers are carried on the indicated relationship and few of them are summarized in this section to be able to derive a conclusion.

Degiannakis, Filis, Kizys (2014) investigates the relationship between the oil price shocks and the stock market volatility for the European region. For this purpose, they use the Eurostoxx 50 index, which consists of the most leading and liquid fifty stocks in Europe, as the measurement for the stock market volatility. So as to build up the

linkage of the oil prices, they define the oil price shocks with Brent oil prices. Estimation results of the study are obtained by a Structural VAR model. Oil price shocks are divided into three categories namely supply-side, aggregate demand and oil specific demand shocks to offer a better understanding of the relationship. According to the results, supply-side and oil-specific demand shocks do not have a significant effect on stock market volatility. On the other hand, aggregate demand oil price shocks have a significant influence on stock market volatility.

Another approach for the same concept is examined by Guesmi and Fattum (2014), which deals with the effect of oil price changes on stock market returns for ten OECD countries. They establish a dynamic conditional correlation model by using monthly data between the time interval of January 1, 1990 and December 1, 2012. Their findings show that the relationship between the crude oil prices and stock markets was affected by mostly oil prices when an oil price shock is observed in global oil market. They contribute to the literature by revealing the mutual interaction between crude oil prices and stock markets.

2.4 Oil prices, stock market and economic activity

Oil market is a powerful market that affects the economic and financial movements or decisions of a country. A considerable number of studies pay attention to this effect of prices on other variables determined to have the potential to be influenced. Hamilton (1983) is the pioneer work to explain the relationships between oil prices and the macroeconomic variables. He examines the oil industry with the annual data covering 1948 and 1972. According to the Granger causality results, change in the oil prices stimulates macroeconomic variables following the period in which shock is encountered. There is little evidence that dramatic changes in macroeconomic variables exhibit an essential influence to predict the oil prices but macroeconomic variables are not found to be completely independent.

Papapetrou (2001) aims to identify the bridge between oil prices and economic development including the stock market, industrial production, and employment. Papapetrou serves the results of the study for Greece as a developing country. He uses multivariate vector-autoregression (VAR) to be able to draw conclusions of this empirical analysis. His analysis shows that oil price shocks have a significant effect not only on industrial production but also on the employment measures. Results also imply that industrial production and employment are influenced negatively when an oil price shock emerged. Moreover, real stock returns are reduced in the case of positive oil price shocks.

Smiech and Papiez (2013) investigate a similar perspective with the variables of fossil fuel, exchange rate and stock market for the European region countries. They share the same methodology with Papapetrou's article, which is again established as a vector-autoregression model and their analysis spans a large region compared with the former study. They found considerable relation between fuel prices and exchange rates, similarly with the stock market and other variables including also mutual causality between variables between the period 2006 and 2008. Apart from the indicated period, causality between variables evidenced to be insignificant.

In the same framework, Seshaiah and Behera (2009) examine Indian data to figure out the linkage between stock prices, exchange rates, and crude oil prices. Data cover the period from 1991 to 2007 of daily frequency. For this aim, they utilize time series analysis and Johansen cointegration to test if there exists any cointegration between variables. The main finding of this paper is that all the variables that are chosen to be analyzed are cointegrated. Causality direction is obtained as from exchange rates to stock prices and also from crude oil prices to stock prices. In addition to this causality, exchange rates affect stock prices. Besides this study, Basher, Haug, and Sadorsky (2012) questioning the same relationship of the variables; however, their data cover emerging countries more extensively. Nevertheless, they establish a structural vector autoregression (SVAR) model for this purpose. Additionally, their data covers the period from 1988 to 2008 on a monthly basis. Their finding of the causality between variables partially supports the study of Seshaiah and Behera (2009) indicating that oil prices have an effect on stock prices in the short term. On the other hand, the direction of the causality of exchange rates and oil prices points out from oil prices to exchange rates in the short run.

Parallel to this issue, Sarı and Soytaş (2006) aims to explain the linkage between stock market returns, crude oil prices and interest rate covering data for a developing country, Turkey. They use time series analysis, variance decomposition and generalized impulse response methodology in order to demonstrate the relation between the variables. Their paper provides evidence that oil price shocks do not have a significant effect on the Turkish stock market.

CHAPTER 3

DATA AND METHODOLOGY

3.1 Choice of variables

For this study, monthly data of exchange rates (EXC), real stock returns (RSR), crude oil prices (OIL) and manufacturing indices (MI) are used consisting of MSCI emerging countries and data cover the period from 1990:01 to 2016:12. MSCI emerging countries are presented in Table 3.1 below to provide countries as a list. Additionally, ranges and sources of the data are represented in Appendix Table A.2 and Table A.3. Few of the emerging countries are eliminated from the data set due to the unavailability of the related data.

Table 3.1: Emerging countries determined by Morgan Stanley Capital International

MSCI EMERGING COUNTRIES			
1	Brazil	9	Mexico
2	Chile	10	Philippines
3	Colombia	11	Poland
4	Czech Republic	12	Russia
5	Hungary	13	South Africa
6	India	14	South Korea
7	Indonesia	15	Turkey
8	Greece		

Exchange rates (EXC) are derived as local currencies per US dollar for each country and the exchange rates are accepted by taking the natural logarithm. Values of the exchange rates are taken from the Bloomberg database.

Real stock return estimation is proceeded as mentioned in Sarı and Soytaş (2006) and Papapetrou (2001). Stock return computation is obtained by taking the difference of the natural logarithm of the related stock market indices (SMI) for each country, which indices were taken into consideration are presented in Appendix Table A.4. Real stock market returns (RSR) are computed as the subtraction of natural logarithm of inflation rates (INF) calculated by Consumer Price Index from the stock market returns. Formulations are employed as the following;

$$\text{Stock Return} = LN\left(SMI_t / SMI_{t-1}\right)$$

$$\text{Real Stock Return} = LN\left(SMI_t / SMI_{t-1}\right) - LN\left(INF\right)$$

Stock market index values are in the form of local currencies per US dollar and inflation rates are taken from the Bloomberg database.

West Texas Intermediate Spot Crude Oil Prices (OIL) are used and taken from the source of Federal Reserve Bank of St. Louise database in US dollar. WTI Crude Oil - Brent Prices (BOIL) are used for the robustness check.

Another variable used to measure economic activity is the Manufacturing Index (MI) used in the form of the natural logarithm. Data series are obtained for the majority of the countries from the OECD Statistics. Manufacturing Index of Philippines is taken from the national government data of the Philippines.

3.2 Methodology

There are several ways to estimate the relationship of the economic variables to check if they influence their own pattern and in what direction they keep going. Conventionally, time series are conducted through checking unit root tests. Unit root tests allow determining the order of integration of the related time series. Johannsen cointegration tests are conducted to detect whether there is cointegration among the

variables or not. Unit root and cointegration tests are essential estimations in order to establish and evaluate the VAR model. Besides all the advantages of the methods, unit root and cointegration testings are required to evaluate the VAR model in conventional processes. Once variables are found to be cointegrated, an error correction model (ECM) can be kept in mind to be conducted. As mentioned in Toda and Yamamoto (1995), unit root testing may suffer from the pretest biases unless there exist robust time series processes to test. In order to avoid these circumstances, Toda Yamamoto augmented VAR procedure for Granger non-causality Wald test is used to inspect the relationship between the variables exchange rates, crude oil prices, real stock returns and manufacturing indices focused on emerging countries.

3.2.1 Unit Root Testing

Unit root testing of the variables is the first step of the Toda Yamamoto procedure to determine. Variables are checked if they are dependent on their own historical data ensuring precisely the stationary condition. Order of integration of the variables are established by Augmented Dickey-Fuller (ADF), Generalized Least Squres Detrended Dickey-Fuller (DFGLS) and Phillips-Perron test using Eviews unit root testing tools. Basic unit root theory provides the simple AR(1) process:

$$y_t = \rho y_{t-1} + x_t'\delta + \varepsilon_t$$

where x_t is exogenous regressor, ρ and δ are parameters and ε_t is the white noise. Mentioned in Dickey and Fuller (1979), model is constructed as below;

$$\Delta y_t = \alpha y_{t-1} + x_t'\delta + \varepsilon_t$$

where $\alpha = \rho - 1$, in a generalized form with p lagged difference;

$$\Delta y_t = \alpha y_{t-1} + x_t'\delta + \beta_1 \Delta y_{t-1} + \beta_2 \Delta y_{t-2} + \ldots + \beta_p \Delta y_{t-p} + v_t$$

Even though ADF test is useful to find out the integration of order of the variables, in case of trend and mean appears for the time series to be analyzed more developed tool is required. For this purpose, Elliott, Rothenberg and Stock (1996) has modified traditional approach of Augmented Dickey-Fuller unit root test to improve and ensure the interpretation of the result of testing. As indicated in the paper of Elliott, Stock and

Rothenberg (1996), new modified version of the model is obtained as follows;

Series of y_t is replaced with the residual series of $y_t^d = y_t - \beta' z_t$ where $z_t = (1,t)'$ is the linear trend. Thus, the modified model is obtained as;

$$\Delta y_t^d = \alpha_0 y_{t-1}^d + \alpha_1 \Delta y_{t-1}^d + \alpha_2 \Delta y_{t-2}^d + \ldots + \alpha_p \Delta y_{t-p}^d + \varepsilon_t$$

DFGLS procedure is more powerful than ADF unit root testing due to de-trended and de-meaned estimation framework.

Last but not the least methodology checked for unit root testing is Phillips and Perron (1988). As other methods take into consideration first-order autoregression, Phillips and Perron allow an analysis independent from the lag length specification. Moreover, method also exhibits more robust form of the heteroscedasticity of the error term disturbances.

Methods mentioned above are followed and compared so as to ensure the order of integration and stationary condition for each variable respectively. Akaike Information Lag Length Criteria is used to check orders. Integration orders are used in Toda Yamamoto procedure to find out the maximum order of integration.

3.2.2 Toda Yamamoto Methodology

Following the Toda Yamamoto procedure, initially maximum order of the integration (d_{max}) for all the variables is determined by implementing a unit root test so as to determine the order of integration for each country. Lag length (m) selection is followed in the procedure, in which the Akaike criterion is the base criteria. According to the VAR$(m+n)$ model, stability of the roots of VAR model is ensured. Diagnostic tests are monitored to check autocorrelation, heteroscedasticity, and stability of the parameters in the form of VAR equations. As indicated in the Toda Yamamoto procedure, first m parameters of other variables in the equations are conducted by Wald tests and causality inferences are interpreted by the results. Causality relations are defined as change in one variable lead to a change in other dependent variable. Generalized impulse responses also obtained to get a general picture of the variables.

CHAPTER 4

EMPIRICAL RESULTS

Table 4.1 presents the descriptive statistics for exchange rates (EXC), real stock returns (RSR), manufacturing indices (MI), Crude oil prices (OIL) and Brent oil prices (BOIL) in order to observe the linkages of variables by expressing them not within the form of natural logarithm. Manufacturing index mean of 324 observations of Brazil is found to be 94.67 which is the implication of the rise of the manufacturing indices between the period 1993:05 and 2002:09 and manufacturing indices keep their upward trend. A similar framework holds for Chile while evaluating the manufacturing indices average. Manufacturing index levels persist its upward trend since 1990 resulting in 79.80 average and closest to the maximum value, even though they face with a sudden decrease in 2010:02. In addition to these analyses, the exchange rates of Philippines keep its upward movement after 1997:06. In that time period, there exists an abrupt increase in exchange rates making the average close to the maximum value. Common variable for each of the country is specified as crude oil prices and Brent oil prices. They display a similar pattern by having an upward trend since 1998:12 but the rise in the prices disrupted and conspicuous falls observed after mid-2008 and mid-2014 which explains the close value to the minimum estimation.

Table 4.2 shows the results of the ADF and PP unit root testing, DFGLS unit root results are followed with Table 4.3. As oil prices and Brent oil prices are common variables for each of the emerging countries, unit root test results are represented in Table 4.4. Plots of the residuals are exhibited in Figure 4.1 which are used to observe and ensure the residual tests for the countries. Moreover, breakpoint results can be checked in Table 4.5. Toda Yamamoto Augmented VAR procedure is followed to

detect the causality relations between variables and results are presented in Table 4.6 followed by the impulse response graphical depictions in Figure 4.2.

Table 4.1: Descriptive statistics

Country	Variables*	Obs.	Mean	Median	St. Dev.	Max.	Min.
Brazil	Exchange Rates	300	1.88	1.92	0.93	4.02	0.00
	Real Stock Returns	251	-1.83	-1.86	0.43	-0.34	-3.12
	Manufac. Indices	324	94.67	92.47	13.99	118.66	57.31
	Oil Prices	324	46.64	32.64	30.52	133.88	11.35
	Brent Oil Prices	324	47.58	30.91	34.17	132.72	9.82
Chile	Exchange Rates	324	511.26	512.38	107.67	749.25	295.2
	Real Stock Returns	314	-1.55	-1.43	0.81	1.24	-3.42
	Manufac. Indices	312	79.88	78.35	16.01	104.30	48.20
	Oil Prices	324	46.64	32.64	30.52	133.88	11.35
	Brent Oil Prices	324	47.58	30.91	34.17	132.72	9.82
Colombia	Exchange Rates	293	1918.5	1949	656.84	3292.9	691.7
	Real Stock Returns	173	-1.45	-1.51	0.43	-0.57	-2.28
	Manufac. Indices	324	82.34	77.78	12.54	108.57	61.47
	Oil Prices	324	46.64	32.64	30.52	133.88	11.35
	Brent Oil Prices	324	47.58	30.91	34.17	132.72	9.82
Czech Republic	Exchange Rates	283	25.86	24.95	6.40	41.06	15.16
	Real Stock Returns	259	-0.88	-0.97	1.13	2.37	-2.65
	Manufac. Indices	312	70.02	69.64	18.68	105.69	39.99
	Oil Prices	324	46.64	32.64	30.52	133.88	11.35
	Brent Oil Prices	324	47.58	30.91	34.17	132.72	9.82
Greece	Exchange Rates	324	0.83	0.80	0.12	1.18	0.63
	Real Stock Returns	279	-1.52	-1.37	0.92	3.73	-3.32
	Manufac. Indices	324	123.2	127.04	14.72	150.30	93.20
	Oil Prices	324	46.64	32.64	30.52	133.88	11.35
	Brent Oil Prices	324	47.58	30.91	34.17	132.72	9.82
Hungary	Exchange Rates	283	210.3	215.30	50.70	310.27	91.76
	Real Stock Returns	292	-1.96	-1.94	1.10	2.33	-3.72
	Manufac. Indices	300	64.05	68.74	25.10	103.67	23.13
	Oil Prices	324	46.64	32.64	30.52	133.88	11.35
	Brent Oil Prices	324	47.58	30.91	34.17	132.72	9.82

Table 4.1: Descriptive statistics (cont'd)

Country	Variables	Obs.	Mean	Median	St. Dev.	Max.	Min.
India	Exchange Rates	324	43.44	44.46	11.72	68.42	16.96
	Real Stock Returns	316	-1.93	-1.97	0.52	0.84	-3.02
	Manufac. Indices	273	62.04	55.34	27.20	106.92	23.23
	Oil Prices	324	46.64	32.64	30.52	133.88	11.35
	Brent Oil Prices	324	47.58	30.91	34.17	132.72	9.82
Indonesia	Exchange Rates	302	8047.79	9072	3597.21	14950	1980
	Real Stock Returns	322	-2.02	-2.00	0.68	1.21	-4.69
	Manufac. Indices	324	69.46	67.73	16.21	107.23	37.43
	Oil Prices	324	46.64	32.64	30.52	133.88	11.35
	Brent Oil Prices	324	47.58	30.91	34.17	132.72	9.82
Mexico	Exchange Rates	324	9.77	10.41	4.04	20.73	2.71
	Real Stock Returns	275	-1.83	-1.54	0.76	-0.77	-3.96
	Manufac. Indices	324	80.25	82.94	13.15	103.98	54.55
	Oil Prices	324	46.64	32.64	30.52	133.88	11.35
	Brent Oil Prices	324	47.58	30.91	34.17	132.72	9.82
Philippines	Exchange Rates	302	42.04	43.88	9.86	56.35	23.40
	Real Stock Returns	321	-1.60	-1.72	0.72	1.61	-3.13
	Manufac. Indices	192	150.29	152.45	20.05	180.70	110.90
	Oil Prices	324	46.64	32.64	30.52	133.88	11.35
	Brent Oil Prices	324	47.58	30.91	34.17	132.72	9.82
Poland	Exchange Rates	283	3.28	3.25	0.63	4.65	1.76
	Real Stock Returns	241	-1.34	-1.37	1.12	1.61	-3.71
	Manufac. Indices	324	54.81	47.50	27.38	108.19	15.59
	Oil Prices	324	46.64	32.64	30.52	133.88	11.35
	Brent Oil Prices	324	47.58	30.91	34.17	132.72	9.82
Russia	Exchange Rates	282	26.83	28.61	15.83	75.45	0.99
	Real Stock Returns	231	-2.48	-2.40	0.65	-1.25	-4.98
	Manufac. Indices	216	79.31	82.13	17.44	106.49	46.52
	Oil Prices	324	46.64	32.64	30.52	133.88	11.35
	Brent Oil Prices	324	47.58	30.91	34.17	132.72	9.82
South Africa	Exchange Rates	324	6.92	6.84	3.05	15.89	2.52
	Real Stock Returns	257	-1.67	-1.77	0.61	1.68	-2.73
	Manufac. Indices	324	89.45	90.11	10.25	111.01	66.91
	Oil Prices	324	46.64	32.64	30.52	133.88	11.35
	Brent Oil Prices	324	47.58	30.91	34.17	132.72	9.82

Table 4.1: Descriptive statistics (cont'd)

Country	Variables	Obs.	Mean	Median	St. Dev.	Max.	Min.
South Korea	Exchange Rates	324	1038.80	1085.74	195.57	1633	689
	Real Stock Returns	324	-1.10	-1.20	0.75	1.69	-2.37
	Manufac. Indices	324	60.40	55.53	28.43	105.50	19.76
	Oil Prices	324	46.64	32.64	30.52	133.88	11.35
	Brent Oil Prices	324	47.58	30.91	34.17	132.72	9.82
Turkey	Exchange Rates	324	1.08	1.33	0.88	3.52	0.00
	Real Stock Returns	324	-3.14	-3.12	1.07	-1.33	-4.91
	Manufac. Indices	324	55.98	46.75	22.36	106.10	27.01
	Oil Prices	324	46.64	32.64	30.52	133.88	11.35
	Brent Oil Prices	324	47.58	30.91	34.17	132.72	9.82

4.1 Unit Root Test Results

According to Toda Yamamoto procedures, all variables for each country are conducted with unit root tests to detect the maximum order of integration. For this purpose, Augmented Dickey-Fuller (ADF), Dickey Fuller Generalized Least Square (DFGLS) and Phillips Perron (PP) unit root tests are applied to find out the order of integration and also to ensure whether the stationary condition is valid for the variables.

The null hypothesis for ADF, DFGLS, and PP tests for stationarity determination are defined as follows;

H_0; series has a unit root

and the alternate hypothesis is defined as;

H_1; series has no unit root

Rejection of the null hypothesis indicates that the series is stationary. Akaike Information Criterion (AIC) is selected to determine the lag length for ADF and DFGLS unit root tests for each of the series. Newey-West Bandwidth automatic selection is preferred for PP unit root testing.

In the level of the series according to DFGLS test results, 11 countries fail to reject the null hypothesis at 10% significant level implying that series have a unit root and stationary condition is not satisfied. For the remaining three countries, Czech Republic and South Korea real stock return series is attained to be stationary and reject the null hypothesis at 5% significant level. In the case of Indonesia, series of real stock returns are obtained to be stationary. The null hypothesis is rejected at 1% significant level and stock returns are proved to deny the presence of a unit root.

ADF unit root results show that among 15 emerging countries, Brazil exhibits stationary exchange rate and real stock return series in level by rejecting the null hypothesis at 1% significance. Exchange rates of India, Russia, Turkey and real stock return of Indonesia share the same interpretation with Brazil standing at a 1% significant level to reject the null hypothesis. Only the manufacturing index series of Czech Republic stands in the 5% significant level which remains to be sufficient to reject the null hypothesis and obtained as stationary. All the series for the remaining countries preserve to be nonstationary even at the significant level of 10%. For these countries, the null hypothesis is failed to be rejected and the series have a unit root.

PP unit root results for level indicates that variables for the emerging countries do not satisfy the stationary condition mostly as parallel to the other unit root test results. Exchange rates of Brazil, India, Russia and Turkey are found to be statistically meaningful at 1% significant level and the null hypothesis of having a unit root is rejected. Hungary, India, and Poland do not have a unit root at 5% significant level for the variable of exchange rates. Exchange rates of the remaining countries are not detected to be statistically meaningful even at 10% significant level and the null hypothesis for this variable is failed to be rejected. Real stock returns of the countries namely, Brazil, Chile, Czech Republic, Hungary, India, Indonesia, Philippines, Russia, and South Korea are found to be meaningful at 1% significant level implying that the variable is stationary for the denoted countries. South Korea and Turkey share the

same results with other emerging countries differently at 5% significant level and the null hypothesis is rejected. Remaining are not performed to be statistically significant even at 10%. Moreover, the null hypothesis for manufacturing indices is also tested and the main findings are observed for Czech Republic, Indonesia, and Turkey to be nonstationary at 1% significant level. The null hypothesis of emerging countries Colombia, Greece and South Africa is rejected to have a unit root at 5%significant level. Remaining countries are observed to be nonstationary.

Common variables for all the countries are defined as crude oil prices and Brent oil prices. ADF, DFGLS and PP unit root results have a consistency of nonstationarity of oil prices even at 10% significant level.

Regarding first differences, variables are observed to be stationary for ADF, DFGLS and PP unit root tests. ADF and PP unit root results are consistent with each other except for the countries Chile and Greece for the variable of stock market returns. Unit Root test results for the variable in first differences I(1) are presented in Table 4.2, Table 4.3 and Table 4.4. Stationary condition is ensured with all applied unit root tests and the null hypothesis of having a unit root is rejected mostly at 1% significant level.

Table 4.2: Unit Root ADF and PP Test Results

			Exchange Rates		**Real Stock Return**		**Manufacturing Index**	
Country		Test	t-stat.	p-value	t-stat.	p-value	t-stat.	p-value
Brazil	Intercept	ADF	-3.624	0.006	-5.385	0.000	-20.738	0.000
		PP	-10.288	0.000	-18.310	0.000	-22.605	0.000
	Trend	ADF	-3.925	0.012	-5.413	0.000	-20.717	0.000
		PP	-11.752	0.000	-18.333	0.000	-22.797	0.000
Chile	Intercept	ADF	-16.058	0.000	-1.113	0.712	-18.802	0.000
		PP	-16.035	0.000	-12.809	0.000	-28.937	0.000
	Trend	ADF	-16.062	0.000	-0.883	0.955	-18.969	0.000
		PP	-16.027	0.000	-12.782	0.000	-30.289	0.000

Maximum lag length is determined by Eviews tools of Akaike criterion for ADF test. Newey-West Bandwidth is automatic selection criterion is chosen to determine the lag length for PP test. Significance intervals are as follows: p<0.01***, p<0.05**, p <0.1*.

Table 4.2: Unit Root ADF and PP Test Results (cont'd)

			Exchange Rates		Real Stock Return		Manufacturing Index	
Country		Test	t-stat.	p-value	t-stat.	p-value	t-stat.	p-value
Colombia	Intercept	ADF	-15.240	0.000	-13.274	0.000	-5.684	0.000
		PP	-15.327	0.000	-13.339	0.000	-32.409	0.000
	Trend	ADF	-15.290	0.000	-13.266	0.000	-5.675	0.000
		PP	-15.330	0.000	-13.325	0.000	-32.378	0.000
Czech Republic	Intercept	ADF	-16.390	0.000	-14.335	0.000	-4.352	0.000
		PP	-16.390	0.000	-14.289	0.000	-27.234	0.000
	Trend	ADF	-16.381	0.000	-14.317	0.000	-4.315	0.003
		PP	-16.381	0.000	-14.270	0.000	-27.613	0.000
Greece	Intercept	ADF	-16.830	0.000	-3.111	0.027	-3.835	0.003
		PP	-16.813	0.000	-15.583	0.000	-35.737	0.000
	Trend	ADF	-16.811	0.000	-3.091	0.111	-3.910	0.013
		PP	-16.794	0.000	-15.669	0.000	-36.001	0.000
Hungary	Intercept	ADF	-8.315	0.000	-17.084	0.000	-6.723	0.000
		PP	-16.525	0.000	-17.234	0.000	-25.818	0.000
	Trend	ADF	-8.374	0.000	-16.938	0.000	-6.853	0.000
		PP	-16.552	0.000	-17.086	0.000	-26.111	0.000
India	Intercept	ADF	-4.048	0.001	-4.863	0.000	-3.817	0.003
		PP	-16.404	0.000	-19.394	0.000	-25.949	0.000
	Trend	ADF	-4.156	0.006	-4.854	0.001	-4.011	0.010
		PP	-16.488	0.000	-19.361	0.000	-26.212	0.000
Indonesia	Intercept	ADF	-4.829	0.000	-3.949	0.002	-4.417	0.000
		PP	-15.362	0.000	-13.615	0.000	-43.779	0.000
	Trend	ADF	-4.900	0.000	-3.936	0.012	-4.415	0.003
		PP	-15.354	0.000	-13.601	0.000	-44.003	0.000
Mexico	Intercept	ADF	-9.295	0.000	-6.730	0.000	-7.511	0.000
		PP	-16.007	0.000	-17.698	0.000	-19.633	0.000
	Trend	ADF	-9.313	0.000	-6.603	0.000	-7.504	0.000
		PP	-16.071	0.000	-17.673	0.000	-19.632	0.000
Philippines	Intercept	ADF	-8.677	0.000	-10.268	0.000	-4.975	0.000
		PP	-15.916	0.000	-16.671	0.000	-13.478	0.000
	Trend	ADF	-8.742	0.000	-10.236	0.000	-14.229	0.000
		PP	-15.917	0.000	-16.634	0.000	-14.222	0.000
Poland	Intercept	ADF	-8.175	0.000	-8.809	0.000	-23.010	0.000
		PP	-15.664	0.000	-16.480	0.000	-22.336	0.000
	Trend	ADF	-15.676	0.000	-8.791	0.000	-22.974	0.000
		PP	-15.674	0.000	-16.443	0.000	-22.307	0.000

Maximum lag length is determined by Eviews tools of Akaike criterion for ADF test. Newey-West Bandwidth is automatic selection criterion is chosen to determine the lag length for PP test. Significance intervals are as follows: p<0.01***, p<0.05**, p <0.1*.

Table 4.2: Unit Root ADF and PP Test Results (cont'd)

Country		Test	Exchange Rates t-stat.	Exchange Rates p-value	Real Stock Return t-stat.	Real Stock Return p-value	Manufacturing Index t-stat.	Manufacturing Index p-value
Russia	Intercept	ADF	-7.154	0.000	-8.532	0.000	-19.659	0.000
		PP	-9.954	0.000	-15.011	0.000	-20.084	0.000
	Trend	ADF	-7.450	0.000	-8.574	0.000	-19.644	0.000
		PP	-10.211	0.000	-14.985	0.000	-20.135	0.000
South Africa	Intercept	ADF	-17.589	0.000	-5.817	0.000	-10.813	0.000
		PP	-17.606	0.000	-12.592	0.000	-28.073	0.000
	Trend	ADF	-17.565	0.000	-5.810	0.000	-10.798	0.000
		PP	-17.582	0.000	-12.575	0.000	-28.033	0.000
South Korea	Intercept	ADF	-16.720	0.000	-7.293	0.000	-18.596	0.000
		PP	-16.715	0.000	-20.384	0.000	-18.596	0.000
	Trend	ADF	-16.709	0.000	-7.247	0.000	-18.661	0.000
		PP	-16.702	0.000	-20.351	0.000	-18.661	0.000
Turkey	Intercept	ADF	-4.381	0.000	-7.559	0.000	-5.099	0.000
		PP	-14.037	0.000	-27.447	0.000	-29.371	0.000
	Trend	ADF	-14.250	0.000	-7.546	0.000	-5.203	0.000
		PP	-14.360	0.000	-27.402	0.000	-29.832	0.000

Maximum lag length is determined by Eviews tools of Akaike criterion for ADF test. Newey-West Bandwidth is automatic selection criterion is chosen to determine the lag length for PP test. Significance intervals are as follows: p<0.01***, p<0.05**, p <0.1*.

Table 4.3: DFGLS Unit Root Test Results

Country		Exchange Rates DFGLS Statistic	Exchange Rates Lag	Real Stock Return DFGLS Statistic	Real Stock Return Lag	Manufacturing Index DFGLS Statistic	Manufacturing Index Lag
Brazil	Intercept	-3.561***	3	2.540**	6	-1.719*	12
	Trend	-3.642***	3	-5.016***	3	-7.565***	3
Chile	Intercept	-15.876***	0	-0.024	11	-1.729*	10
	Trend	-15.981***	0	-1.273	11	-2.760*	10
Colombia	Intercept	-2.812***	13	-3.102***	4	-2.113**	6
	Trend	-15.171***	0	-7.765***	1	-3.538***	6
Czech Republic	Intercept	-7.416***	2	-1.990**	7	0.034	15
	Trend	-7.960***	2	-1.406	7	-1.355	15
Greece	Intercept	-16.811***	0	-0.734	13	-0.960	14
	Trend	-16.831***	0	-1.916	13	-2.142	14
Hungary	Intercept	-1.154	15	-1.922*	12	-4.597***	6
	Trend	-7.290***	2	0.430	12	-6.855***	4

Maximum lag length is determined by Eviews tools of Akaike criterion for DFGLS test. Significance intervals are as follows: p<0.01***, p<0.05**, p <0.1*.

Table 4.3: DFGLS Unit Root Test Results (cont'd)

Country		Exchange Rates		Real Stock Return		Manufacturing Index	
		DFGLS Statistic	Lag	DFGLS Statistic	Lag	DFGLS Statistic	Lag
India	Intercept	-3.883***	14	-2.585**	11	-1.478	10
	Trend	-4.149***	14	-1.602	11	-2.980**	10
Indonesia	Intercept	-4.836***	13	-2.523**	15	-0.427	13
	Trend	-4.877***	13	-2.278*	15	-1.576	13
Mexico	Intercept	-8.891***	3	-0.555	14	-1.592	13
	Trend	-9.301***	3	-1.206	14	-2.766*	13
Philippines	Intercept	-8.591***	2	-9.268***	1	-4.896***	3
	Trend	-8.631***	2	-1.088	16	-5.106***	3
Poland	Intercept	-3.810***	5	-1.053	6	0.328	15
	Trend	-7.383***	2	-2.473	6	-0.757	15
Russia	Intercept	-7.027***	2	-8.309***	13	-0.742	12
	Trend	-7.105***	2	-8.441***	13	-2.307	12
South Africa	Intercept	-17.162***	0	-1.954**	5	-10.100***	2
	Trend	-17.383***	0	-3.376**	3	-10.661***	2
South Korea	Intercept	-4.468***	8	-4.545***	12	-3.750***	5
	Trend	-16.499***	0	-6.158***	11	-11.562***	1
Turkey	Intercept	-2.005**	14	-0.309	16	-1.682*	16
	Trend	-14.204***	0	-1.745	16	-2.973**	15

Maximum lag length is determined by Eviews tools of Akaike criterion for DFGLS test. Significance intervals are as follows: p<0.01***, p<0.05**, p <0.1*.

Table 4.4: Oil Prices Unit Root Results

Variable		Test	t-stat.	p-value/[lag]
OIL	Intercept	ADF	-13.027	0.0000
		PP	-12.484	0.0000
		DFGLS	-9.444***	[1]
	Trend	ADF	-13.007	0.0000
		PP	-13.458	0.0000
		DFGLS	-12.496***	[0]
BOIL	Intercept	ADF	-13.524	0.0000
		PP	-13.062	0.0000
		DFGLS	-2.000**	[10]
	Trend	ADF	-13.504	0.0000
		PP	-13.037	0.0000
		DFGLS	-3.264**	[10]

Maximum lag length is determined by Eviews tools of Akaike criterion for ADF test. Newey-West Bandwidth is automatic selection criterion is chosen to determine the lag length for PP test. Significance intervals are as follows: p<0.01***, p<0.05**, p <0.1*.

4.2 Diagnostic Test Results

Regarding the Toda Yamamoto procedure, the first step of the procedure is to determine the maximum order of integration (m) for each of the variables according to the unit root test results. The second step is to specify the optimum lag length (n) via lag length criteria tool of Eviews utilizing Akaike Information Criterion to select the appropriate lag length. As indicated in Grendenhoff and Karlsson (1997), lag length selection is a crucial issue to discuss and construct a model, since lag length criteria can mislead the model estimations. They compare both Schwarz or Bayesian Information Criterion (SC or BIC) and Akaike Information Criterion (AIC) to determine the appropriate lag length. Their conclusion shows that the true lag length of the model is underestimated if Schwarz criterion is employed and interpretations about the result of the model may not reflect the actual conclusions. When hypothesis testing and interpretations about a model are considered, the model may not provide reliable results with the Schwarz lag length criterion selection. Although lag length specification of a model may not be accurately known whether the exact lag length is selected or not, Akaike Information Criterion (AIC) is indicated to perform better inferences than SC criterion.

Akaike (1974) defines the information criterion (AIC) as follows;

$$\text{AIC} = \frac{-2\log(maximum\ likelihood)+2k}{N}$$

where k is the number of endogenous variables, N is the number of observations.

$$\log(maximum\ likelihood) = -\frac{N}{2}\{k(1+\log 2\pi)+\log|\sum\epsilon|\}$$

in which $|\sum\epsilon|$ is defined as;

$$\left|\sum\epsilon\right| = \det\left(\frac{1}{N-(pk+d)}\sum\epsilon_t\epsilon_t'\right)$$

where p is the lag included, d is exogenous intercept of C and $\sum\epsilon_t\epsilon_t'$ is the sum of the estimates of residuals. Lag length criteria are decided by using Eviews tool and results are indicated in Appendix Table A.6.

The procedure is followed with the VAR stability detection. VAR$(m+n)$ is established to check the stability of the augmented VAR. Roots of the related VARs are monitored to handle the stability condition. VAR equations are established according to the order of integration and supported the lag length criteria. Equations used in the analysis are denoted as below.

First VAR equation is constructed as;

$$\mathrm{EXC} = \sum_{s=1}^{m+n} \alpha_s \mathrm{EXC}_{t-s} + \sum_{s=1}^{m+n} \beta_s \mathrm{OIL}_{t-s} + \sum_{s=1}^{m+n} \gamma_s \mathrm{RSR}_{t-s} + \sum_{s=1}^{m+n} \theta_s \mathrm{MI}_{t-s} + \text{Dummy variable} + \mathrm{C}$$

where $\alpha, \beta, \gamma, \theta$ are the coefficients of variables respectively exchange rates, crude oil prices, real stock returns, and manufacturing indices. m is the maximum order of integration for each of the variables as defined formerly and n is the optimum lag length.

Causality direction from crude oil prices to exchange rates is estimated by verifying joint hypothesis which implies that the first m coefficients of crude oil prices do not equal to zero. Respectively, causality from the real stock return to exchange rates and manufacturing indices to exchange rates proceed with the same framework.

Second VAR equation is constructed as;

$$\mathrm{OIL} = \sum_{s=1}^{m+n} \alpha_s \mathrm{EXC}_{t-s} + \sum_{s=1}^{m+n} \beta_s \mathrm{OIL}_{t-s} + \sum_{s=1}^{m+n} \gamma_s \mathrm{RSR}_{t-s} + \sum_{s=1}^{m+n} \theta_s \mathrm{MI}_{t-s} + \text{Dummy variable} + \mathrm{C}$$

Causality from all variables to crude oil prices to other variables are detected by using this equation and joint hypothesis.

Third VAR equation is constructed as;

$$\mathrm{RSR} = \sum_{s=1}^{m+n} \alpha_s \mathrm{EXC}_{t-s} + \sum_{s=1}^{m+n} \beta_s \mathrm{OIL}_{t-s} + \sum_{s=1}^{m+n} \gamma_s \mathrm{RSR}_{t-s} + \sum_{s=1}^{m+n} \theta_s \mathrm{MI}_{t-s} + \text{Dummy variable} + \mathrm{C}$$

Fourth VAR equation is constructed as;

$$\mathrm{MI} = \sum_{s=1}^{m+n} \alpha_s \mathrm{EXC}_{t-s} + \sum_{s=1}^{m+n} \beta_s \mathrm{OIL}_{t-s} + \sum_{s=1}^{m+n} \gamma_s \mathrm{RSR}_{t-s} + \sum_{s=1}^{m+n} \theta_s \mathrm{MI}_{t-s} + \text{Dummy variable} + \mathrm{C}$$

Breakpoints for each of the VAR equations allow specifying the dummy variables which are added to equations to ensure not to have separate serial correlations in subgroups with the breakpoints and enable them to have a single regression line. Breakpoint determination is used to put dummy variables in the VAR equations and dummy variables are defined to be independent variables of each equation as denoted in VAR equations not to distort the outcomes. Quandt-Andrews breakpoint test is conducted for each of the VAR equations and results are denoted in Table 4.5.

Table 4.5: Break Points of VAR Equations

Countries	Equation	Structural Break Point
Brazil	EQN 1	1999-07
	EQN 2	2000-10
	EQN 3	1999-09
	EQN 4	2009-01
Chile	EQN 1	2008-11
	EQN 2	2002-09
	EQN 3	2009-04
	EQN 4	2013-04
Colombia	EQN 1	2014-11
	EQN 2	2008-08
	EQN 3	2007-05
	EQN 4	2012-11
Czech Republic	EQN 1	2008-08
	EQN 2	2007-09
	EQN 3	2013-01
	EQN 4	2000-02
Greece	EQN 1	2008-08
	EQN 2	2008-10
	EQN 3	2009-08
	EQN 4	1993-11
Hungary	EQN 1	2008-08
	EQN 2	2008-08
	EQN 3	2011-02
	EQN 4	2003-03
Indonesia	EQN 1	1998-03
	EQN 2	2001-10
	EQN 3	2000-11
	EQN 4	1998-04
India	EQN 1	2013-05
	EQN 2	2013-09
	EQN 3	1999-05
	EQN 4	2011-04

Countries	Equation	Structural Break Point
Mexico	EQN 1	1998-01
	EQN 2	1999-01
	EQN 3	1998-10
	EQN 4	2000-08
Philippines	EQN 1	2004-05
	EQN 2	2006-05
	EQN 3	2014-01
	EQN 4	2005-12
Poland	EQN 1	2008-08
	EQN 2	2008-08
	EQN 3	2003-05
	EQN 4	2003-03
Russia	EQN 1	2014-04
	EQN 2	2009-01
	EQN 3	2001-12
	EQN 4	2001-12
South Africa	EQN 1	2002-01
	EQN 2	2007-09
	EQN 3	2003-12
	EQN 4	2008-09
South Korea	EQN 1	1998-01
	EQN 2	1999-04
	EQN 3	1999-08
	EQN 4	2009-02
Turkey	EQN 1	2001-02
	EQN 2	1995-08
	EQN 3	2002-03
	EQN 4	1997-04

Proceeding the stability of the roots and employing VAR equations, Toda Yamamoto procedure is continued with autocorrelation, heteroscedasticity and parameter stability tests to ensure the robustness. Breusch-Godfrey serial correlation LM test is

used to detect whether there is a relationship between the variable and its lagged history. The null hypothesis of Breusch-Godfrey test is as follows;

H_o; There is a serial correlation

The alternate hypothesis is defined as;

H_1; There is no serial correlation

When the probability of Chi-Square is detected to be below 5% significant level, the null hypothesis is rejected. It is deduced that serial correlation is not observed and each variable can be defined independently from each other.

Variance of the residuals may not be distributed proportionally and stability of the equations can be disrupted for this reason. In order to investigate and observe the distribution of the residuals to check the reliability of the estimations, a heteroscedasticity examination is performed. Breusch-Pagan-Godfrey heteroscedasticity test is conducted for each the VAR equation. The null hypothesis of Breusch-Pagan-Godfrey heteroscedasticity test is defined as;

H_o; Residuals are homoscedastic

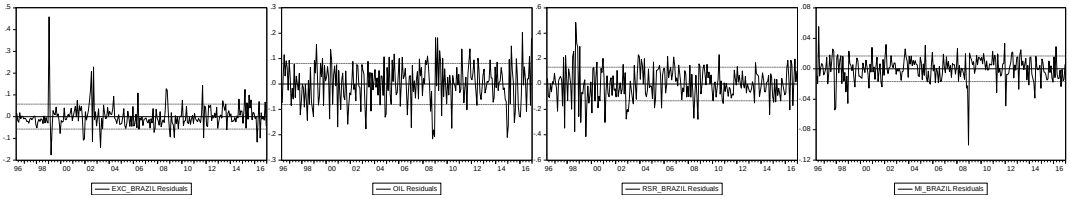
and the alternate hypothesis is defined as;

H_1; Residuals are heteroscedastic

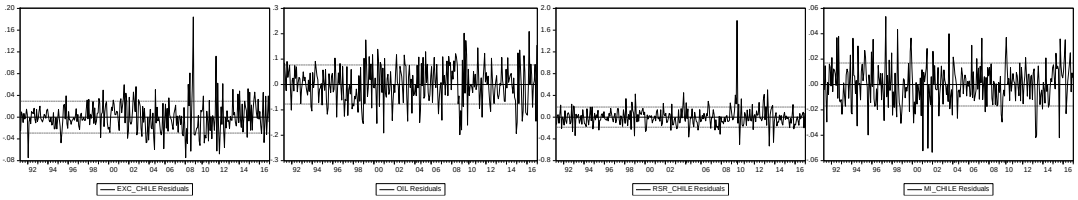
If the probability value of Chi-Square is obtained below 5% significant level, the null hypothesis of having a homoscedastic distribution of the residuals is rejected. Residual Results of the VAR Equations are represented in Appendix Table A.6.

Residual tests are useful to take into account since they provide the difference between the observed (actual) value of the exogenous variable and the expected (fitted) value. Heteroscedasticity problems can be detected with the graphical depictions of the VAR equation residuals. Figure 4.1 presents the residuals of the independent variables for each emerging country.

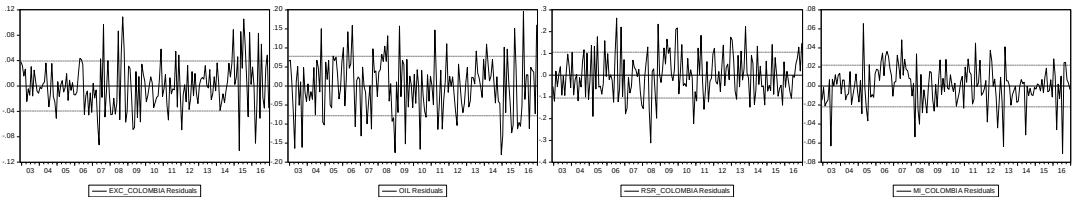
BRAZIL



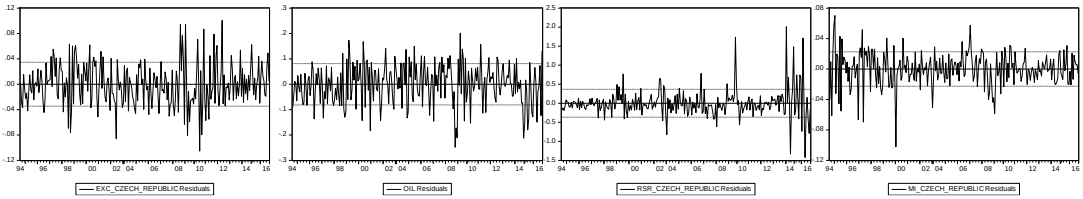
CHILE



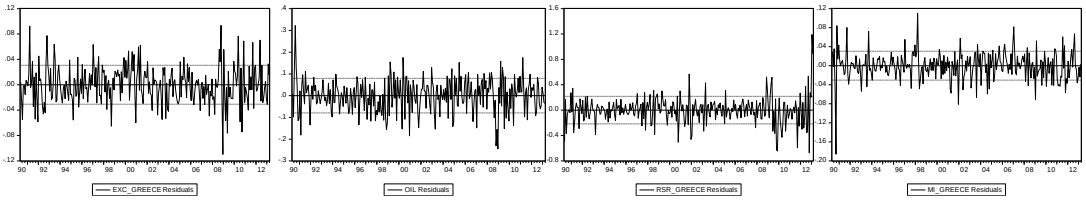
COLOMBIA



CZECH REPUBLIC



GREECE



HUNGARY

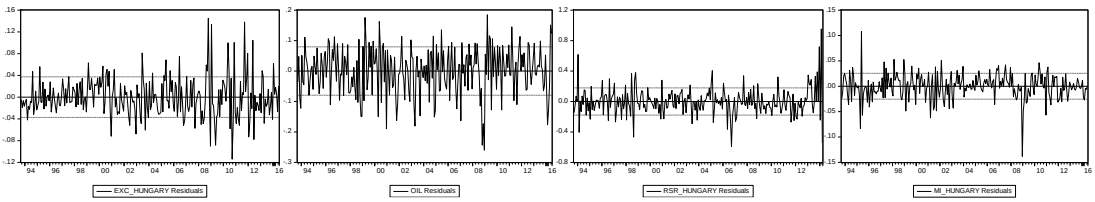
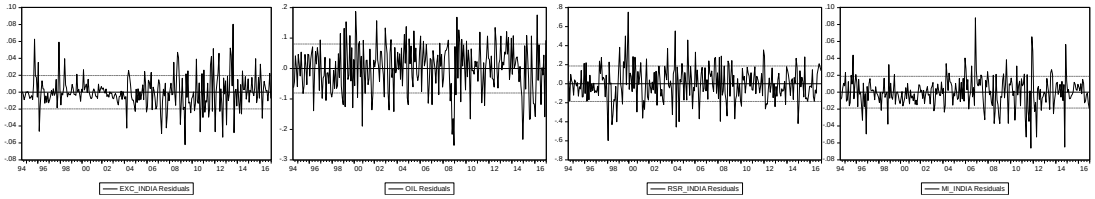
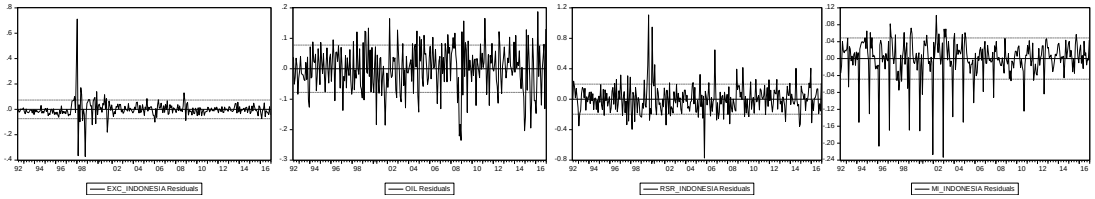


Figure 4.1: Residual Graphs of VAR equations

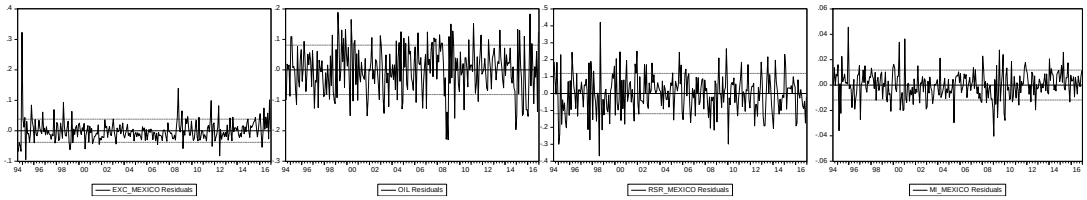
INDIA



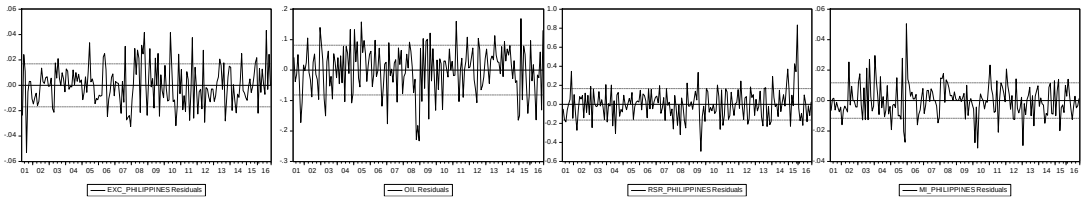
INDONESIA



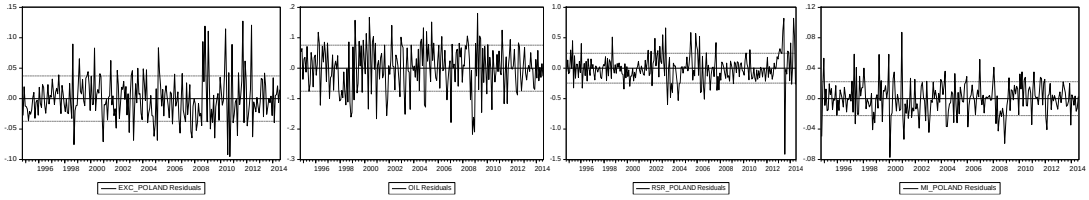
MEXICO



PHILIPPINES



POLAND



RUSSIA

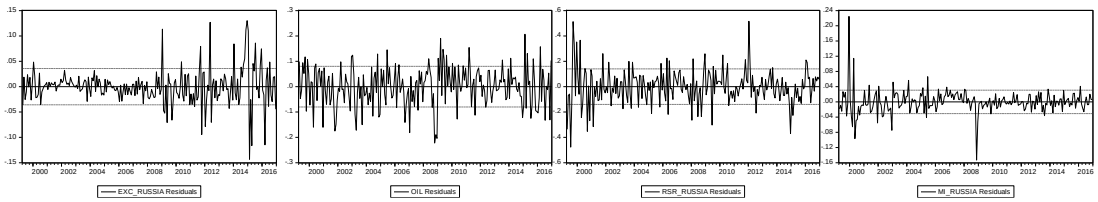
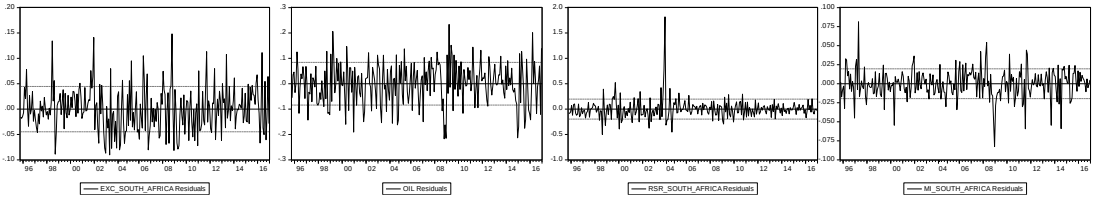
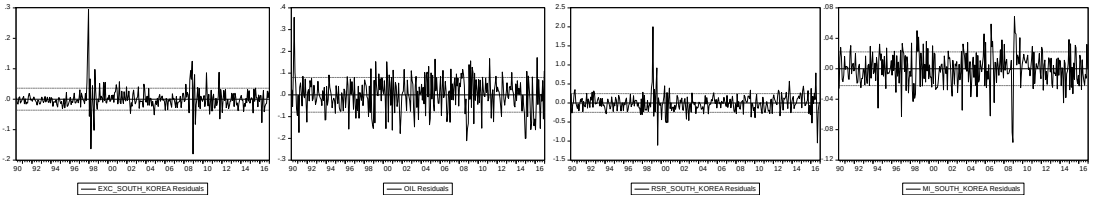


Figure 4.1: Residual Graphs of VAR equations (cont'd)

SOUTH AFRICA



SOUTH KOREA



TURKEY

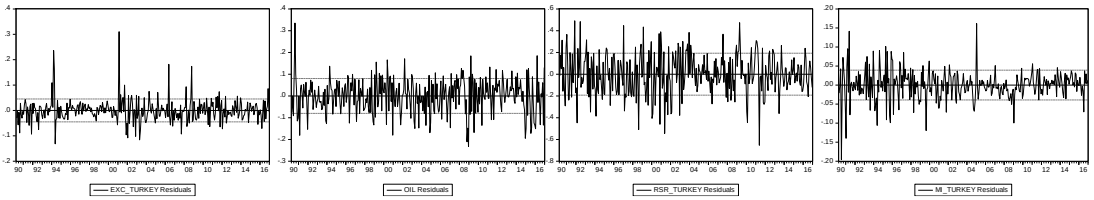


Figure 4.1: Residual Graphs of VAR equations (cont'd)

Evaluation of the results exhibits that there exist autocorrelation and heteroscedasticity problems in most of the VAR equations which cause to have a tendency to interpret the outcomes in a biased manner or proceed with an inefficient estimation of parameters. Huber-White and Newey-West estimators are utilized to derive more robust error variances.

Huber (1967) demonstrates the consistency of the standard errors in a maximum likelihood to fit the model in asymptotic normality. The study of White (1980) about heteroscedasticity issue completes the paper of Huber. White (1980) aims to provide an alternative estimation to the covariance matrix to be able to handle with misleading interpretation due to heteroscedasticity. Even though it is not possible to remove the heteroscedasticity factor completely from the model, combined approaches allow having a more proper implication about the results. Whenever the heteroscedasticity

problem arises for time series, the coefficient covariance method tool in Eviews is selected to employ the Huber-White estimation.

Regression equations those exposed to autocorrelation problems also have a tendency to give distorted inferences about the results. Newey and West (1987) suggest estimators to overcome autocorrelation by providing a more consistent covariance matrix of the standard errors. For these cases, HAC (Newey-West) covariance method is selected to proceed with more appropriate interpretations.

Parameter stability tests are conducted by Cumulative Sum (CUSUM) and Cumulative Sum of Squares tests to detect if the parameters are changing systematically or abruptly. Results of all the mentioned diagnostic tests are stated in Appendix Table A.8.

4.3 Wald Test Results

Causality relations which are examined according to the Toda Yamamoto procedure in both directions are analyzed based on the Wald test results provided in Table 4.6. Summary tables for each of these relations are also reported in Appendix Table A.9.

The null hypothesis for Wald coefficient tests to detect the causality between each variable is as follows;

H_0; first m parameters of other variable are equal to zero

and the alternative hypothesis is defined as;

H_1; first m parameters of other variable are not equal to zero

Causality relations those having Chi-square probability value below 5% significant level are considered to be statistically significant. The defined null hypothesis of the Wald coefficient test is rejected which implies that first m parameters of other variables are not equal to zero. Wald test result for the tested variable and country concluded that causality relation between two variables exists.

Since emerging countries hold dependent economies to foreign sources, having close relations with foreign investors is regarded as an opportunity for the development of a country. Regarding the economic dependence, it is expected that a shock in exchange rate can be received with a change in other variables conducted for this study. Furthermore, industry of the emerging countries can rely on mostly oil-dependent companies. As the result of this dependence, it is anticipated that there exists a strong relationship between oil prices and the production both from oil prices to production and from production to oil prices.

As reported in Table 4.6, Wald coefficient test results revealed that the strongest causality relationship is observed between exchange rates and manufacturing indices in the direction of exchange rates to manufacturing indices. Eight emerging countries namely Brazil, Colombia, Indonesia, Mexico, Philippines, Poland, South Korea, and Turkey supports causality claim with the significant probability values. Nevertheless, Colombia, India and South Korea are the only countries in the reverse direction mostly standing at the 1% significant level.

Furthermore, causality from manufacturing indices to oil prices is observed to be the second strongest linkage with six emerging countries when the general picture about the outcomes are evaluated. Brazil, Chile, Mexico, Poland, Russia, and South Korea exhibit meaningful causality relations for the indicated direction. In the reverse direction from crude oil prices to manufacturing indices, five emerging countries namely Brazil, Hungary, Philippines, Poland, and Russia appear to have a close relationship between the variables in the mentioned direction. On the contrary, few relationships between the variables show statistically insignificant or weaker outcomes. None of the emerging countries is estimated to be meaningful for the causality from manufacturing indices to real stock returns. Conversely, only Indonesia show a considerable linkage from real stock returns to manufacturing indices at 5% significant level.

Meaningful linkage from crude oil prices to exchange rates is observed only for South Africa; however, in the reverse direction, which is defined as the causality from exchange rates to crude oil prices, emerging countries Brazil, Colombia, Greece, Russia and South Korea are observed to have meaningful relations in the long-run.

Additionally, Poland is found to be the unique country to be evidenced to have a causal relation from real stock returns to exchange rates at 5% significant level. Whereas, in the opposite direction, 4 emerging countries indicate a statistically significant causal relationship from exchange rates to real stock returns, which are evidenced as Brazil, Indonesia, Mexico, and South Korea. These empirical results and claims are confirmed with the work of Chkili and Nguyen (2014) for the BRICS countries proving the statement that real stock returns are not affected by exchange rate changes.

Last causal relation considered between real stock returns and crude oil prices can be explained in the same framework. Linkage among emerging countries is observed with the causal direction from crude oil prices to real stock returns at the 5% significant level of Wald test result only for South Korea. Remaining emerging countries do not contribute to the results with a potential causality relation. Results are consistent with the analysis of Sarı and Soytaş (2006) conducted primarily for Turkey that oil price shocks do not contribute to explain the change in the real stock returns. On the other hand, real stock returns are evidenced to be meaningful to cause crude oil prices at 5% significant level for three emerging countries. Causality results of India, Indonesia, and Turkey confirm the relation in the long-run.

Table 4.6: Wald Test Causality Results

	CAUSALITY BETWEEN EXC AND RSR				CAUSALITY BETWEEN EXC AND OIL				CAUSALITY BETWEEN RSR AND OIL			
	From EXC to RSR		From RSR to EXC		From EXC to OIL		From OIL to EXC		From RSR to OIL		From OIL to RSR	
Country	F-stat.	p-value	F-stat.	p-value	F-stat.	p-value	F-stat.	p-value	F-stat.	p-value	F-stat.	p-value
Brazil	4.045	0.019	0.213	0.808	4.647	0.011	2.721	0.068	0.291	0.748	1.559	0.213
Chile	2.114	0.123	0.209	0.812	2.668	0.071	0.877	0.417	2.339	0.098	2.068	0.128
Colombia	1.951	0.124	0.356	0.785	4.558	0.004	0.461	0.710	1.494	0.219	0.543	0.654
Czech Republic	1.499	0.226	0.276	0.759	1.904	0.151	2.086	0.127	0.376	0.687	0.571	0.566
Greece	0.919	0.432	0.130	0.942	2.642	0.050	1.756	0.156	0.386	0.763	0.218	0.884
Hungary	0.936	0.394	0.436	0.647	2.600	0.076	0.885	0.414	1.037	0.356	2.424	0.091
India	1.081	0.358	1.282	0.281	1.389	0.247	0.862	0.461	3.500	0.016	0.565	0.638
Indonesia	3.115	0.006	1.526	0.170	0.852	0.531	1.882	0.084	2.493	0.023	0.187	0.980
Mexico	2.970	0.013	0.474	0.795	1.190	0.315	1.415	0.219	1.629	0.153	1.165	0.327
Philippines	0.913	0.436	0.205	0.893	0.843	0.472	0.882	0.452	0.280	0.840	1.957	0.123
Poland	0.961	0.384	5.416	0.005	2.162	0.118	1.851	0.160	0.937	0.394	1.975	0.141
Russia	1.454	0.236	1.326	0.268	7.722	0.001	1.881	0.155	0.736	0.481	0.599	0.550
South Africa	0.866	0.422	1.293	0.276	1.497	0.226	5.018	0.007	0.769	0.465	2.608	0.076
South Korea	3.305	0.021	0.523	0.667	4.128	0.007	1.208	0.307	0.621	0.602	3.302	0.021
Turkey	0.138	0.871	1.500	0.225	0.525	0.592	0.600	0.550	3.311	0.038	0.171	0.843

Table 4.6: Wald Test Causality Results (cont'd)

	CAUSALITY BETWEEN RSR AND MI				CAUSALITY BETWEEN MI AND OIL				CAUSALITY BETWEEN MI AND EXC			
	From RSR to MI		From MI to RSR		From MI to OIL		From OIL to MI		From MI to EXC		From EXC to MI	
Country	F-stat.	p-value	F-stat.	p-value	F-stat.	p-value	F-stat.	p-value	F-stat.	p-value	F-stat.	p-value
Brazil	1.673	0.190	0.590	0.555	5.798	0.004	5.674	0.004	1.263	0.285	6.493	0.002
Chile	1.671	0.190	1.747	0.176	6.364	0.002	1.708	0.183	0.421	0.657	2.704	0.069
Colombia	1.118	0.344	0.752	0.523	0.853	0.467	2.484	0.063	3.311	0.022	3.775	0.012
Czech Republic	0.108	0.898	1.415	0.245	0.125	0.882	1.465	0.233	0.823	0.440	0.740	0.478
Greece	0.124	0.946	2.395	0.069	0.577	0.631	1.901	0.130	0.199	0.897	0.429	0.733
Hungary	0.893	0.411	0.304	0.738	0.464	0.629	4.099	0.018	2.065	0.129	0.233	0.792
India	1.346	0.260	0.729	0.536	1.049	0.371	1.156	0.327	5.196	0.002	2.425	0.066
Indonesia	2.593	0.019	1.876	0.085	1.383	0.222	0.697	0.652	1.213	0.300	2.951	0.008
Mexico	2.115	0.064	0.097	0.993	2.787	0.018	1.039	0.396	1.987	0.081	3.593	0.004
Philippines	1.060	0.368	0.634	0.594	1.411	0.241	13.387	0.000	0.329	0.804	2.874	0.038
Poland	0.598	0.551	0.376	0.687	4.613	0.011	3.773	0.025	2.103	0.125	3.047	0.050
Russia	0.983	0.376	1.321	0.269	6.415	0.002	4.332	0.014	2.370	0.096	1.939	0.147
South Africa	0.485	0.616	0.923	0.399	0.747	0.475	2.429	0.090	1.176	0.310	1.694	0.186
South Korea	0.258	0.855	2.386	0.069	2.806	0.040	1.512	0.211	4.124	0.007	3.201	0.024
Turkey	1.766	0.173	0.367	0.693	0.263	0.769	1.207	0.301	0.386	0.680	4.993	0.007

4.4 Impulse Response Results

Besides to analysis of causality linkages, as discussed in Lüktepohl (2005), impulse response analysis provides the general picture of the dependences of the variables to each other. Impulse response function is employed for each country to observe how one variable affects others and how reaction changes over time the horizon.

Impulse response results are reported in Figure 4.2 for the emerging countries. Although the response of crude oil prices to real stock returns is positively plotted for all the countries conducted except for Brazil and the Philippines, causality results are estimated to be insignificant. Only South Korea is found to be statistically significant by holding the causality relation. The initial response of Brazil to the same impulse impacts negatively and the response turns to be positive in period 4. Similarly, in the case of the Philippines, initial response starts in the negative region and changes its direction in period 7.

Responses of crude oil prices to exchange rates are observed to be positive assisting to explain the causal relationship between the denoted variables in the long-run. South Africa is the only emerging country having an analysis of causality relation that is evidenced to be significant. Despite its close relationship between crude oil prices and exchange rates, responses of oil prices are observed to be negative as time period progresses.

Remarkably, Wald coefficient test results state that meaningful causal relations are not estimated between manufacturing indices and real stock returns in the long-run however response of real stock return to manufacturing indices changes varies from country to country. Any shock in manufacturing indices is received with a negative response for the countries Greece and the Philippines. On the other hand, responses of India, Mexico, Russia, South Africa, South Korea and Turkey are captured to be positive to real stock returns. Plotted graphs show that responses alter their directions in the confidence intervals for the remaining countries. Initial response of Brazil changes its direction to positive in the second period. Similar frameworks are observed in Chile, Hungary, and Turkey but they change their direction of the responses in different periods respectively in period 3, period 4 and period 6. Positive

impact of Colombia alters its direction two times in the second time horizon. Similarly, real stock returns responses to any unanticipated shock in any manufacturing indices of Poland start on the positive side and changes its direction two times in period 3. As indicated in Figure 4.2, responses of Indonesia begin its path in negative and immediately turn to positive in period 1. In period 5, responses alter two times and continue its path on the positive side over the time horizon.

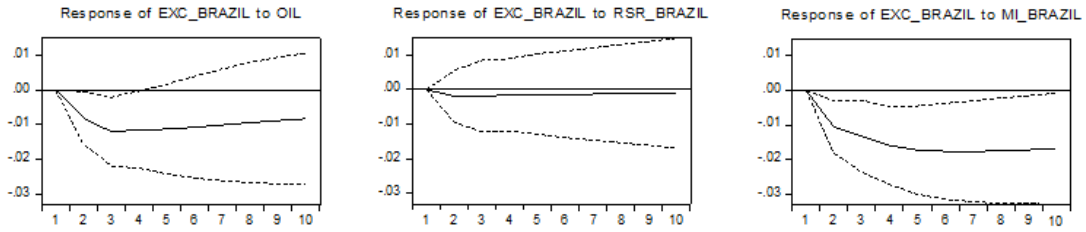
4.5 Robustness Checks

Conclusions derived from the defined variables are performed with crude oil brent prices once more in order to verify analysis whether outcomes and inferences are handled in the right manner. Outputs of robustness checks are monitored mostly consistent with the analysis first handled. Causality results and the summary relation tables estimated with Brent Crude oil prices are presented in the Appendix B.

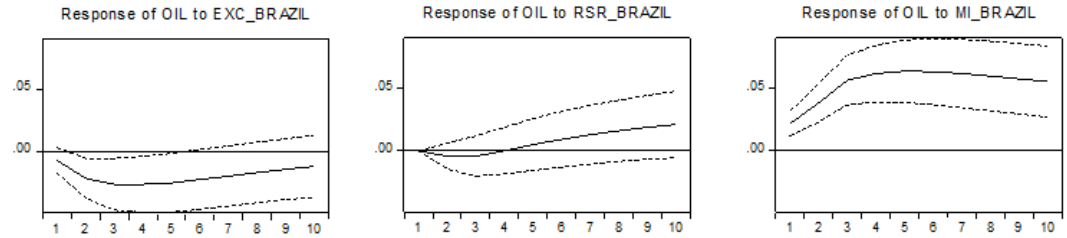
Conducting the relationship between Crude oil Brent prices and exchange rates, causality from Brent prices to exchange rates results holds for all the countries as in the test of crude oil prices. Causality from real stock returns to exchange rates keeps having a weak relationship claim with the former argument. Statement that draws a conclusion as no strong relationship between real stock returns and crude oil prices occurs is found to be valid also for Crude oil Brent prices. Besides, the linkage between manufacturing indices and Crude oil Brent prices maintain as interpreted for most of the countries but the results of Colombia, Mexico, and South Korea indicate the opposite claim. Outcomes of the causality between real stock return and manufacturing indices are not distinguished from the oil prices results due to the consistency.

BRAZIL

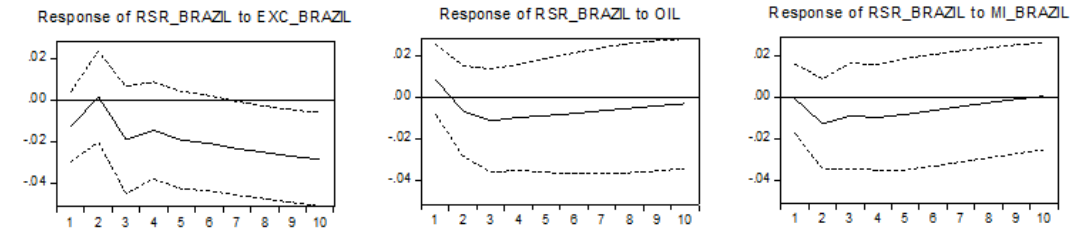
Responses of Exchange Rates;



Responses of Crude Oil Prices;



Responses of Real Stock Returns;



Responses of Manufacturing Indices;

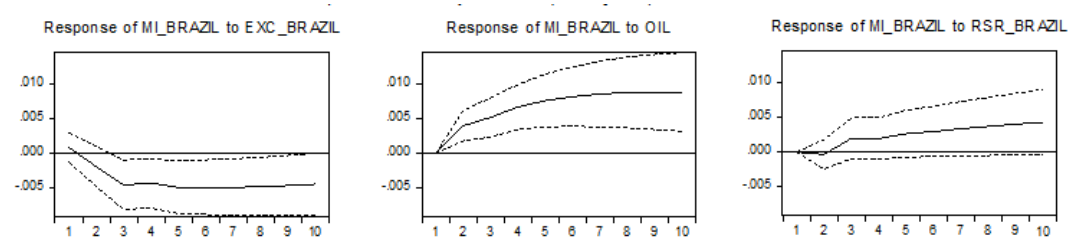
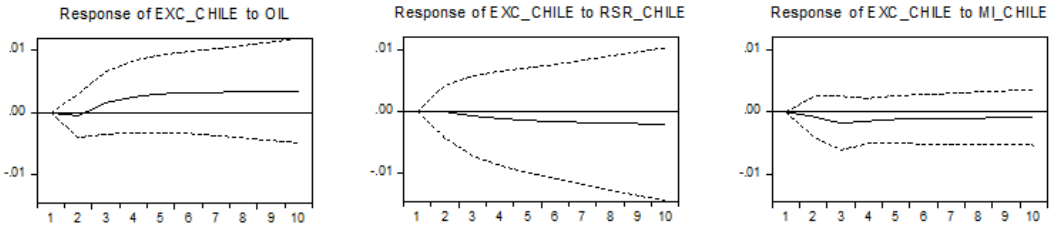


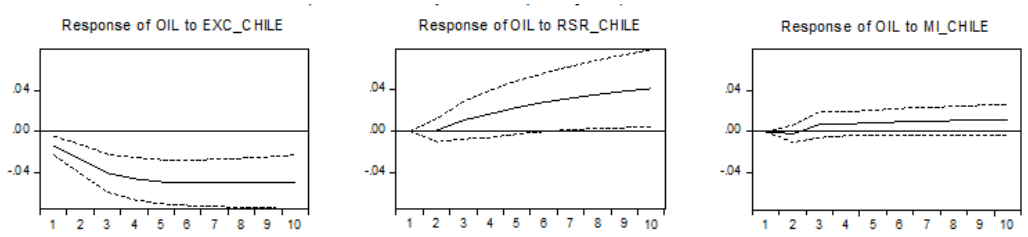
Figure 4.2: Impulse Responses

CHILE

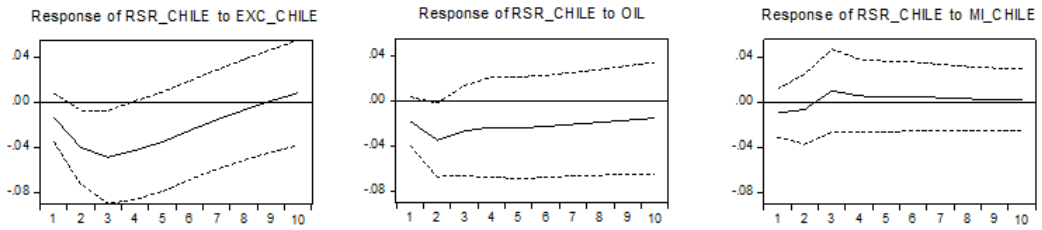
Responses of Exchange Rates;



Responses of Crude Oil Prices;



Responses of Real Stock Returns;



Responses of Manufacturing Indices;

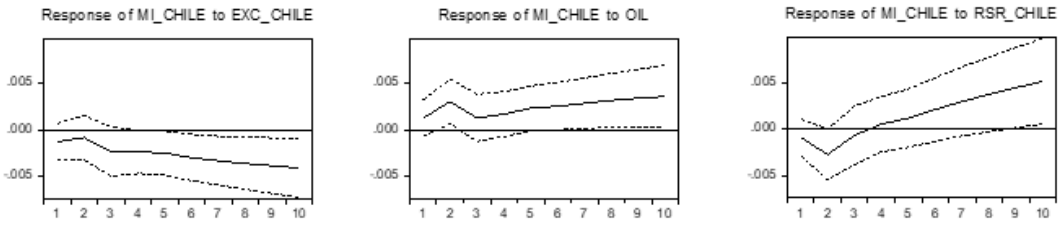
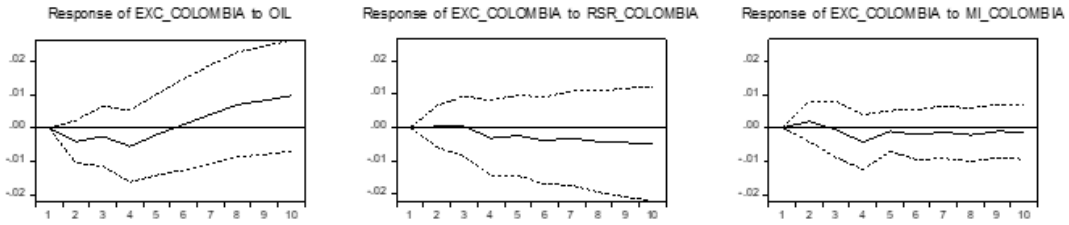


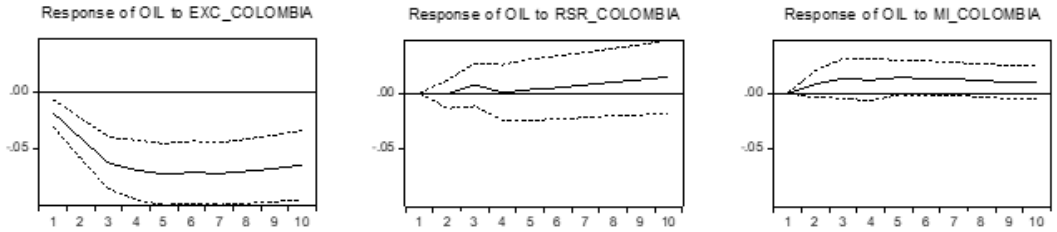
Figure 4.2: Impulse Responses (cont'd)

COLOMBIA

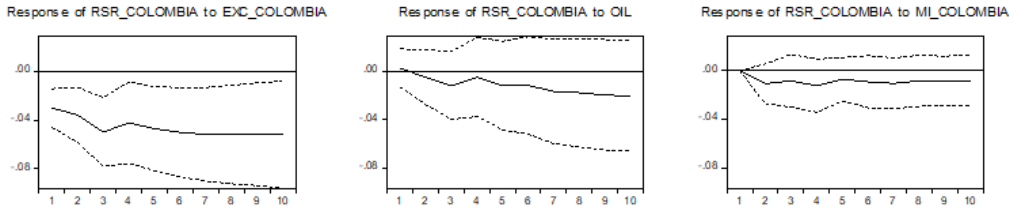
Responses of Exchange Rates;



Responses of Crude Oil Prices;



Responses of Real Stock Returns;



Responses of Manufacturing Indices;

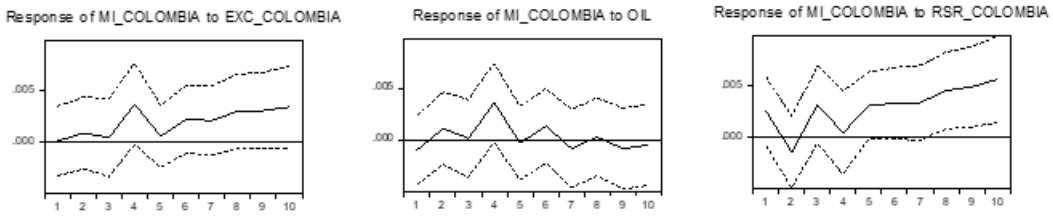
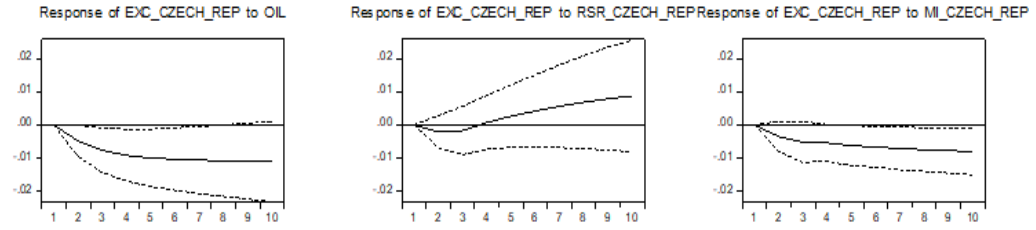


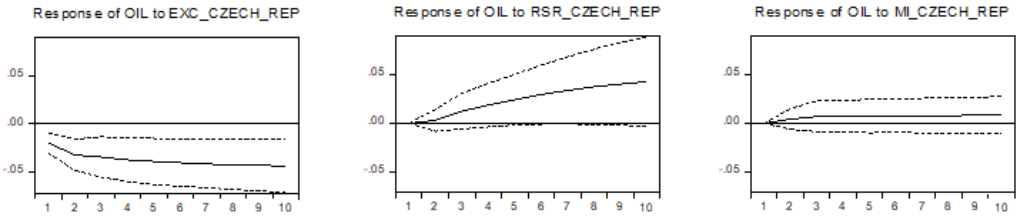
Figure 4.2: Impulse Responses (cont'd)

CZECH REPUBLIC

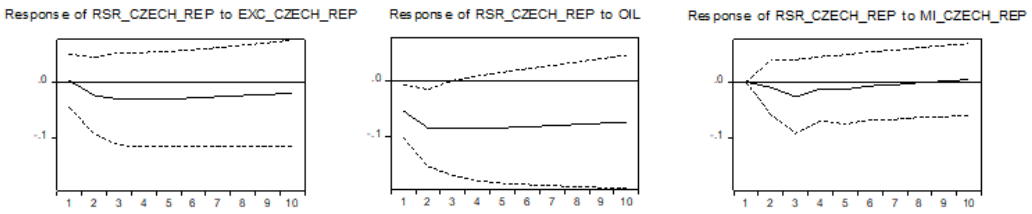
Responses of Exchange Rates;



Responses of Crude Oil Prices;



Responses of Real Stock Returns;



Responses of Manufacturing Indices;

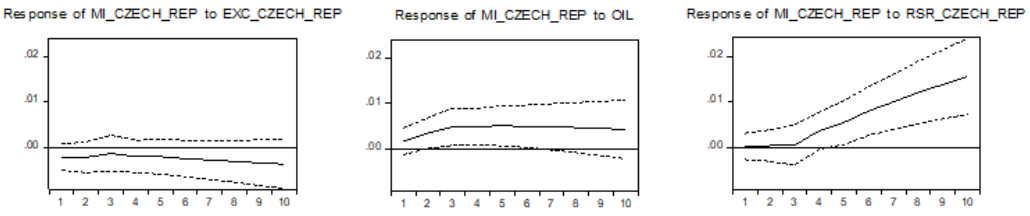
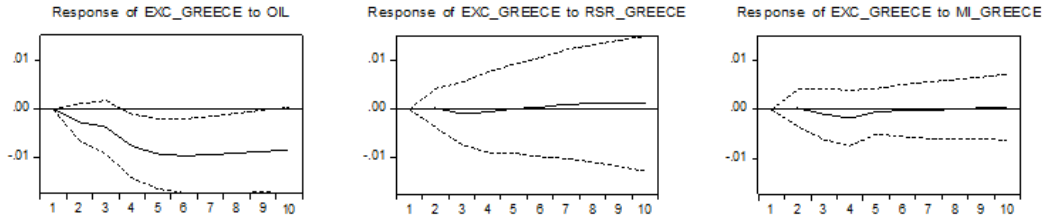


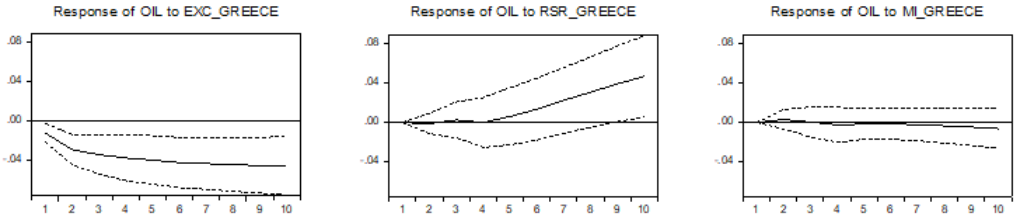
Figure 4.2: Impulse Responses (cont'd)

GREECE

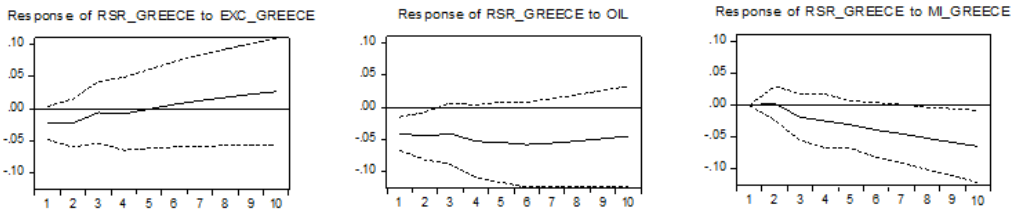
Responses of Exchange Rates;



Responses of Crude Oil Prices;



Responses of Real Stock Returns;



Responses of Manufacturing Indices;

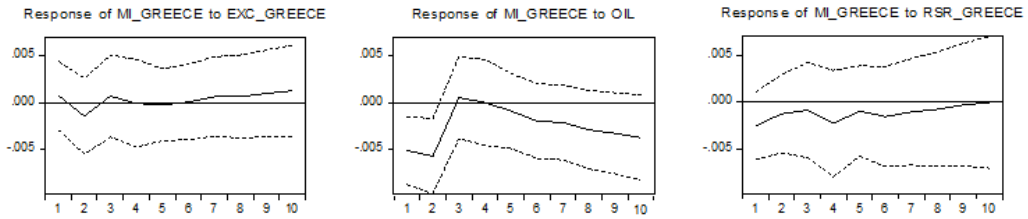
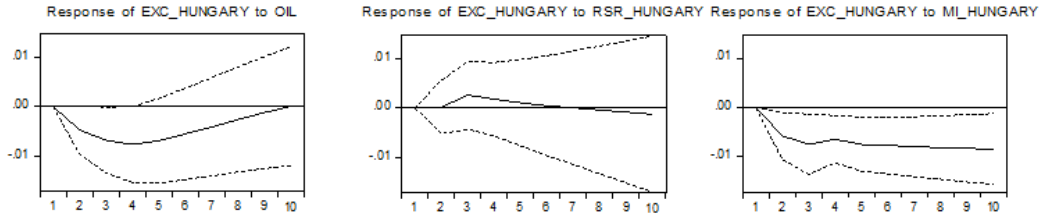


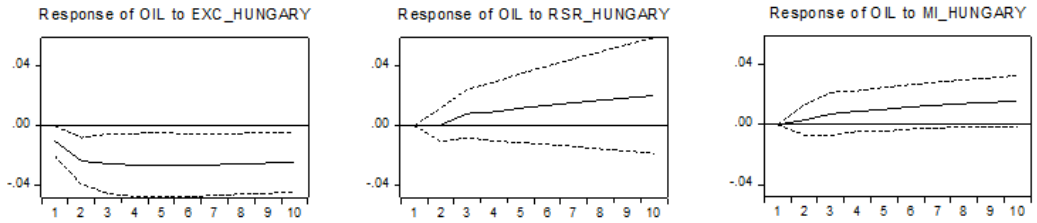
Figure 4.2: Impulse Responses (cont'd)

HUNGARY

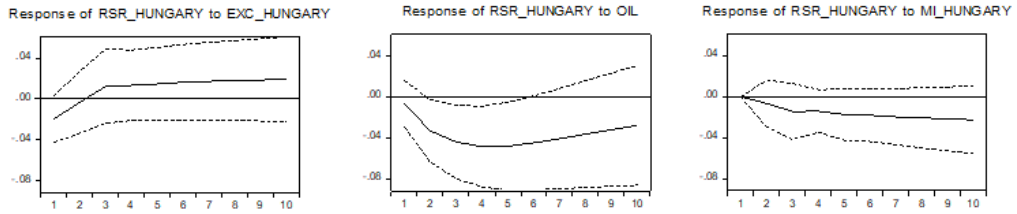
Responses of Exchange Rates;



Responses of Crude Oil Prices;



Responses of Real Stock Returns;



Responses of Manufacturing Indices;

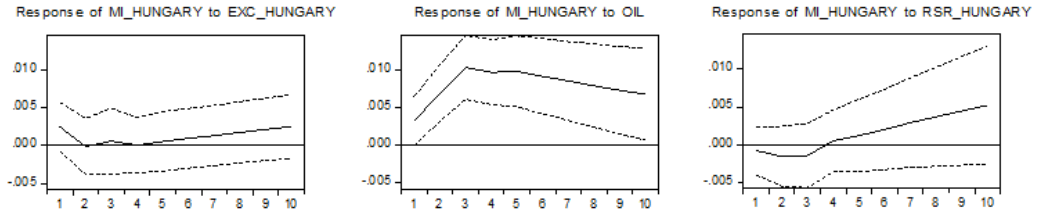
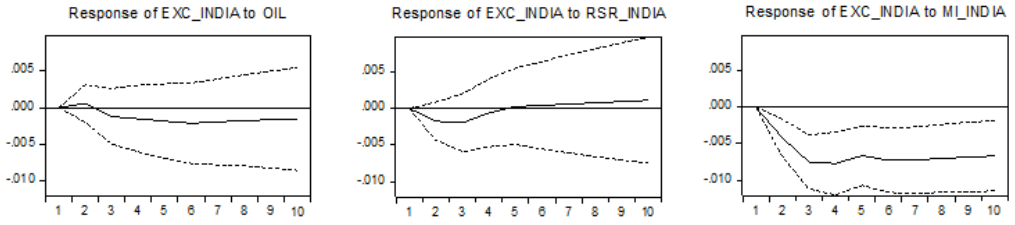


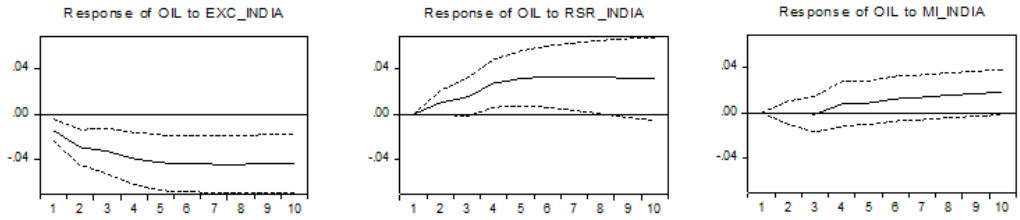
Figure 4.2: Impulse Responses (cont'd)

INDIA

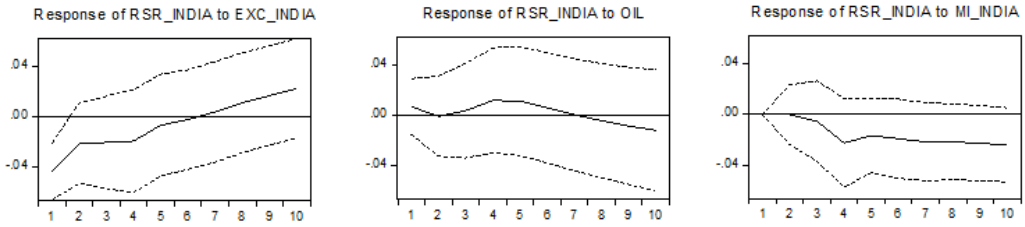
Responses of Exchange Rates;



Responses of Crude Oil Prices;



Responses of Real Stock Returns;



Responses of Manufacturing Indices;

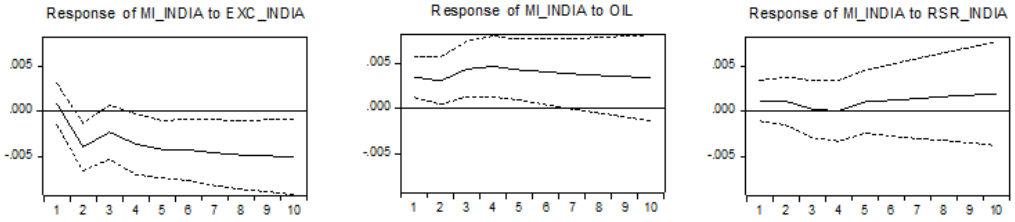
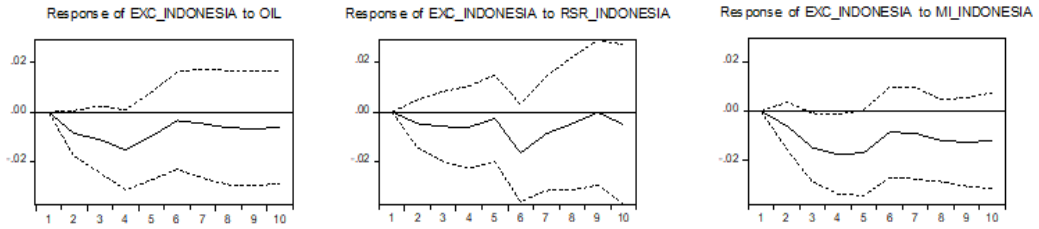


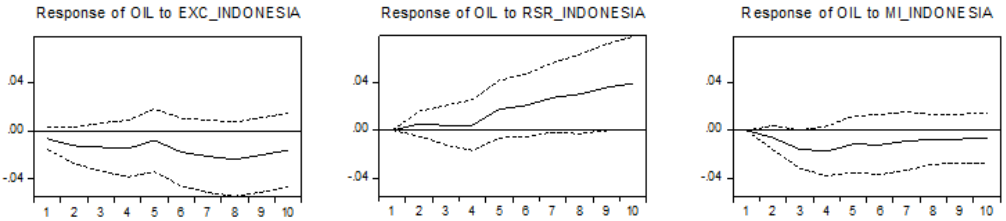
Figure 4.2: Impulse Responses (cont'd)

INDONESIA

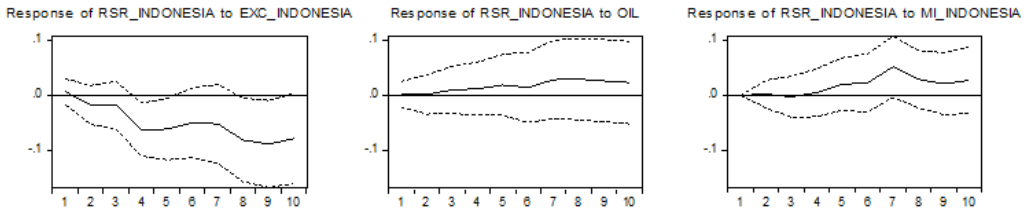
Responses of Exchange Rates;



Responses of Crude Oil Prices;



Responses of Real Stock Returns;



Responses of Manufacturing Indices;

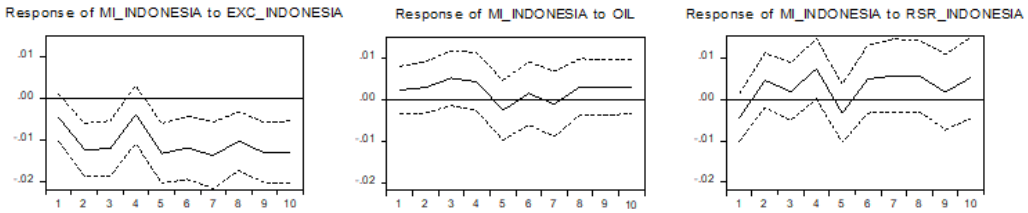
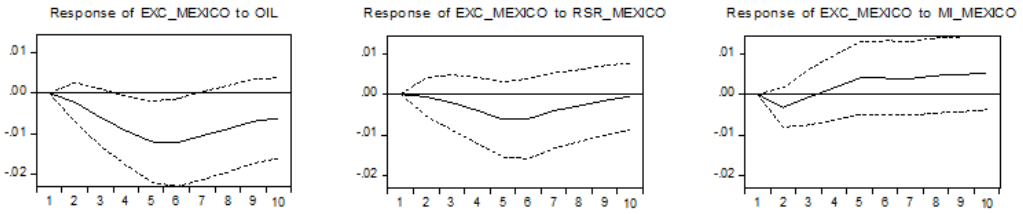


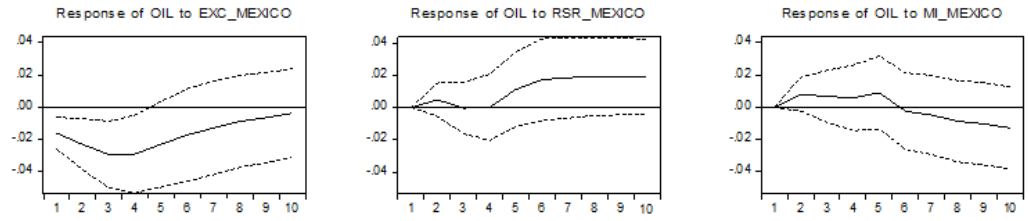
Figure 4.2: Impulse Responses (cont'd)

MEXICO

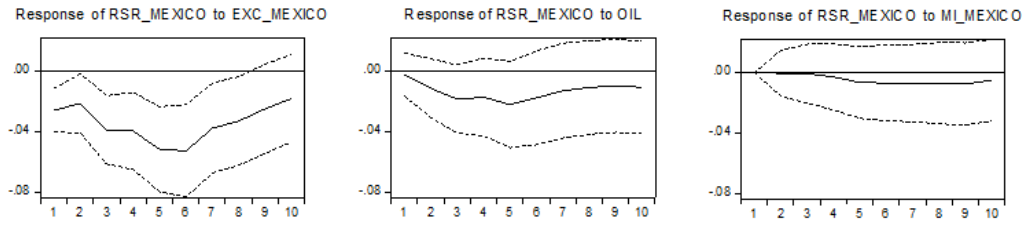
Responses of Exchange Rates;



Responses of Crude Oil Prices;



Responses of Real Stock Returns;



Responses of Manufacturing Indices;

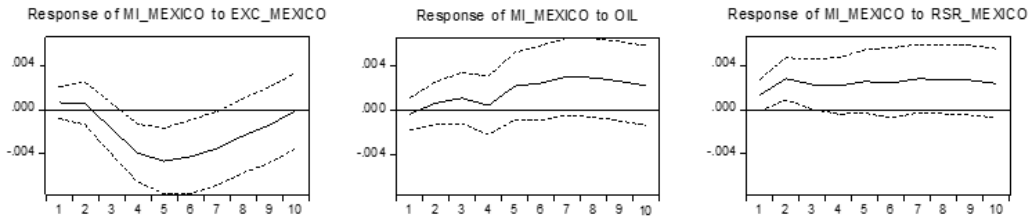
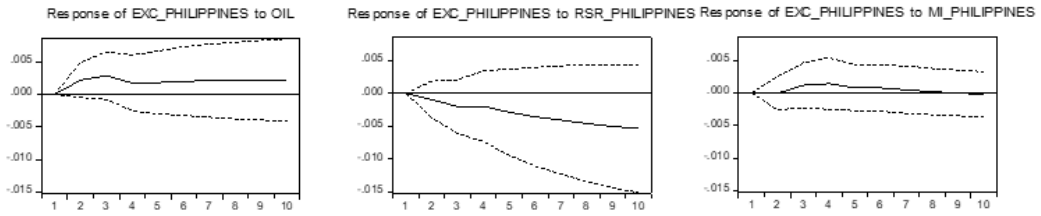


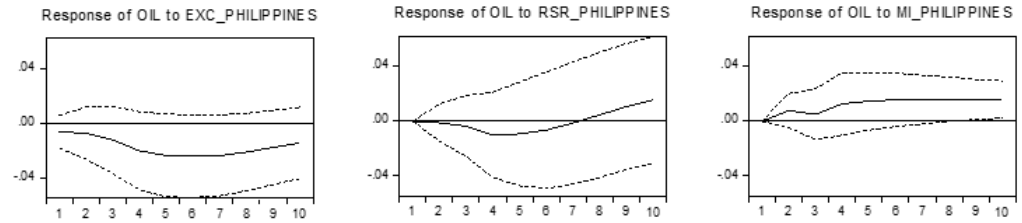
Figure 4.2: Impulse Responses (cont'd)

PHILIPPINES

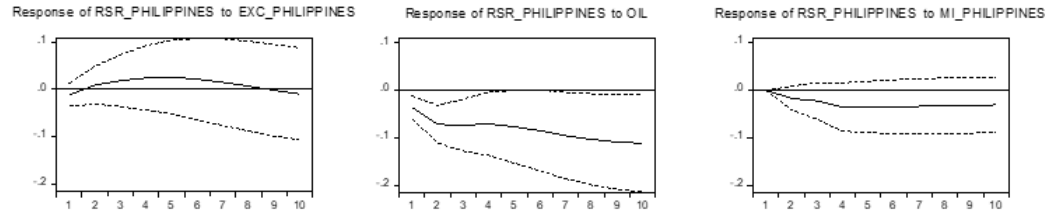
Responses of Exchange Rates;



Responses of Crude Oil Prices;



Responses of Real Stock Returns;



Responses of Manufacturing Indices;

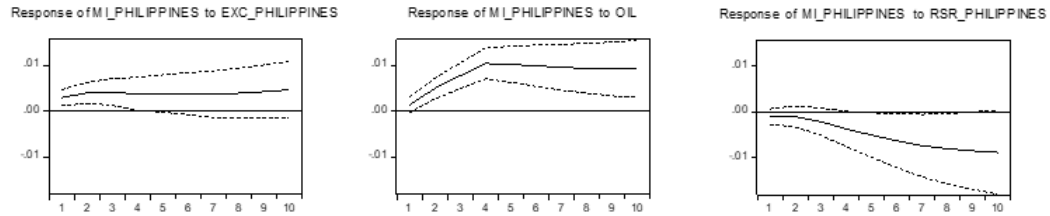
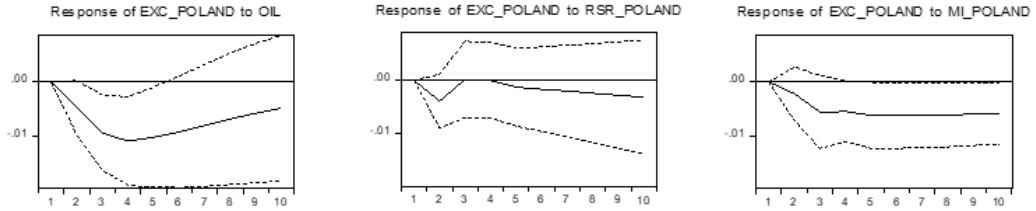


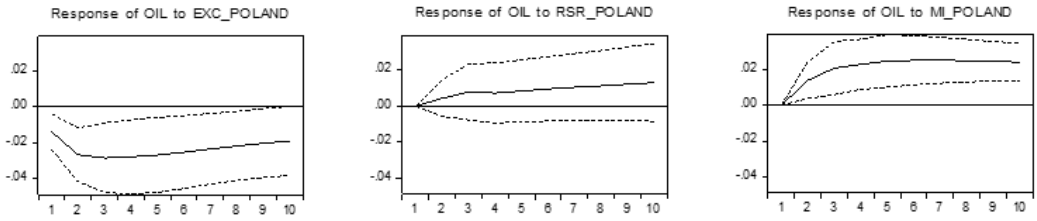
Figure 4.2: Impulse Responses (cont'd)

POLAND

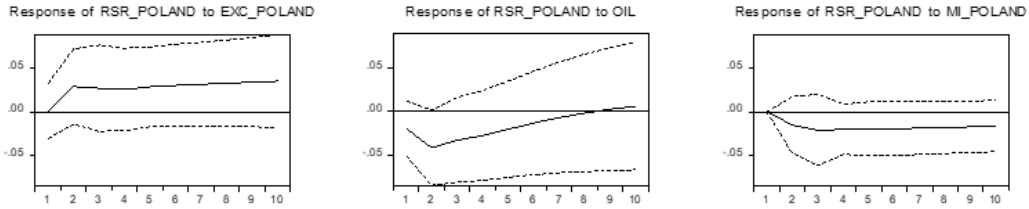
Responses of Exchange Rates;



Responses of Crude Oil Prices;



Responses of Real Stock Returns;



Responses of Manufacturing Indices;

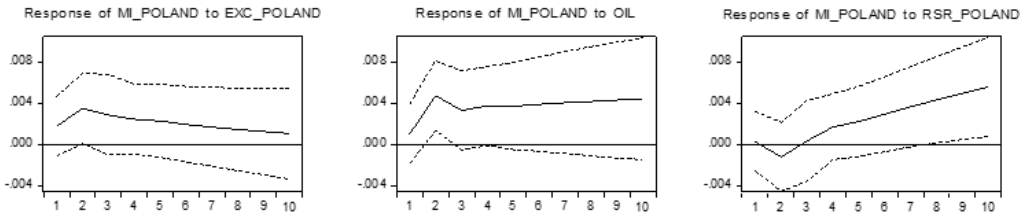
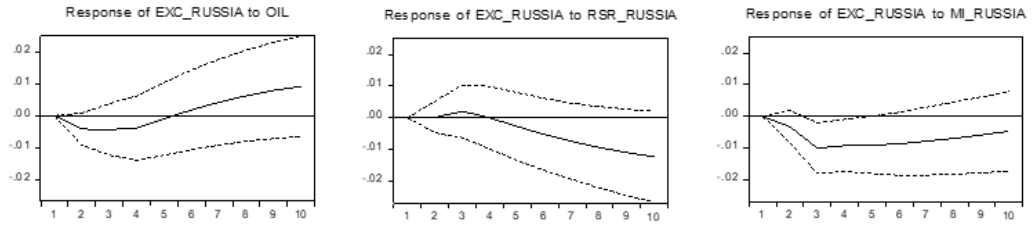


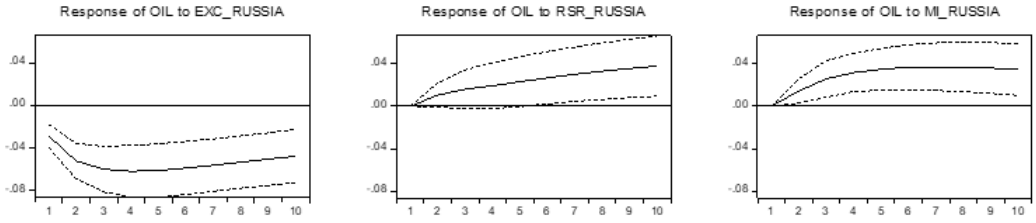
Figure 4.2: Impulse Responses (cont'd)

RUSSIA

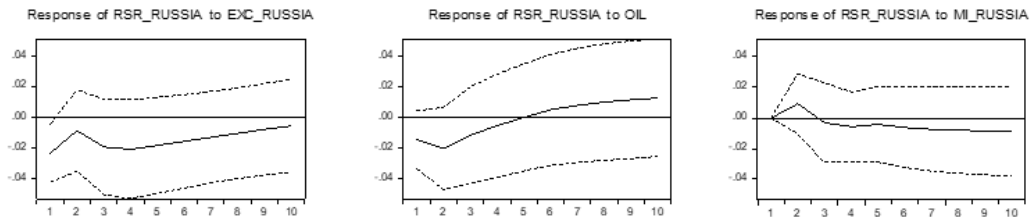
Responses of Exchange Rates;



Responses of Crude Oil Prices;



Responses of Real Stock Returns;



Responses of Manufacturing Indices;

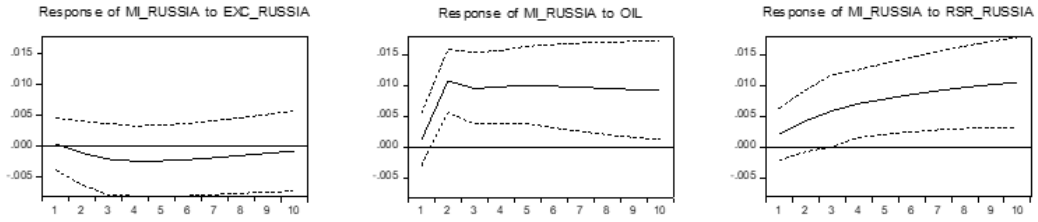
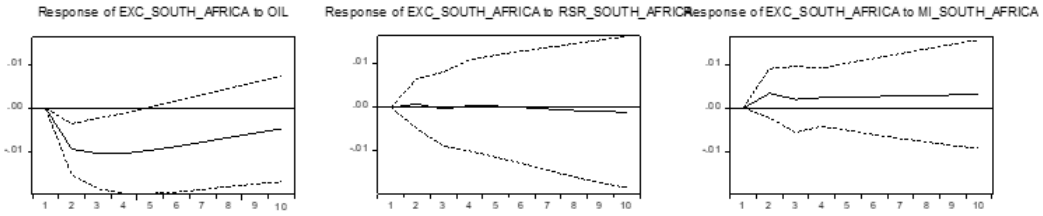


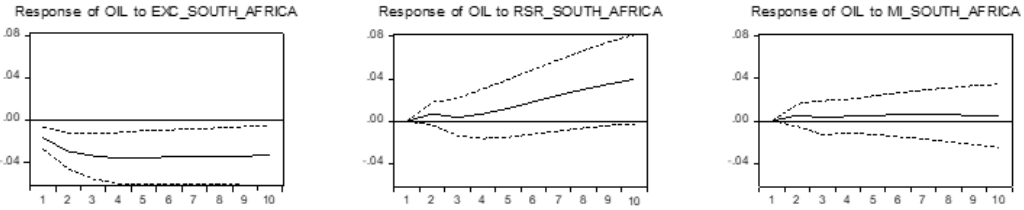
Figure 4.2: Impulse Responses (cont'd)

SOUTH AFRICA

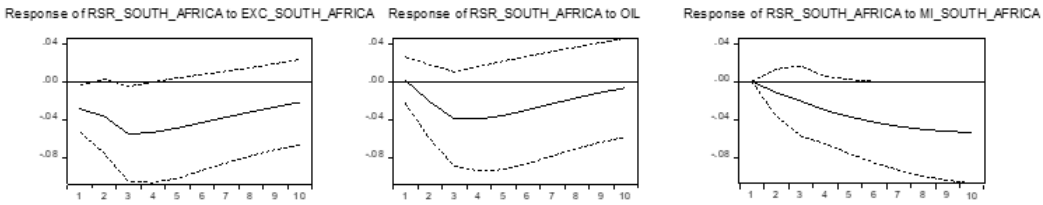
Responses of Exchange Rates;



Responses of Crude Oil Prices;



Responses of Real Stock Returns;



Responses of Manufacturing Indices;

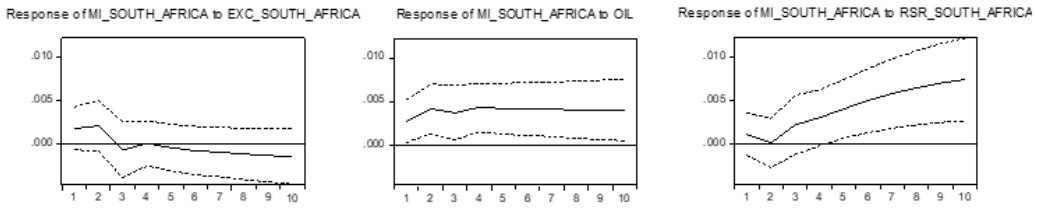
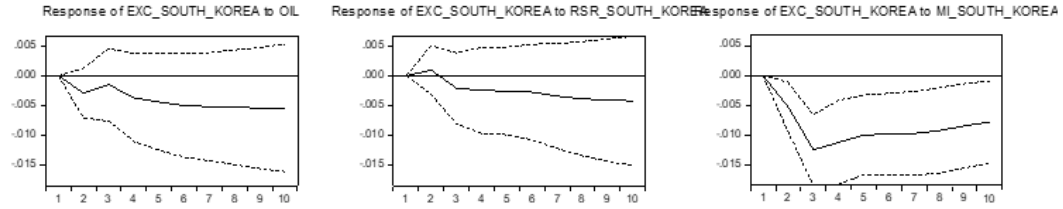


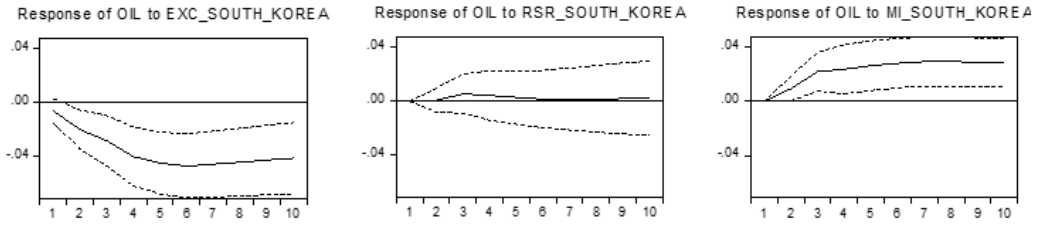
Figure 4.2: Impulse Responses (cont'd)

SOUTH KOREA

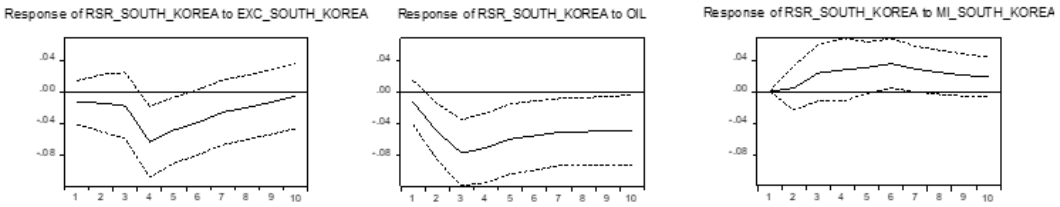
Responses of Exchange Rates;



Responses of Crude Oil Prices;



Responses of Real Stock Returns;



Responses of Manufacturing Indices;

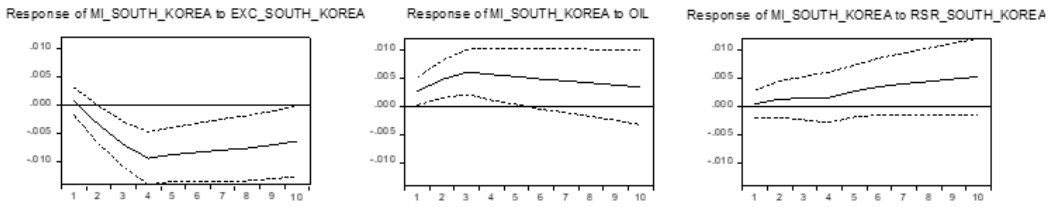
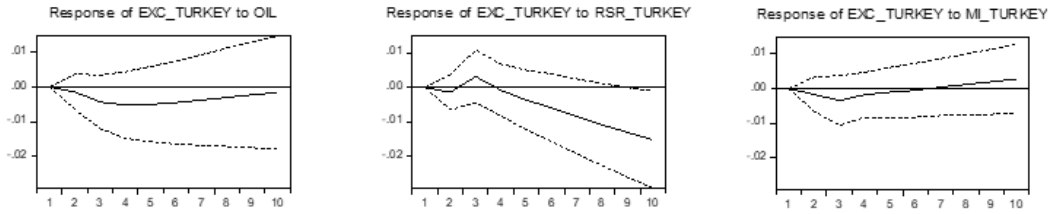


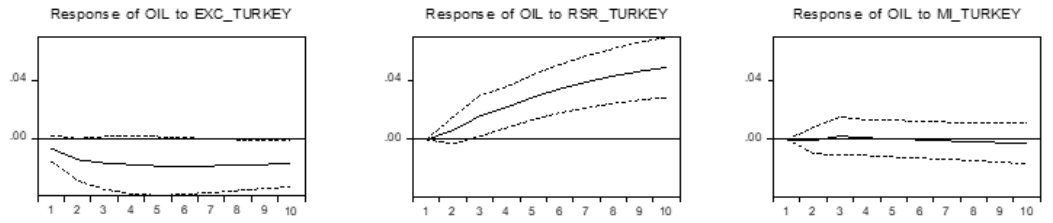
Figure 4.2: Impulse Responses (cont'd)

TURKEY

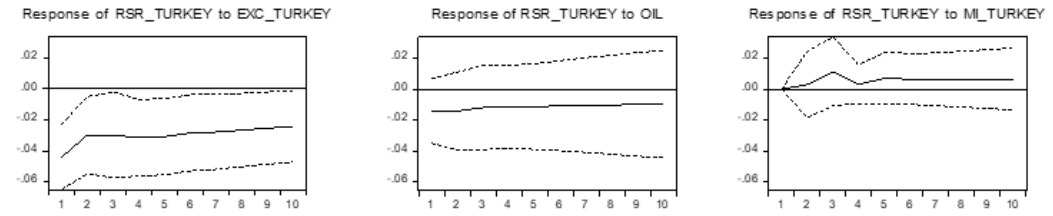
Responses of Exchange Rates;



Responses of Crude Oil Prices;



Responses of Real Stock Returns;



Responses of Manufacturing Indices;

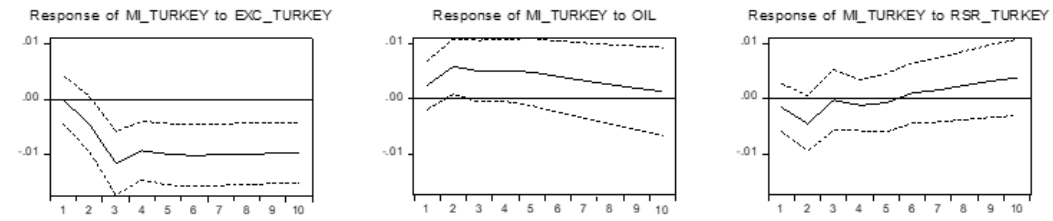


Figure 4.2: Impulse Responses (cont'd)

CHAPTER 5

CONCLUSION

This paper investigates the interrelationship between exchange rates, real stock returns, crude oil spot prices and manufacturing indices as a representation of the production factor of the emerging countries, which are defined by MSCI. Data taken from the determined variables is collected on a monthly basis to achieve the analysis. As a methodology, Toda Yamamoto procedure is pursued by checking the order of integration for each country firstly. VAR equations are conducted to establish the significant causality relations between variables showing the long-run relationship. Impulse response graphical depictions and interpretations are obtained to acquire a general picture of the outcomes.

One of the most important relationships for emerging countries that allow revealing more insight interpretations about countries is the bridge between manufacturing indices and WTI spot oil prices. According to the findings conducted in this paper, not only from manufacturing indices to oil prices but also on the contrary direction, change in one variable affects other variables in a meaningful measure. Analysis of Ayres et al (2013) supports the importance of the energy prices for economic growth estimated in this paper as the manufacturing indices. However, no significant relation is found for Colombia, Czech Republic, Greece, Hungary, India, Indonesia, Philippines, South Africa and Turkey that can be explained as the dependence of the economy to outsources, which can be expressed as the foreign investments, or not having a powerful industrial production process to be affected by the oil price changes.

As examined in the paper of Fratzscher, Schneider, and Robays (2014), fluctuations in foreign currency put pressure on importers to adapt their budget decisions to be

voluntary to produce or make investments. Exchange rates are expected to have a potential relation with the production of the emerging countries that can be associated with the non-US dollar pricing factor of production processes. Causality relation results for manufacturing indices and exchange rates seem to support the analysis made by Fratzscher et al (2014). Most of the countries, which are Brazil, Colombia, Indonesia, Mexico, Philippines, Poland, South Korea, and Turkey, show that there exists a strong causal relation from exchange rates to manufacturing indices. Countries not having a linkage between variables may not have an accessible trade opportunity or may not have effective channels for importation and exportation. The inverse relationship appears to be not as significant as the former relationship for most of the countries. Since manufacturing indices and crude oil prices comprise close relationships explaining the effects of each other, exchange rate movements can be interpreted with a similar approach stated by Fratzscher et al (2014). Wald test causality results for exchange rates and crude oil prices verify the mentioned relation by obtaining significant statistical measures for the emerging countries of Brazil, Colombia, Greece, Russia, and South Korea.

Another result found to be crucial to denote is the linkage between real stock returns and exchange rates. Brazil, Indonesia, Mexico, and South Korea present meaningful causal relation from exchange rates to real stock returns, which can be explained by holding financial development with close investor contact for the stated countries.

None of the emerging countries are estimated to be meaningful for the causality from manufacturing indices to real stock returns. Conversely, only Indonesia shows a considerable linkage from real stock returns to manufacturing indices. Findings of manufacturing indices and real stock returns are in line with the research of Hondroyiannis and Papapetrou(2004) supporting the claim that association between the industrial production and stock market returns is not significant to be linked. Their empirical results demonstrate that economic activity do not have an influence on the stock market returns. Similarly, meaningful linkage from crude oil prices to exchange rates is observed only for South Africa; however, in the reverse direction, which is defined as the causality from exchange rates to crude oil prices, emerging countries Brazil, Colombia, Greece, Russia, and South Korea are observed to have meaningful relations in the long-run.

This thesis extends the interactions of the variables used to express the financial and economic level of the emerging countries. It combines previous empirical approaches conducted by using part of the relations to give an understanding the insights of the considered countries. Causal relations provide an overall point of view to the dynamics of the emerging countries. Moreover, this study contains many financial and developmental implications for the policy makers by clarifying the relations between variables and allow to interpret in an empirical way.

REFERENCES

Abidin, S., Walters, C., Lim, K. L., Banchit, A., 2013. Cointegration between stock prices and exchange rates in Asia-Pacific countries*. Investment Management and Financial Innovations*, Vol 10, No. 2, pp. 142-146.

Abouwafia, H. E., Chambers, M. J., 2015. Monetary policy, exchange rates and stock prices in the Middle East region*. International Review of Financial Analysis*, Vol 37, pp. 14-28.

Akaike, H., 1974. A New Look at the Statistical Model Identification, *IEEE Transactions on Automatic Control,* Vol 19, No. 6, pp, 716-723.

Ayres, R. U., Bergh, J., Lindenberger, D., Warr, B., 2013. The underestimated contribution of energy to economic growth. *Structural Change and Economic Dynamics,* Vol 27, pp. 79-88.

Basher, S. A., Haug, A. A., Sadorsky, P., 2012. Oil prices, exchange rates and emerging stock markets. *Energy economics*, Vol 34, No. 1, pp. 227-240.

Cavenaile, L., Gengenbach, C., Palm F., 2014. Stock Markets, Banks and Long Run Economic Growth: A Panel Cointegration-Based Analysis. *De Economist*, Vol 162, No.1, pp. 19-40.

Chang, E. C., Pinegar, J. M, 1989. Seasonal Fluctuations in Industrial Production and Stock Market Seasonals, *Journal of Financial and Quantitative Analysis*, Vol 24, No. 1, pp. 59-74.

Chkili, W., Nguyen, D. K., 2014. Exchange rate movements and stock market returns in a regime-switching environment: Evidence for BRICS countries. *Research in International Business and Finance,* Vol 31, pp. 46-56.

Degiannakis, S., Filis, G., Kizys R., 2014. The Effects of Oil Price Shocks on Stock Market Volatility: Evidence from European Data. *The Energy Journal*, Vol 35, No. 1, pp. 35-56.

Dickey, D. A., Fuller, W. A., 1979. Distribution of the Estimators for autoregressive Time Series with a Unit Root. *Journal of the American Statistical Association,* Vol 74, No. 366, pp. 427-431.

Elliott, G., Rothenberg, T. J., Stock, J. H., 1996. Efficient Tests for an Autoregressive Unit Root. *Econometrica,* Vol 64, No. 4, pp. 813-836.

Fama, E. F., 1990. Stock Returns, Expected Returns, and Real Activity. *The Journal of Finance,* Vol 45, No. 4, pp. 1089-1108.

Fratzscher, M., Schneider, D., Robays, V. I., 2014. Oil prices, exchange rates and asset prices. *European Central Bank Working Paper Series,* No. 1689, pp. 1-45.

Granger, C., Huang, B., Yang, C.W., 2000. A bivariate causality between stock prices and exchange rates: evidence from recent Asian flu. *The Quarterly Review of Economics and Finance*, Vol 40, No. 3, pp. 337-354.

Gredenhoff, M., Karlsson, S., 1997. Lag-length Selection in VAR-models Using Equal and Unequal Lag-length Procedures. *Working Paper Series in Economiccs and Finance,* No. 11, pp. 1-40.

Guesmi, K., Fattoum, S., 2014. The Relationship between Oil Price and OECD Stock Markets: Multivariate Approach. *Economics Bulletin,* Vol 34, No. 1, pp. 510-519.

Hajilee, M., Nasser, O. M., 2014. Exchange rate volatility and stock market development in emerging economies. *Journal of Post Keynesian Economics*, Vol 37, No. 1, pp. 163-180.

Hamilton, J. D., 1983. Oil and the Macroeconomy since World War II. *Journal of Political Economy,* Vol 91, No. 2, pp. 228-248.

Hondroyiannes, G., Papapetrou, E., 2001. Macroeconomic Influences on the Stock Market. *Journal of Economics and Finance,* Vol 25, No. 1, pp. 33-49.

Huber, P. J, 1967. The behavior of maximum likelihood estimates under nonstandard conditions. *Proceedings of the Fifth Berkeley Symposium on Mathematical Statistics and Probability,* Vol 1, pp. 221-233.

Islami, M., Welfens P. J. J., 2013. Financial market integration, stock markets and exchange rate dynamics in Eastern Europe. *International Economics and Economy Policy*, Vol 10, No. 1, pp. 47-79.

Lüktepohl, H. 2005. New Introduction to Multiple Time Series Analysis, New York: Springer.

Newey, W. K., West, K. D., 1987. Hypothesis Testing with Efficient Method of Moments Estimation. *International Economic Review*, Vol 28, No. 3, pp. 777-787.

Papapetrou, E., 2001. Oil price shocks, stock market, economic activity and employment in Greece. *Energy Economics*, Vol 23, No. 5, pp. 511-532.

Phillips, P. C. B., Perron, P., 1988. Testing for a Unit Root in Time Series Regression. *Biometrika,* Vol 75, No. 2, pp. 335-346.

Sarı, R., Soytaş, U., 2006. The Relationship between Stock Returns, Crude Oil Prices, Interest Rates, and Output: Evidence from a Developing Economy. The Empirical Economics Letters, Vol 5, No. 4, pp. 205-220.

Schwert, G. W., 1990. Stock Returns and Real Activity: A century of Evidence. *The Journal of Finance,* Vol, 45, No. 4, pp. 1237-1257.

Seshaiah, V. S., Behera, C., 2009. Stock Prices and Its Relation with Crude Oil Prices and Exchange Rates. *Applied Economics and International Development*, Vol 9, No. 1, pp. 149-156.

Smiech, S., Papiez, M., 2013. Fossil fuel prices, exchange rate, and stock market: A dynamic causality analysis on the European market. *Economics Letters*, Vol 1188, No. 1, pp. 199-202.

Şensoy, C., Sobacı, C., 2014. Effects of volatility shocks on the dynamic linkages between exchange rate, interest rate and the stock market: The case of Turkey. *Economic Modeling*, Vol 43, pp. 448-457.

Toda, H. Y., Yamamoto, T., 1995. Statistical inference in vector autoregressions with possibly integrated processes. *Journal of Econometrics*, Vol 66, No. 1-2, pp. 225-250.

Tsagkanos, A., Siriopoulos, C., 2015. Stock markets and industrial production in north and south of Euro-zone: Asymmetric effects via threshold cointegration approach. *The Journal of Economic Asymmetries,* Vol 12. No. 2, pp. 162-172.

White, H., 1980. A Heteroscedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroscedasticity. *Econometrica*, Vol 48, No. 4, pp. 817-837.

Yu, J., Hassan, K. M., Sanchez, B., 2012. A re-examination of financial development, stock markets development and economic growth. *Applied Economics*, Vol 44, No. 27, pp. 3479-3489.

APPENDICES

APPENDIX A: FINDINGS OF THE MODEL

Table A.1: Summary of the literature for the relationships

#	Article	Author	Data	Methodology	Main Findings
1	The effects of oil price shocks on stock market volatility: evidence from European data	Degiannakis et al (2014)	Daily data from January 1999 to December 2010	• Structural VAR model • Impulse response analysis	Oil price changes because of the aggregate demand shocks cause to decrease in stock market volatility.
2	The relationship between Oil Price and OECD Stock Markets: A Multivariate Approach	Guesmi and Fattoum (2014)	Monthly data from January 1,1990 to December 1, 2006	• Dynamic conditional correlation model panel model	Relationship between crude oil prices and stock markets is affected by oil prices.
3	Financial market integration, stock markets and exchange rate dynamics in Eastern Europe	Islami and Welfens (2013)	Monthly data until March 2008	• VAR model • Johansen cointegration test • Granger causality	Stock market index and the foreign exchange rate have significant relationship for the countries.
4	Cointegration between stock prices and exchange rates in Asia-Pacific countries	Abidin et al (2013)	Daily data from January 2006 to December 2008	• Time series Analysis • Engle and • Granger's two-step methodology	Stock markets and exchange rates do not prevail significant relationship in the long run.
5	A brivariate causality between stock prices and exchange rates: evidence from recent Asian flu	Granger et al (2000)	Daily data from December 1, 1987 to May 31, 1997	• Granger causality test • Impulse response analysis	Most markets exhibit either changes in stock prices lead that in exchange rates or either market can take the lead.

Table A.1: Summary of the literature for the relationships (cont'd)

6	Effects of volatility shocks on the dynamic linkages between exchange rate, interest rate and stock market: The case of Turkey	Şensoy and Sobacı (2014)	Daily data from January 2, 2003 to September 5, 2013	• VAR model • Dynamic conditional correlation (cDCC)	Relationship between the volatility shocks and dynamic correlations for the variables is observed in the short run.
7	Exchange rate volatility and stock market developing in emerging economies	Hajilee and Nasser (2014)	Annual data from 1980 to 2010	• Engle and Granger cointegration test	Stock market development is affected by exchange rate volatility both in the short run and long run.
8	Stock markets and industrial production in north and south of Euro-zone: Asymmetric effects via threshold cointegration approach	Tsagkanos and Siriopoulos (2015)	Monthly data from January 2, 2004 to December 30, 2013.	• Treshold cointegration approach (panel and aggregate context)	In the long run, a shock in a variable is adjusted with equilibrium but adjustment speed differs in North and South.
9	Seasonal Fluctuations in Industrial Production and Stock Market Seasonals	Chang and Pinegar (1989)	Monthly data from January 1958 to December 1986	• Granger causality test	Causality between the variables of large scale firms endures and can be predictable more than small scale firms.
10	Stock markets, Banks and Long Run Economic Growth: A Panel Cointegration-Based Analysis	Cavenaile et al (2014)	Annual data from 1977 to 2007	• Panel unit root and cointegration tests • Toda and Phillips causality test	There exists a long-run cointegrating vector between financial development and economic growth

Table A.1: Summary of the literature for the relationships (cont'd)

11	A re-examination of financial development, stock markets development and economic growth	Yu et al (2012)	Annual data from 1980 to 2009	• VAR model Granger causality • Panel estimates	There exists a causality between financial development, stock market development and economic growth.
12	Oil and the Macroeconomy since World War II	Hamilton (1983)	Anuual data from 1948 to 1972	• Granger causality test	Macroeconomic variables are affected from the increase in the crude oil prices.
13	Oil price shocks, stock market, economic activity and employment in Greece	Papapetrou (2001)	Monthly data from January 1989 to June 1999	Multivariate VAR model	Oil price shocks affects industrial production and employment negatively. Increase in interest rates have a tendency to be linked with a growth in production and employment.
14	Monetary policy, exchange rates and stock prices in the Middle East region	Abouwafia and Chambers (2015)	Monthly data from November 2003 to December 2012	• VAR model • Johansen cointegration test • Impulse response analysis	A monetary tightening cause a decrease in stock prices although countries have different dynamics.
15	Stock Prices and Its Relation with Crude Oil Prices and Exchange Rates	Seshaiah and Behera (2009)	Daliy data from January 2, 1991 to December 12, 2007	• Time series analysis • Johansen cointegration test	Crude oil prices and exchange rates are cointegrated with stock price indexes in the long run.

Table A.1: Summary of the literature for the relationships (cont'd)

16	Fossil fuel prices, exchange rate, and stock market: A dynamic causality analysis on the European market	Smiech and Papiez (2013)	Weekly data from October 2001 to June 2012	• VAR model • Granger causality	There exists a mutual causal relationship between fossil fuels and exchange rates with the currency USD/EUR.
17	Oil prices, exchange rates and emerging stock markets	Basher et al (2012)	Monthly data from January 1988 to December 2008	Structural VAR model	A positive oil price shock cause to a decrease in exchange rates. A positive change in real economic activity give rises to oil prices.
18	The relationship between Stock Returns, Crude Oil Prices, Interest Rates, and Output: Evidence from a Developing Economy	Sarı and Soytaş (2006)	Monthly data from January 1987 to March 2004	• Time series analysis • Variance decomposition • Impulse response analysis	Oil prices shocks do not have a significant effect on the real stock returns.

Table A.2: Data Ranges of Emerging Countries

Emerging Countries	Exchang e Rate	Crude Oil Prices	Brent Oil Prices	Inflation Rate	Real Stock Return	Manufacturing Index
Brazil	01-1992 02-2019	01-1990 01-2019	01-1990 01-2019	01-1990 01-2019	02-1996 02-2019	01-1990 02-2019
Chile	10-1988 02-2019	01-1990 01-2019	01-1990 01-2019	01-1990 12-2018	02-1990 02-2019	01-1991 02-2019
Colombia	09-1992 02-2019	01-1990 01-2019	01-1990 01-2019	01-1990 01-2019	08-2002 02-2019	01-1990 12-2018
Czech Republic	06-1993 02-2019	01-1990 01-2019	01-1990 01-2019	01-1992 02-2019	05-1994 02-2019	01-1991 01-2019
Greece	04-1989 02-2019	01-1990 01-2019	01-1990 01-2019	01-1990 02-2019	01-1990 02-2019	01-1990 01-2019
Hungary	06-1993 02_2019	01-1990 01-2019	01-1990 01-2019	01-1990 01-2019	02-1991 02-2019	01-1992 01-2019
India	11-1988 02-2019	01-1990 01-2019	01-1990 01-2019	01-1990 12-2018	08-1990 02-2019	04-1994 12-2018
Indonesia	11-1991 02-2019	01-1990 01-2019	01-1990 01-2019	01-1990 01-2019	01-1990 02-2019	01-1990 07-2018
Mexico	08-1989 02-2019	01-1990 01-2019	01-1990 01-2019	01-1990 01-2019	02-1994 02-2019	01-1990 01-2019
Philippines	11-1991 02-2019	01-1990 01-2019	01-1990 01-2019	01-1990 02-2019	01-1990 02-2019	01-2001 01-2019
Poland	06-1993 02-2019	01-1990 01-2019	01-1990 01-2019	01-1990 02-2019	07-1994 02-2019	01-1990 02-2019
Russia	07-1993 02-2019	01-1990 01-2019	01-1990 01-2019	01-1992 02-2019	10-1997 03-2018	01-1999 01-2019
South Africa	04-1989 02-2019	01-1990 01-2019	01-1990 01-2019	01-1990 01-2019	07-1995 02-2019	01-1990 01-2019
South Korea	08-1989 02-2019	01-1990 01-2019	01-1990 01-2019	01-1990 01-2019	01-1990 02-2019	01-1990 02-2019
Turkey	04-1989 02-2019	01-1990 01-2019	01-1990 01-2019	01-1990 01-2019	01-1990 02-2019	01-1990 01-2019

Table A.3: Data Sources of Emerging Countries

Emerging Countries	Exchange Rate	Oil Prices	Brent Oil Prices	Inflation Rate	Real Stock Return	Manufacturing Index
Brazil	Bloomberg	FRBSL	FRBSL	Bloomberg	Bloomberg	stats.oecd.org
Chile	Bloomberg	FRBSL	FRBSL	Bloomberg	Bloomberg	stats.oecd.org
Colombia	Bloomberg	FRBSL	FRBSL	Bloomberg	Bloomberg	stats.oecd.org
Czech Republic	Bloomberg	FRBSL	FRBSL	Bloomberg	Bloomberg	stats.oecd.org
Greece	Bloomberg	FRBSL	FRBSL	Bloomberg	Bloomberg	stats.oecd.org
Hungary	Bloomberg	FRBSL	FRBSL	Bloomberg	Bloomberg	stats.oecd.org
India	Bloomberg	FRBSL	FRBSL	data.oecd.org	Bloomberg	stats.oecd.org
Indonesia	Bloomberg	FRBSL	FRBSL	Bloomberg	Bloomberg	stats.oecd.org
Mexico	Bloomberg	FRBSL	FRBSL	Bloomberg	Bloomberg	stats.oecd.org
Philippines	Bloomberg	FRBSL	FRBSL	Bloomberg	Bloomberg	data.gov.ph
Poland	Bloomberg	FRBSL	FRBSL	Bloomberg	Bloomberg	stats.oecd.org
Russia	Bloomberg	FRBSL	FRBSL	Bloomberg	Bloomberg	stats.oecd.org
South Africa	Bloomberg	FRBSL	FRBSL	Bloomberg	Bloomberg	stats.oecd.org
South Korea	Bloomberg	FRBSL	FRBSL	Bloomberg	Bloomberg	stats.oecd.org
Turkey	Bloomberg	FRBSL	FRBSL	Bloomberg	Bloomberg	stats.oecd.org

Table A.4: Bloomberg Stock Market Indices of Emerging countries

Emerging Countries		Stock Market Indices	Emerging Countries		Stock Market Indices
1	Brazil	IBRX	9	Mexico	MEXBOL
2	Chile	IGPA	10	Philippines	PCOMP
3	Colombia	COLCAP	11	Poland	WIG20
4	Czech Republic	PX	12	Russia	IMOEX
5	Greece	ASE	13	South Africa	FTSE/JSE
6	Hungary	BUX	14	South Korea	KOSPI
7	India	NSE (NIFTY50)	15	Turkey	BIST100
8	Indonesia	JCI			

Table A.5: Correlation Matrices of the Emerging Countries

BRAZIL

	EXC	RSR	OIL	MI
EXC	1.000	-0.097	-0.087	0.050
RSR	-0.097	1.000	0.072	-0.011
OIL	-0.087	0.072	1.000	0.266
MI	0.050	-0.011	0.266	1.000

CHILE

	EXC	RSR	OIL	MI
EXC	1.000	-0.071	-0.176	-0.075
RSR	-0.071	1.000	-0.082	-0.053
OIL	-0.176	-0.082	1.000	0.089
MI	-0.075	-0.053	0.089	1.000

COLOMBIA

	EXC	RSR	OIL	MI
EXC	1.000	-0.232	-0.286	0.007
RSR	-0.232	1.000	0.089	-0.043
OIL	-0.286	0.089	1.000	0.110
MI	0.007	-0.043	0.110	1.000

CZECH REPUBLIC

	EXC	RSR	OIL	MI
EXC	1.000	-0.243	0.005	-0.096
RSR	-0.243	1.000	-0.145	0.093
OIL	0.005	-0.145	1.000	-0.005
MI	-0.096	0.093	-0.005	1.000

GREECE

	EXC	RSR	OIL	MI
EXC	1.000	-0.148	-0.103	0.025
RSR	-0.148	1.000	-0.173	-0.169
OIL	-0.103	-0.173	1.000	-0.053
MI	0.025	-0.169	-0.053	1.000

HUNGARY

	EXC	RSR	OIL	MI
EXC	1.000	-0.131	-0.109	0.098
RSR	-0.131	1.000	-0.021	0.111
OIL	-0.109	-0.021	1.000	-0.045
MI	0.098	0.111	-0.045	1.000

INDIA

	EXC	RSR	OIL	MI
EXC	1.000	-0.172	-0.232	0.048
RSR	-0.172	1.000	0.078	0.178
OIL	-0.232	0.078	1.000	0.058
MI	0.048	0.178	0.058	1.000

INDONESIA

	EXC	RSR	OIL	MI
EXC	1.000	-0.082	0.035	-0.093
RSR	-0.082	1.000	0.013	0.056
OIL	0.035	0.013	1.000	-0.092
MI	-0.093	0.056	-0.092	1.000

MEXICO

	EXC	RSR	OIL	MI
EXC	1.000	-0.199	-0.215	0.054
RSR	-0.199	1.000	0.025	-0.039
OIL	-0.215	0.025	1.000	0.097
MI	0.054	-0.039	0.097	1.000

PHILLIPINES

	EXC	RSR	OIL	MI
EXC	1.000	-0.077	-0.069	0.253
RSR	-0.077	1.000	-0.213	0.096
OIL	-0.069	-0.213	1.000	-0.132
MI	0.253	0.096	-0.132	1.000

POLAND

	EXC	RSR	OIL	MI
EXC	1.000	-0.183	0.004	0.080
RSR	-0.183	1.000	-0.079	0.033
OIL	0.004	-0.079	1.000	0.010
MI	0.080	0.033	0.010	1.000

RUSSIA

	EXC	RSR	OIL	MI
EXC	1.000	-0.359	-0.166	0.014
RSR	-0.359	1.000	-0.036	0.033
OIL	-0.166	-0.036	1.000	0.060
MI	0.014	0.033	0.060	1.000

Table A.5: Correlation Matrices of the Emerging Countries (cont'd)

SOUTH AFRICA

	EXC	RSR	OIL	MI
EXC	1.000	-0.197	-0.146	0.093
RSR	-0.197	1.000	0.034	0.119
OIL	-0.146	0.034	1.000	0.043
MI	0.093	0.119	0.043	1.000

SOUTH KOREA

	EXC	RSR	OIL	MI
EXC	1.000	-0.076	-0.055	0.033
RSR	-0.076	1.000	-0.047	0.117
OIL	-0.055	-0.047	1.000	0.011
MI	0.033	0.117	0.011	1.000

TURKEY

	EXC	RSR	OIL	MI
EXC	1.000	-0.077	-0.229	-0.002
RSR	-0.077	1.000	-0.055	0.063
OIL	-0.229	-0.055	1.000	-0.043
MI	-0.002	0.063	-0.043	1.000

Table A.6: Residual Results of the VAR Equations

VAR Equation 1; EXC = EXC$(m+n)$ + OIL$(m+n)$ + RSR$(m+n)$ + MI$(m+n)$ + dummy variable + C

VAR Equation 2; OIL = EXC$(m+n)$ + OIL$(m+n)$ + RSR$(m+n)$ + MI$(m+n)$ + dummy variable + C

VAR Equation 3; RSR = EXC$(m+n)$ + OIL$(m+n)$ + RSR$(m+n)$ + MI$(m+n)$ + dummy variable + C

VAR Equation 4; MI = EXC$(m+n)$ + OIL$(m+n)$ + RSR$(m+n)$ + MI$(m+n)$ + dummy variable + C

		Serial Correlation		**Heteroscedasticity**	
Country	**Equation**	**Obs. R-squared**	**Prob. Chi-Square**	**Obs. R-squared**	**Prob. Chi-Square**
Brazil	EQN 1	1.6307	0.6525	35.7203	0.0007
	EQN 2	3.8654	0.2764	48.6465	0.0000
	EQN 3	11.251	0.0104	59.4705	0.0000
	EQN 4	1.5176	0.6782	32.6939	0.0019

Table A.6: Residual Results of the VAR Equations (cont'd)

Country	Equation	Serial Correlation		Heteroscedasticity	
		Obs. R-squared	Prob. Chi-Square	Obs. R-squared	Prob. Chi-Square
Chile	EQN 1	0.9911	0.8034	37.9527	0.0003
	EQN 2	0.9951	0.8024	49.1061	0.0000
	EQN 3	4.9323	0.1768	30.8114	0.0036
	EQN 4	8.1647	0.0427	22.8862	0.0431
Colombia	EQN 1	5.8337	0.2119	38.2490	0.0023
	EQN 2	2.2451	0.6908	29.2678	0.0321
	EQN 3	3.1651	0.5306	18.2187	0.3752
	EQN 4	3.7482	0.4412	17.2227	0.4394
Czech Republic	EQN 1	7.7416	0.0517	26.9646	0.0126
	EQN 2	0.9585	0.8113	41.6430	0.0001
	EQN 3	19.1031	0.0003	47.8664	0.0000
	EQN 4	1.8450	0.6052	33.2849	0.0015
Greece	EQN 1	9.2245	0.0557	57.6102	0.0000
	EQN 2	10.1356	0.0382	37.5562	0.0028
	EQN 3	9.5490	0.0487	85.3071	0.0000
	EQN 4	10.0150	0.0402	29.7969	0.0278
Hungary	EQN 1	5.9829	0.1124	45.7605	0.0000
	EQN 2	5.9074	0.1162	43.2654	0.0000
	EQN 3	27.8654	0.0000	52.8938	0.0000
	EQN 4	6.0169	0.1108	31.4595	0.0029
India	EQN 1	5.9327	0.2042	45.6846	0.0002
	EQN 2	4.4822	0.3447	39.5884	0.0015
	EQN 3	0.1447	0.9975	25.1648	0.0911
	EQN 4	2.0170	0.7326	34.4679	0.0073
Indonesia	EQN 1	23.6741	0.0013	105.3087	0.0000
	EQN 2	7.4381	0.3847	64.8305	0.0001
	EQN 3	7.0985	0.4187	81.2377	0.0000
	EQN 4	21.0350	0.0037	29.6942	0.4294
Mexico	EQN 1	14.6090	0.0235	42.8706	0.0145
	EQN 2	4.0531	0.6695	60.2371	0.0001
	EQN 3	32.1578	0.0000	49.0678	0.0028
	EQN 4	3.7645	0.7085	49.3206	0.0026
Philippines	EQN 1	7.8051	0.0990	18.9745	0.3300
	EQN 2	5.2621	0.2614	40.0284	0.0013
	EQN 3	3.9800	0.4087	44.8768	0.0003
	EQN 4	3.9557	0.4107	20.3190	0.2582

Table A.6: Residual Results of the VAR Equations (cont'd)

Country	Equation	Serial Correlation		Heteroscedasticity	
		Obs. R-squared	Prob. Chi-Square	Obs. R-squared	Prob. Chi-Square
Poland	EQN 1	9.4479	0.0239	21.9182	0.0566
	EQN 2	0.6521	0.8844	33.1451	0.0016
	EQN 3	1.7444	0.6271	47.9944	0.0000
	EQN 4	0.3542	0.9495	20.0943	0.0929
Russia	EQN 1	7.7422	0.0517	60.4918	0.0000
	EQN 2	1.8037	0.6141	37.7336	0.0003
	EQN 3	9.2128	0.0266	43.6697	0.0000
	EQN 4	5.5528	0.1355	23.7400	0.0336
South Africa	EQN 1	4.5514	0.2078	18.0298	0.1564
	EQN 2	2.4916	0.4768	40.7307	0.0001
	EQN 3	2.4824	0.4785	37.8270	0.0003
	EQN 4	5.3684	0.1467	27.3030	0.0113
South Korea	EQN 1	9.7533	0.0448	95.7720	0.0000
	EQN 2	4.7022	0.3192	21.4048	0.2087
	EQN 3	0.9156	0.9223	62.3323	0.0000
	EQN 4	7.1211	0.1296	59.1747	0.0000
Turkey	EQN 1	1.9356	0.5859	35.2773	0.0008
	EQN 2	3.1458	0.3697	30.0096	0.0047
	EQN 3	0.7725	0.8560	22.8835	0.0431
	EQN 4	5.1389	0.1619	33.6678	0.0014

Table A.7: Lag Length Criteria Results

	Lag								
Country	0	1	2	3	4	5	6	7	8
Brazil	-0.98	-11.39	-11.56*	-11.50	-11.43	-11.42	-11.34	-11.28	-11.29
Chile	0.47	-12.13	-12.33*	-12.30	-12.23	-12.27	-12.30	-12.28	-12.25
Colombia	-2.97	-11.51	-12.10	-12.10*	-12.09	-11.97	-11.92	-11.84	-11.78
Czech Republic	1.59	-10.10	-10.28*	-10.18	-10.16	-10.09	-10.01	-9.97	-9.98
Greece	0.57	-10.47	-10.69	-10.70*	-10.67	-10.63	-10.58	-10.52	-10.50
Hungary	1.73	-10.88	-11.18*	-11.15	-11.11	-11.11	-11.07	-10.99	-10.92
India	1.18	-12.44	-12.71	-12.72*	-12.68	-12.61	-12.55	-12.53	-12.47
Indonesia	4.04	-7.31	-7.64	-7.68	-7.76	-7.90	-7.90*	-7.89	-7.85
Mexico	-0.20	-13.04	-13.11	-13.14	-13.11	-13.21*	-13.12	-13.09	-13.06
Philippines	-2.39	-14.07	-14.19	-14.19*	-14.12	-14.06	-14.00	-14.15	-14.11
Poland	1.95	-10.46	-10.69*	-10.62	-10.58	-10.48	-10.41	-10.34	-10.29
Russia	-0.39	-11.11	-11.32*	-11.28	-11.28	-11.28	-11.24	-11.14	-11.09
South Africa	0.09	-10.60	-10.87*	-10.80	-10.73	-10.67	-10.60	-10.52	-10.46
South Korea	2.18	-10.52	-10.63	-10.66*	-10.64	-10.64	-10.63	-10.63	-10.63
Turkey	6.12	-9.34	-9.74*	-9.73	-9.69	-9.71	-9.70	-9.66	-9.62

Table A.8: Results of Diagnostic Tests

VAR Equation 1; EXC = EXC$(m+n)$ + OIL$(m+n)$ + RSR$(m+n)$ + MI$(m+n)$ + dummy variable + C

VAR Equation 2; OIL = EXC$(m+n)$ + OIL$(m+n)$ + RSR$(m+n)$ + MI$(m+n)$ + dummy variable + C

VAR Equation 3; RSR = EXC$(m+n)$ + OIL$(m+n)$ + RSR$(m+n)$ + MI$(m+n)$ + dummy variable + C

VAR Equation 4; MI = EXC$(m+n)$ + OIL$(m+n)$ + RSR$(m+n)$ + MI$(m+n)$ + dummy variable + C

Countries	**Equation**	**m**	**n**	**Roots**	**Structural Break Point**	**Auto correlation**	**Heterosce dasticity**
Brazil	EQN 1	1	2	stable	1999-07	no	yes
	EQN 2	1	2	stable	2000-10	no	yes
	EQN 3	1	2	stable	1999-09	yes	yes
	EQN 4	1	2	stable	2009-01	no	yes

Table A.8: Results of Diagnostic Tests (cont'd)

Countries	Equation	m	n	Roots	Structural Break Point	Auto correlation	Heterosce dasticity
Chile	EQN 1	1	2	stable	2008-11	no	yes
	EQN 2	1	2	stable	2002-09	no	yes
	EQN 3	1	2	stable	2009-04	no	yes
	EQN 4	1	2	stable	2013-04	yes	yes
Colombia	EQN 1	1	3	stable	2014-11	no	yes
	EQN 2	1	3	stable	2008-08	no	yes
	EQN 3	1	3	stable	2007-05	no	no
	EQN 4	1	3	stable	2012-11	no	no
Czech Republic	EQN 1	1	2	stable	2008-08	no	yes
	EQN 2	1	2	stable	2007-09	no	yes
	EQN 3	1	2	stable	2013-01	yes	yes
	EQN 4	1	2	stable	2000-02	no	yes
Greece	EQN 1	1	3	stable	2008-08	no	yes
	EQN 2	1	3	stable	2008-10	yes	yes
	EQN 3	1	3	stable	2009-08	yes	yes
	EQN 4	1	3	stable	1993-11	yes	yes
Hungary	EQN 1	1	2	stable	2008-08	no	yes
	EQN 2	1	2	stable	2008-08	no	yes
	EQN 3	1	2	stable	2011-02	yes	yes
	EQN 4	1	2	stable	2003-03	no	yes
India	EQN 1	1	3	stable	2013-05	no	yes
	EQN 2	1	3	stable	2013-09	no	yes
	EQN 3	1	3	stable	1999-05	no	no
	EQN 4	1	3	stable	2011-04	no	yes
Indonesia	EQN 1	1	6	stable	1998-03	yes	yes
	EQN 2	1	6	stable	2001-10	no	yes
	EQN 3	1	6	stable	2000-11	no	yes
	EQN 4	1	6	stable	1998-04	yes	no
Mexico	EQN 1	1	5	stable	1998-01	yes	yes
	EQN 2	1	5	stable	1999-01	no	yes
	EQN 3	1	5	stable	1998-10	yes	yes
	EQN 4	1	5	stable	2000-08	no	yes
Philippines	EQN 1	1	3	stable	2004-05	no	no
	EQN 2	1	3	stable	2006-05	no	yes
	EQN 3	1	3	stable	2014-01	no	yes
	EQN 4	1	3	stable	2005-12	no	no
Poland	EQN 1	1	2	stable	2008-08	yes	no
	EQN 2	1	2	stable	2008-08	no	yes
	EQN 3	1	2	stable	2003-05	no	yes
	EQN 4	1	2	stable	2003-03	no	no

Table A.8: Results of Diagnostic Tests (cont'd)

Countries	Equation	m	n	Roots	Structural Break Point	Auto correlation	Heterosce dasticity
Russia	EQN 1	1	2	stable	2014-04	no	yes
	EQN 2	1	2	stable	2009-01	no	yes
	EQN 3	1	2	stable	2001-12	yes	yes
	EQN 4	1	2	stable	2001-12	no	yes
South Africa	EQN 1	1	2	stable	2002-01	no	no
	EQN 2	1	2	stable	2007-09	no	yes
	EQN 3	1	2	stable	2003-12	no	yes
	EQN 4	1	2	stable	2008-09	no	yes
South Korea	EQN 1	1	3	stable	1998-01	yes	yes
	EQN 2	1	3	stable	1999-04	no	no
	EQN 3	1	3	stable	1999-08	no	yes
	EQN 4	1	3	stable	2009-02	no	yes
Turkey	EQN 1	1	2	stable	2001-02	no	yes
	EQN 2	1	2	stable	1995-08	no	yes
	EQN 3	1	2	stable	2002-03	no	yes
	EQN 4	1	2	stable	1997-04	no	yes

Table A.9: Summary of Causality Relations

Country	CAUSALITY BETWEEN EXC AND RSR		CAUSALITY BETWEEN EXC AND OIL	
	From EXC to RSR	From RSR to EXC	From EXC to OIL	From OIL to EXC
Brazil	Causality	No causality	Causality	No causality
Chile	No causality	No causality	No causality	No causality
Colombia	No causality	No causality	Causality	No causality
Czech Republic	No causality	No causality	No causality	No causality
Greece	No causality	No causality	Causality	No causality
Hungary	No causality	No causality	No causality	No causality
India	No causality	No causality	No causality	No causality
Indonesia	Causality	No causality	No causality	No causality
Mexico	Causality	No causality	No causality	No causality
Philippines	No causality	No causality	No causality	No causality
Poland	No causality	Causality	No causality	No causality
Russia	No causality	No causality	Causality	No causality
South Africa	No causality	No causality	No causality	Causality
South Korea	Causality	No causality	Causality	No causality
Turkey	No causality	No causality	No causality	No causality

Table A.9: Summary of Causality Relations (cont'd)

Country	CAUSALITY BETWEEN RSR AND OIL		CAUSALITY BETWEEN RSR AND MI	
	From RSR to OIL	From OIL to RSR	From RSR to MI	From MI to RSR
Brazil	No causality	No causality	No causality	No causality
Chile	No causality	No causality	No causality	No causality
Colombia	No causality	No causality	No causality	No causality
Czech Republic	No causality	No causality	No causality	No causality
Greece	No causality	No causality	No causality	No causality
Hungary	No causality	No causality	No causality	No causality
India	Causality	No causality	No causality	No causality
Indonesia	Causality	No causality	Causality	No causality
Mexico	No causality	No causality	No causality	No causality
Philippines	No causality	No causality	No causality	No causality
Poland	No causality	No causality	No causality	No causality
Russia	No causality	No causality	No causality	No causality
South Africa	No causality	No causality	No causality	No causality
South Korea	No causality	Causality	No causality	No causality
Turkey	Causality	No causality	No causality	No causality

Country	CAUSALITY BETWEEN MI AND OIL		CAUSALITY BETWEEN MI AND EXC	
	From MI to OIL	From OIL to MI	From MI to EXC	From EXC to MI
Brazil	Causality	Causality	No causality	Causality
Chile	Causality	No causality	No causality	No causality
Colombia	No causality	No causality	Causality	Causality
Czech Republic	No causality	No causality	No causality	No causality
Greece	No causality	No causality	No causality	No causality
Hungary	No causality	Causality	No causality	No causality
India	No causality	No causality	Causality	No causality
Indonesia	No causality	No causality	No causality	Causality
Mexico	Causality	No causality	No causality	Causality
Philippines	No causality	Causality	No causality	Causality
Poland	Causality	Causality	No causality	Causality
Russia	Causality	Causality	No causality	No causality
South Africa	No causality	No causality	No causality	No causality
South Korea	Causality	No causality	Causality	Causality
Turkey	No causality	No causality	No causality	Causality

APPENDIX B: FINDINGS OF THE ROBUSTNESS TETS OF THE MODEL

Table B.1: Correlation Matrices of the Emerging Countries for Robustness Tests

BRAZIL

	EXC	RSR	BOIL	MI
EXC	1.000	-0.096	-0.059	0.045
RSR	-0.096	1.000	0.012	-0.005
BOIL	-0.059	0.012	1.000	0.216
MI	0.045	-0.005	0.216	1.000

CHILE

	EXC	RSR	BOIL	MI
EXC	1.000	-0.068	-0.180	-0.079
RSR	-0.068	1.000	-0.068	-0.059
BOIL	-0.180	-0.068	1.000	0.139
MI	-0.079	-0.059	0.139	1.000

COLOMBIA

	EXC	RSR	BOIL	MI
EXC	1.000	-0.208	-0.308	-0.002
RSR	-0.208	1.000	0.096	0.013
BOIL	-0.308	0.096	1.000	0.134
MI	-0.002	0.013	0.134	1.000

CZECH REPUBLIC

	EXC	RSR	BOIL	MI
EXC	1.000	-0.226	0.006	-0.099
RSR	-0.226	1.000	-0.142	0.057
BOIL	0.006	-0.142	1.000	-0.007
MI	-0.099	0.057	-0.007	1.000

GREECE

	EXC	RSR	BOIL	MI
EXC	1.000	-0.130	-0.098	0.028
RSR	-0.130	1.000	-0.222	-0.180
BOIL	-0.098	-0.222	1.000	-0.057
MI	0.028	-0.180	-0.057	1.000

HUNGARY

	EXC	RSR	BOIL	MI
EXC	1.000	-0.146	-0.101	0.087
RSR	-0.146	1.000	-0.026	0.090
BOIL	-0.101	-0.026	1.000	-0.051
MI	0.087	0.090	-0.051	1.000

INDIA

	EXC	RSR	BOIL	MI
EXC	1.000	-0.140	-0.210	0.044
RSR	-0.140	1.000	0.095	0.129
BOIL	-0.210	0.095	1.000	0.056
MI	0.044	0.129	0.056	1.000

INDONESIA

	EXC	RSR	BOIL	MI
EXC	1.000	-0.059	0.055	-0.105
RSR	-0.059	1.000	0.002	0.045
BOIL	0.055	0.002	1.000	-0.081
MI	-0.105	0.045	-0.081	1.000

MEXICO

	EXC	RSR	BOIL	MI
EXC	1.000	-0.174	-0.211	0.054
RSR	-0.174	1.000	-0.016	-0.031
BOIL	-0.211	-0.016	1.000	0.087
MI	0.054	-0.031	0.087	1.000

PHILLIPINES

	EXC	RSR	BOIL	MI
EXC	1.000	-0.089	-0.074	0.211
RSR	-0.089	1.000	-0.169	0.123
BOIL	-0.074	-0.169	1.000	-0.075
MI	0.211	0.123	-0.075	1.000

Table B.1: Correlation Matrices of the Emerging Countries for Robustness Tests (cont'd)

POLAND

	EXC	RSR	BOIL	MI
EXC	1.000	-0.164	0.000	0.073
RSR	-0.164	1.000	-0.083	0.003
BOIL	0.000	-0.083	1.000	0.007
MI	0.073	0.003	0.007	1.000

RUSSIA

	EXC	RSR	BOIL	MI
EXC	1.000	-0.328	-0.170	0.019
RSR	-0.328	1.000	-0.092	0.000
BOIL	-0.170	-0.092	1.000	0.054
MI	0.019	0.000	0.054	1.000

SOUTH AFRICA

	EXC	RSR	BOIL	MI
EXC	1.000	-0.185	-0.138	0.096
RSR	-0.185	1.000	-0.023	0.105
BOIL	-0.138	-0.023	1.000	0.042
MI	0.096	0.105	0.042	1.000

SOUTH KOREA

	EXC	RSR	BOIL	MI
EXC	1.000	-0.036	-0.050	0.033
RSR	-0.036	1.000	-0.059	0.119
BOIL	-0.050	-0.059	1.000	0.026
MI	0.033	0.119	0.026	1.000

TURKEY

	EXC	RSR	BOIL	MI
EXC	1.000	-0.049	-0.231	-0.005
RSR	-0.049	1.000	-0.073	0.108
BOIL	-0.231	-0.073	1.000	-0.049
MI	-0.005	0.108	-0.049	1.000

Table B.2: Residual Results of the VAR Equations of Robustness Tests

		Serial Correlation		**Heteroscedasticity**	
Country	**Equation**	**Obs. R-squared**	**Prob. Chi-Square**	**Obs. R-squared**	**Prob. Chi-Square**
Brazil	EQN 1	1.9970	0.3684	35.3138	0.0005
	EQN 2	1.0577	0.7873	47.0183	0.0000
	EQN 3	12.3148	0.0064	61.5372	0.0000
	EQN 4	2.0569	0.5607	35.0079	0.0008
Chile	EQN 1	0.6395	0.8873	38.5400	0.0002
	EQN 2	0.5767	0.9017	43.2909	0.0000
	EQN 3	4.7566	0.1905	27.6032	0.0103
	EQN 4	7.8304	0.0497	23.2979	0.0382

Table B.2: Residual Results of the VAR Equations of Robustness Tests (cont'd)

Country	Equation	Serial Correlation		Heteroscedasticity	
		Obs. R-squared	Prob. Chi-Square	Obs. R-squared	Prob. Chi-Square
Colombia	EQN 1	3.0954	0.3771	32.8801	0.0018
	EQN 2	1.8325	0.6079	33.0769	0.0017
	EQN 3	3.6555	0.3011	12.5871	0.4802
	EQN 4	13.7226	0.0033	10.9148	0.6179
Czech Republic	EQN 1	5.7039	0.1269	27.1869	0.0117
	EQN 2	3.5484	0.3145	30.5462	0.0039
	EQN 3	19.2722	0.0002	47.6984	0.0000
	EQN 4	2.0160	0.5691	32.5475	0.0020
Greece	EQN 1	7.0937	0.1310	48.4545	0.0001
	EQN 2	8.8765	0.0643	15.3354	0.5713
	EQN 3	10.1554	0.0379	85.8949	0.0000
	EQN 4	15.3865	0.0040	35.7807	0.0049
Hungary	EQN 1	3.3376	0.3424	47.8435	0.0000
	EQN 2	6.7361	0.0808	40.4558	0.0001
	EQN 3	25.9695	0.0000	53.6057	0.0000
	EQN 4	10.1434	0.0174	32.2694	0.0022
India	EQN 1	9.7240	0.0211	32.7239	0.0019
	EQN 2	2.2789	0.5166	41.2741	0.0001
	EQN 3	4.5773	0.2055	28.0263	0.0090
	EQN 4	1.8596	0.6020	32.7119	0.0019
Indonesia	EQN 1	26.4279	0.0009	107.2592	0.0000
	EQN 2	24.5749	0.0018	73.5921	0.0001
	EQN 3	12.3675	0.1355	89.8279	0.0000
	EQN 4	35.4976	0.0000	34.8273	0.3811
Mexico	EQN 1	17.0719	0.0090	41.1906	0.0219
	EQN 2	6.7592	0.3437	59.6502	0.0001
	EQN 3	31.3938	0.0000	49.3171	0.0026
	EQN 4	3.5001	0.7440	47.0236	0.0049
Philippines	EQN 1	7.1588	0.0670	19.2754	0.1148
	EQN 2	0.5004	0.9188	36.2998	0.0005
	EQN 3	8.1240	0.0435	39.3510	0.0002
	EQN 4	0.7454	0.8625	19.1880	0.1174

Table B.2: Residual Results of the VAR Equations of Robustness Tests (cont'd)

Country	Equation	Serial Correlation		Heteroscedasticity	
		Obs. R-squared	Prob. Chi-Square	Obs. R-squared	Prob. Chi-Square
Poland	EQN 1	7.2671	0.0639	23.1182	0.0403
	EQN 2	4.2154	0.2391	30.3967	0.0041
	EQN 3	1.9584	0.5811	46.7176	0.0000
	EQN 4	0.4433	0.9312	17.8065	0.1650
Russia	EQN 1	10.2160	0.0168	61.1748	0.0000
	EQN 2	3.6807	0.2981	46.5841	0.0000
	EQN 3	10.0388	0.0182	40.6583	0.0001
	EQN 4	6.3643	0.0952	23.4432	0.0367
South Africa	EQN 1	4.5578	0.2072	16.5709	0.2197
	EQN 2	3.0558	0.3831	36.6807	0.0005
	EQN 3	2.9718	0.3960	37.8775	0.0003
	EQN 4	7.6039	0.0549	26.0797	0.0166
South Korea	EQN 1	9.8846	0.0424	94.7392	0.0000
	EQN 2	8.6855	0.0695	18.1440	0.3798
	EQN 3	0.7487	0.9452	62.3469	0.0000
	EQN 4	7.0689	0.1323	57.5452	0.0000
Turkey	EQN 1	2.0945	0.7184	44.6541	0.0003
	EQN 2	2.4809	0.6481	31.4671	0.0175
	EQN 3	6.9176	0.1403	20.4860	0.2501
	EQN 4	18.7132	0.0009	37.9319	0.0025

Table B.3: Lag Length Criteria Results of Robustness Tests

	Lag								
Country	0	1	2	3	4	5	6	7	8
Brazil	-0.82	-11.23	-11.39*	-11.33	-11.27	-11.26	-11.18	-11.12	-11.14
Chile	0.57	-12.02	-12.19*	-12.16	-12.08	-12.10	-12.11	-12.09	-12.06
Colombia	-2.96	-11.52	-12.06*	-12.06	-12.04	-11.92	-11.88	-11.82	-11.77
Czech Republic	1.80	-9.94	-10.10*	-9.99	-9.97	-9.88	-9.80	-9.73	-9.71
Greece	0.70	-10.38	-10.59	-10.59*	-10.55	-10.50	-10.45	-10.39	-10.36
Hungary	2.07	-10.74	-10.99*	-10.98	-10.93	-10.91	-10.84	-10.76	-10.69
India	1.34	-12.33	-12.58*	-12.57	-12.53	-12.46	-12.39	-12.36	-12.30
Indonesia	4.17	-7.21	-7.51	-7.56	-7.63	-7.77	-7.79	-7.79*	-7.75
Mexico	-0.02	-12.90	-12.93	-12.98	-12.94	-13.02*	-12.93	-12.91	-12.89
Philippines	-2.27	-14.02	-14.07*	-14.04	-13.94	-13.91	-13.81	-13.94	-13.90
Poland	2.09	-10.32	-10.52*	-10.44	-10.41	-10.31	-10.23	-10.16	-10.09
Russia	-0.12	-10.98	-11.17*	-11.13	-11.13	-11.15	-11.10	-10.99	-10.95
South Africa	0.30	-10.48	-10.71*	-10.65	-10.57	-10.51	-10.45	-10.37	-10.30
South Korea	2.31	-10.40	-10.50	-10.52*	-10.50	-10.50	-10.50	-10.49	-10.51
Turkey	6.28	-9.23	-9.61	-9.61*	-9.55	-9.59	-9.58	-9.54	-9.50

Table B.4: Robustness Results of Diagnostic Tests

VAR Equation 1; EXC = EXC$(m+n)$ + BOIL$(m+n)$ + RSR$(m+n)$ + MI$(m+n)$ + dummy variable + C

VAR Equation 2; BOIL = EXC$(m+n)$ + BOIL$(m+n)$ + RSR$(m+n)$ + MI$(m+n)$ + dummy variable + C

VAR Equation 3; RSR = EXC$(m+n)$ + BOIL$(m+n)$ + RSR$(m+n)$ + MI$(m+n)$ + dummy variable + C

VAR Equation 4; MI = EXC$(m+n)$ + BOIL$(m+n)$ + RSR$(m+n)$ + MI$(m+n)$ + dummy variable + C

Countries	**Equation**	**m**	**n**	**Roots**	**Structural Break Point**	**Auto correlation**	**Heterosce dasticity**
Brazil	EQN 1	1	2	stable	1999-07	no	yes
	EQN 2	1	2	stable	2000-10	no	yes
	EQN 3	1	2	stable	1999-09	yes	yes
	EQN 4	1	2	stable	2009-01	no	yes

Table B.4: Robustness Results of Diagnostic Tests (cont'd)

Countries	Equation	m	n	Roots	Structural Break Point	Auto correlation	Heterosce dasticity
Chile	EQN 1	1	2	stable	2008-11	no	yes
	EQN 2	1	2	stable	2002-09	no	yes
	EQN 3	1	2	stable	2009-05	no	yes
	EQN 4	1	2	stable	2013-04	yes	yes
Colombia	EQN 1	1	2	stable	2014-11	no	yes
	EQN 2	1	2	stable	2006-09	no	yes
	EQN 3	1	2	stable	2007-06	no	no
	EQN 4	1	2	stable	2010-12	yes	no
Czech Republic	EQN 1	1	2	stable	2008-08	no	yes
	EQN 2	1	2	stable	2007-09	no	yes
	EQN 3	1	2	stable	2013-01	yes	yes
	EQN 4	1	2	stable	2000-02	no	yes
Greece	EQN 1	1	3	stable	2008-12	no	yes
	EQN 2	1	3	stable	1999-01	no	no
	EQN 3	1	3	stable	2009-08	yes	yes
	EQN 4	1	3	stable	2009-01	yes	yes
Hungary	EQN 1	1	2	stable	2008-08	no	yes
	EQN 2	1	2	stable	2007-09	no	yes
	EQN 3	1	2	stable	2011-01	yes	yes
	EQN 4	1	2	stable	2003-07	yes	yes
India	EQN 1	1	2	stable	2013-05	yes	yes
	EQN 2	1	2	stable	2012-07	no	yes
	EQN 3	1	2	stable	2000-12	no	yes
	EQN 4	1	2	stable	2011-04	no	yes
Indonesia	EQN 1	1	7	stable	1998-03	yes	yes
	EQN 2	1	7	stable	2001-10	yes	yes
	EQN 3	1	7	stable	2001-03	no	yes
	EQN 4	1	7	stable	1998-04	yes	no
Mexico	EQN 1	1	5	stable	1998-01	yes	yes
	EQN 2	1	5	stable	2000-12	no	yes
	EQN 3	1	5	stable	1998-10	yes	yes
	EQN 4	1	5	stable	2000-08	no	yes
Philippines	EQN 1	1	2	stable	2004-04	no	no
	EQN 2	1	2	stable	2007-10	no	yes
	EQN 3	1	2	stable	2014-01	yes	yes
	EQN 4	1	2	stable	2012-06	no	no

Table B.4: Robustness Results of Diagnostic Tests (cont'd)

Countries	Equation	m	n	Roots	Structural Break Point	Auto correlation	Heterosce dasticity
Poland	EQN 1	1	2	stable	2008-08	no	yes
	EQN 2	1	2	stable	2000-12	no	yes
	EQN 3	1	2	stable	2003-05	no	yes
	EQN 4	1	2	stable	2003-05	no	no
Russia	EQN 1	1	2	stable	2014-05	yes	yes
	EQN 2	1	2	stable	2009-01	no	yes
	EQN 3	1	2	stable	2001-12	yes	yes
	EQN 4	1	2	stable	2001-12	no	yes
South Africa	EQN 1	1	2	stable	2002-01	no	no
	EQN 2	1	2	stable	2008-08	no	yes
	EQN 3	1	2	stable	2003-12	no	yes
	EQN 4	1	2	stable	2008-11	no	yes
South Korea	EQN 1	1	3	stable	1998-01	yes	yes
	EQN 2	1	3	stable	1999-03	no	no
	EQN 3	1	3	stable	1999-08	no	yes
	EQN 4	1	3	stable	2009-02	no	yes
Turkey	EQN 1	1	3	stable	2001-02	no	yes
	EQN 2	1	3	stable	1994-06	no	yes
	EQN 3	1	3	stable	2002-02	no	no
	EQN 4	1	3	stable	1994-06	yes	yes

Table B.5: Robustness Causality Results of Emerging Countries

	CAUSALITY BETWEEN EXC AND RSR				CAUSALITY BETWEEN EXC AND OIL			
	From EXC to RSR		From RSR to EXC		From EXC to BOIL		From BOIL to EXC	
Country	F-stat.	p-value	F-stat.	p-value	F-stat.	p-value	F-stat.	p-value
Brazil	4.421	0.013	0.328	0.721	7.931	0.001	2.040	0.132
Chile	1.888	0.153	0.201	0.818	2.983	0.052	0.672	0.511
Colombia	2.584	0.079	0.046	0.955	20.88	0.000	0.629	0.535
Czech Republic	1.359	0.259	0.267	0.766	3.107	0.047	1.862	0.158
Greece	0.864	0.460	0.180	0.910	4.336	0.005	1.985	0.117
Hungary	1.155	0.317	0.464	0.629	3.640	0.028	0.561	0.571
India	1.573	0.209	1.013	0.365	4.408	0.013	0.534	0.587
Indonesia	3.232	0.003	1.752	0.098	1.855	0.078	1.091	0.369
Mexico	2.952	0.013	0.438	0.822	0.900	0.481	1.320	0.256
Philippines	1.716	0.183	0.034	0.966	1.072	0.345	0.289	0.749
Poland	0.888	0.413	4.455	0.013	3.860	0.023	1.163	0.314
Russia	1.564	0.212	1.247	0.290	6.738	0.002	2.173	0.117
South Africa	0.739	0.479	1.327	0.267	1.893	0.153	3.929	0.021
South Korea	3.793	0.011	0.500	0.682	6.420	0.000	0.338	0.798
Turkey	0.467	0.705	1.791	0.149	1.592	0.191	0.600	0.615

	CAUSALITY BETWEEN RSR AND OIL				CAUSALITY BETWEEN RSR AND MI			
	From RSR to BOIL		From BOIL to RSR		From RSR to MI		From MI to RSR	
Country	F-stat.	p-value	F-stat.	p-value	F-stat.	p-value	F-stat.	p-value
Brazil	2.253	0.777	2.398	0.093	1.869	0.157	0.615	0.541
Chile	2.738	0.066	0.714	0.490	1.428	0.242	1.935	0.146
Colombia	1.375	0.256	0.010	0.905	1.121	0.329	0.668	0.514
Czech Republic	0.681	0.507	0.468	0.627	0.079	0.924	1.485	0.229
Greece	0.908	0.438	0.140	0.936	0.195	0.900	2.217	0.087
Hungary	1.126	0.326	2.081	0.127	0.547	0.580	0.299	0.742
India	4.323	0.014	0.305	0.738	2.030	0.134	0.244	0.783
Indonesia	1.861	0.077	0.288	0.958	2.194	0.035	1.234	0.284
Mexico	2.200	0.055	0.799	0.551	2.150	0.060	0.103	0.992
Philippines	0.502	0.606	3.074	0.049	0.926	0.398	0.732	0.482
Poland	0.644	0.526	2.324	0.100	0.692	0.502	0.404	0.668
Russia	1.268	0.284	0.555	0.575	1.092	0.338	1.560	0.213
South Africa	1.448	0.237	1.363	0.258	0.360	0.698	1.206	0.301
South Korea	0.248	0.863	3.021	0.030	0.292	0.831	2.180	0.090
Turkey	2.427	0.066	0.704	0.551	1.284	0.280	0.227	0.878

Table B.5: Robustness Causality Results of Emerging Countries (cont'd)

	CAUSALITY BETWEEN MI AND OIL				CAUSALITY BETWEEN MI AND EXC			
	From MI to BOIL		From BOIL to MI		From MI to EXC		From EXC to MI	
Country	F-stat.	p-value	F-stat.	p-value	F-stat.	p-value	F-stat.	p-value
Brazil	4.454	0.013	5.685	0.004	1.475	0.231	7.452	0.001
Chile	4.912	0.008	1.602	0.203	0.466	0.628	2.376	0.095
Colombia	4.650	0.011	0.943	0.392	0.649	0.524	0.110	0.896
Czech Republic	0.283	0.754	1.371	0.256	0.928	0.397	0.776	0.462
Greece	1.525	0.209	1.116	0.343	0.917	0.434	0.962	0.411
Hungary	0.469	0.626	2.512	0.083	2.029	0.134	0.436	0.647
India	0.198	0.820	1.073	0.344	3.647	0.027	3.626	0.028
Indonesia	1.178	0.316	1.580	0.142	0.896	0.510	3.381	0.002
Mexico	1.950	0.087	0.966	0.439	2.022	0.076	3.619	0.004
Philippines	0.613	0.543	16.427	0.000	0.424	0.655	6.023	0.003
Poland	3.640	0.028	3.958	0.020	2.007	0.137	3.337	0.037
Russia	5.544	0.005	4.165	0.017	2.101	0.125	1.774	0.172
South Africa	0.091	0.913	4.068	0.018	1.005	0.368	1.681	0.188
South Korea	1.837	0.140	1.839	0.140	4.681	0.003	3.187	0.024
Turkey	0.966	0.409	0.675	0.568	0.557	0.644	3.568	0.015

Table B.6: Summary of Robustness Causality Relations

	CAUSALITY BETWEEN EXC AND RSR		CAUSALITY BETWEEN EXC AND OIL	
Country	**From EXC to RSR**	**From RSR to EXC**	**From EXC to BOIL**	**From BOIL to EXC**
Brazil	Causality	No causality	Causality	No causality
Chile	No causality	No causality	No causality	No causality
Colombia	Causality	No causality	Causality	No causality
Czech Republic	No causality	No causality	Causality	No causality
Greece	Causality	No causality	Causality	No causality
Hungary	No causality	No causality	Causality	No causality
India	No causality	No causality	Causality	No causality
Indonesia	Causality	No causality	No causality	No causality
Mexico	Causality	No causality	No causality	No causality
Philippines	No causality	No causality	No causality	No causality
Poland	No causality	Causality	Causality	No causality
Russia	No causality	No causality	Causality	No causality
South Africa	No causality	No causality	No causality	Causality
South Korea	Causality	No causality	Causality	No causality
Turkey	No causality	No causality	No causality	No causality

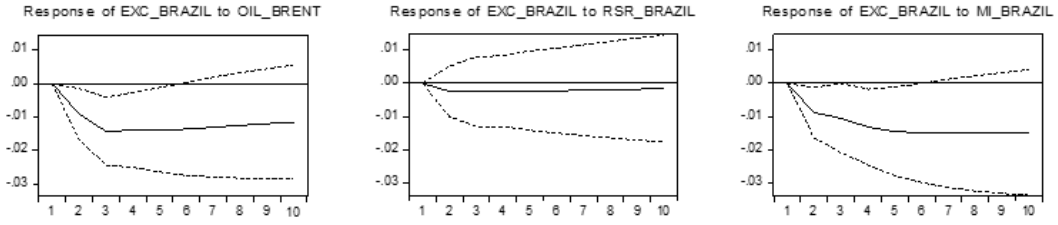
Table B.6: Summary of Robustness Causality Relations (cont'd)

Country	CAUSALITY BETWEEN RSR AND OIL		CAUSALITY BETWEEN RSR AND MI	
	From RSR to BOIL	From BOIL to RSR	From RSR to MI	From MI to RSR
Brazil	No causality	No causality	No causality	No causality
Chile	No causality	No causality	No causality	No causality
Colombia	No causality	No causality	No causality	No causality
Czech Republic	No causality	No causality	No causality	No causality
Greece	No causality	No causality	No causality	No causality
Hungary	No causality	No causality	No causality	No causality
India	Causality	No causality	No causality	No causality
Indonesia	No causality	No causality	Causality	No causality
Mexico	No causality	No causality	No causality	No causality
Philippines	No causality	Causality	No causality	No causality
Poland	No causality	No causality	No causality	No causality
Russia	No causality	No causality	No causality	No causality
South Africa	No causality	No causality	No causality	No causality
South Korea	No causality	Causality	No causality	No causality
Turkey	No causality	No causality	No causality	No causality

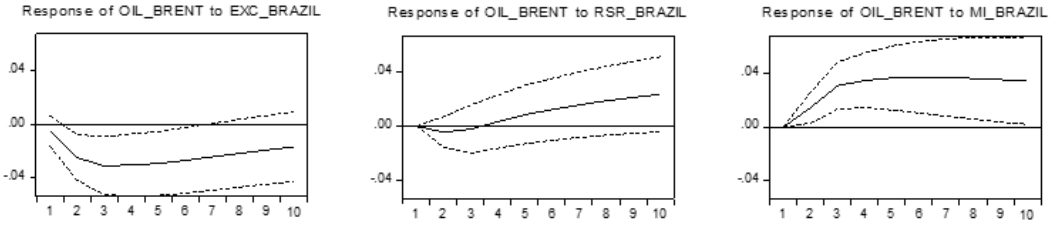
Country	CAUSALITY BETWEEN MI AND OIL		CAUSALITY BETWEEN MI AND EXC	
	From MI to BOIL	From BOIL to MI	From MI to EXC	From EXC to MI
Brazil	Causality	Causality	No causality	Causality
Chile	Causality	No causality	No causality	No causality
Colombia	Causality	No causality	No causality	No causality
Czech Republic	No causality	No causality	No causality	No causality
Greece	No causality	No causality	No causality	No causality
Hungary	No causality	No causality	No causality	No causality
India	No causality	No causality	Causality	Causality
Indonesia	No causality	No causality	No causality	Causality
Mexico	No causality	No causality	No causality	Causality
Philippines	No causality	Causality	No causality	Causality
Poland	Causality	Causality	No causality	Causality
Russia	Causality	Causality	No causality	No causality
South Africa	No causality	Causality	No causality	No causality
South Korea	No causality	No causality	Causality	Causality
Turkey	No causality	No causality	No causality	Causality

BRAZIL

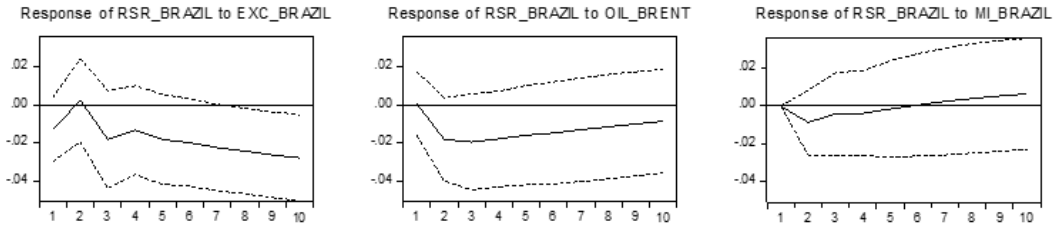
Responses of Exchange Rates;



Responses of Brent Oil Prices;



Responses of Real Stock Returns;



Responses of Manufacturing Indices;

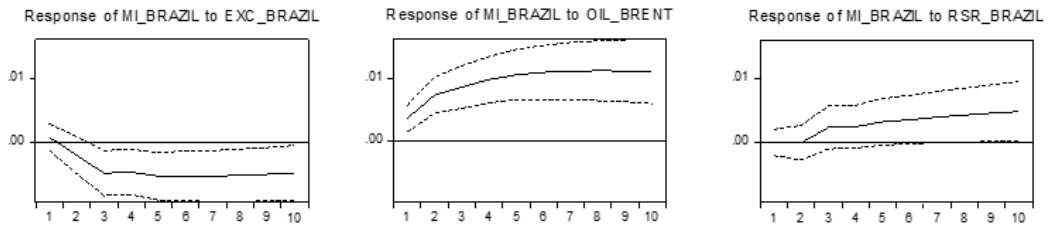
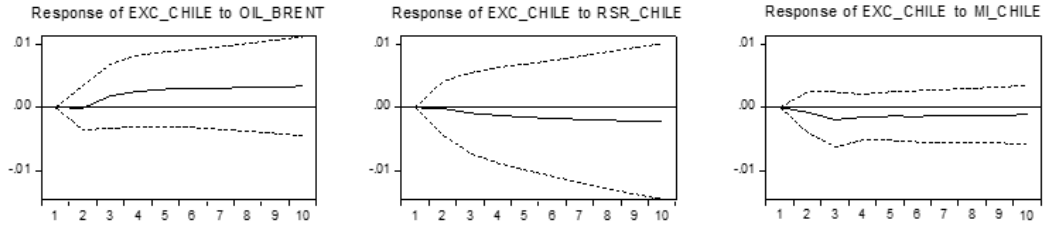


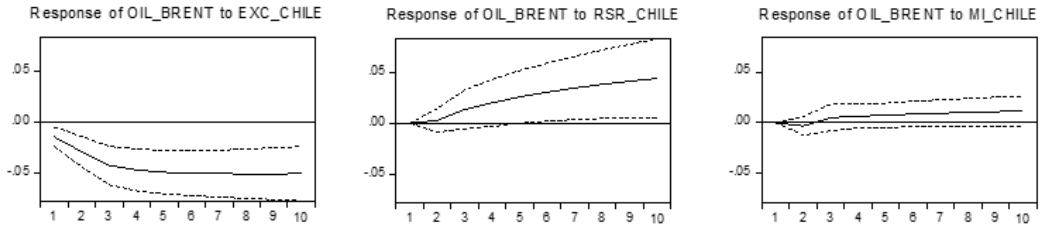
Figure B.1: Impulse Responses of Robustness Check

CHILE

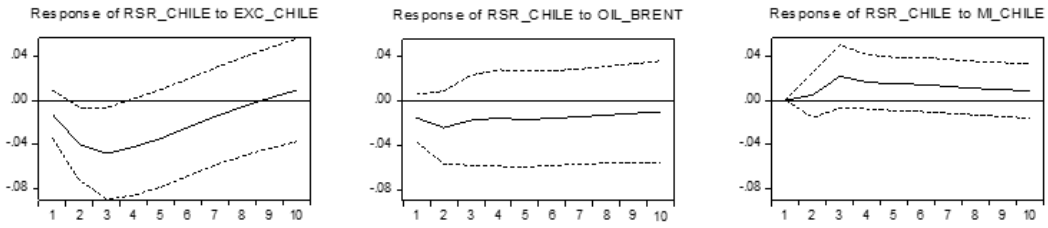
Responses of Exchange Rates;



Responses of Brent Oil Prices;



Responses of Real Stock Returns;



Responses of Manufacturing Indices;

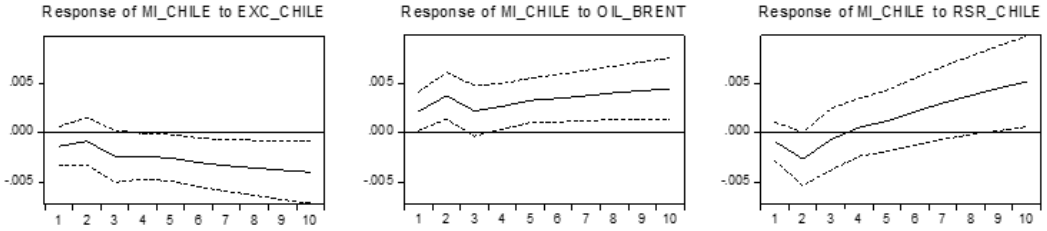
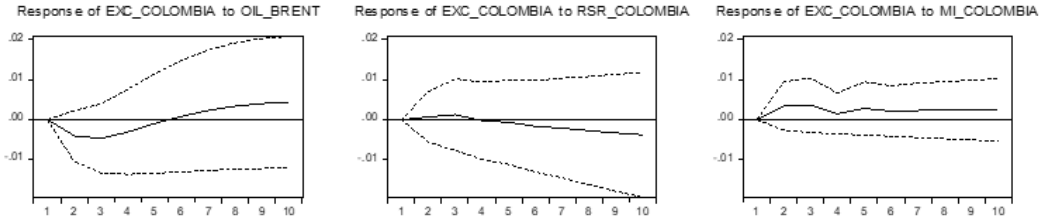


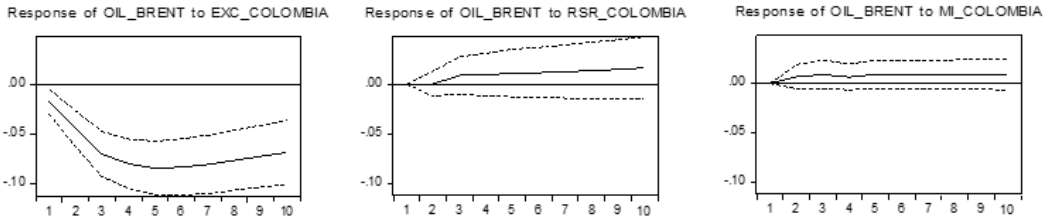
Figure B.1: Impulse Responses of Robustness Check (cont'd)

COLOMBIA

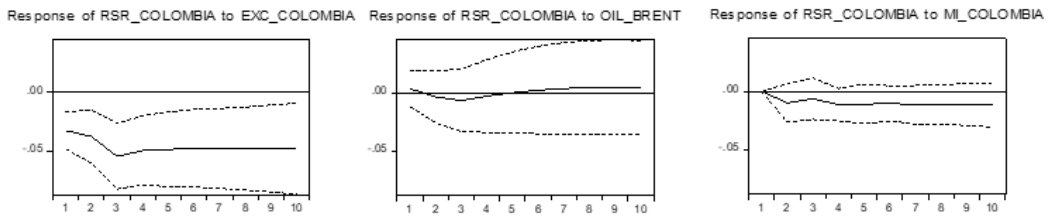
Responses of Exchange Rates;



Responses of Brent Oil Prices;



Responses of Real Stock Returns;



Responses of Manufacturing Indices;

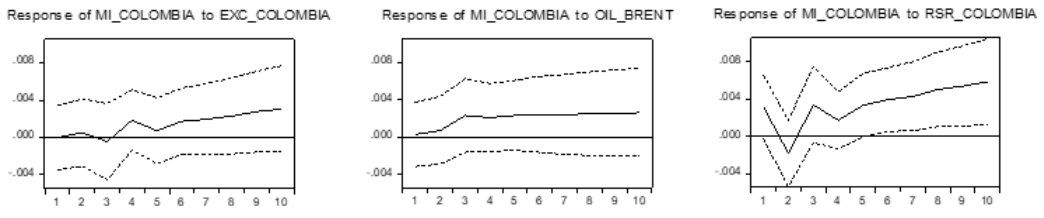
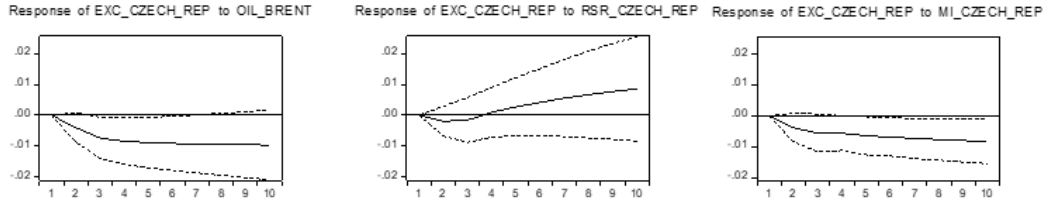


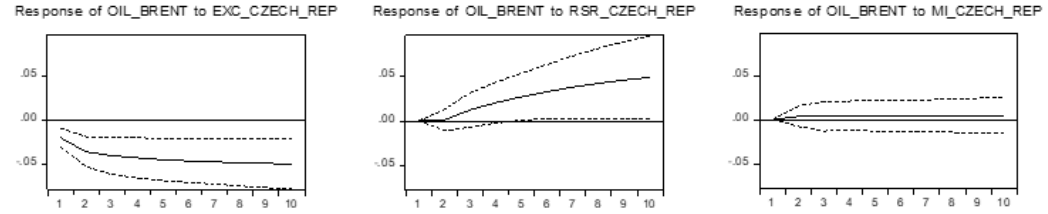
Figure B.1: Impulse Responses of Robustness Check (cont'd)

CZECH REPUBLIC

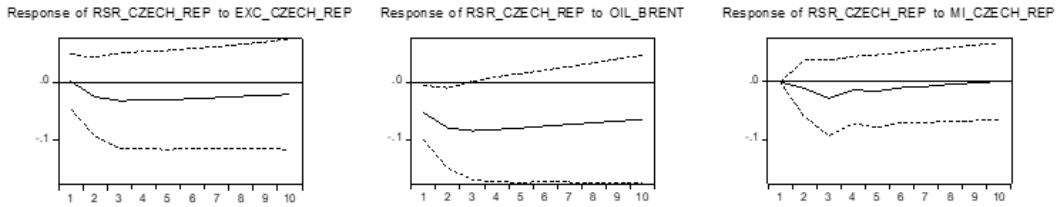
Responses of Exchange Rates;



Responses of Brent Oil Prices;



Responses of Real Stock Returns;



Responses of Manufacturing Indices;

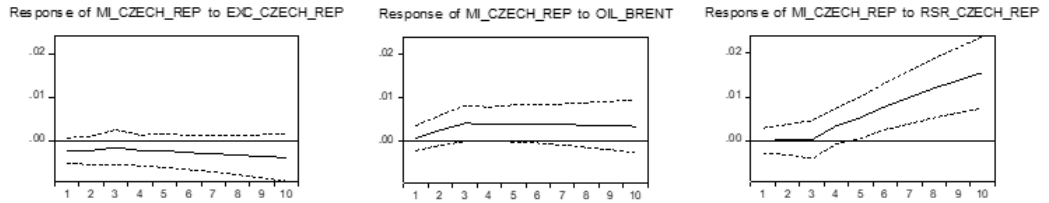
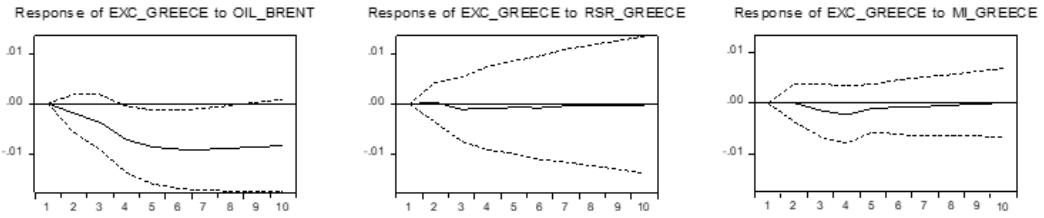


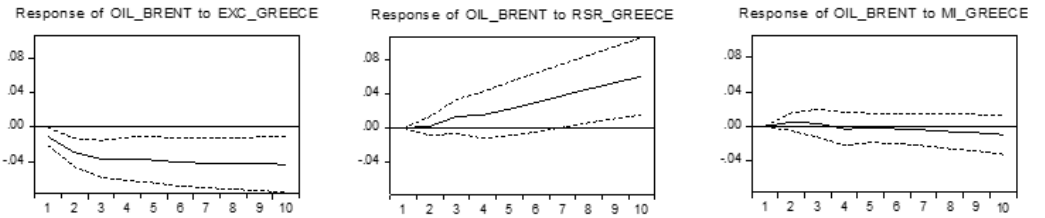
Figure B.1: Impulse Responses of Robustness Check (cont'd)

GREECE

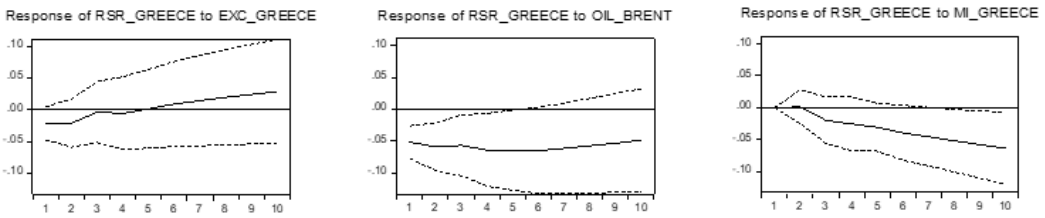
Responses of Exchange Rates;



Responses of Brent Oil Prices;



Responses of Real Stock Returns;



Responses of Manufacturing Indices;

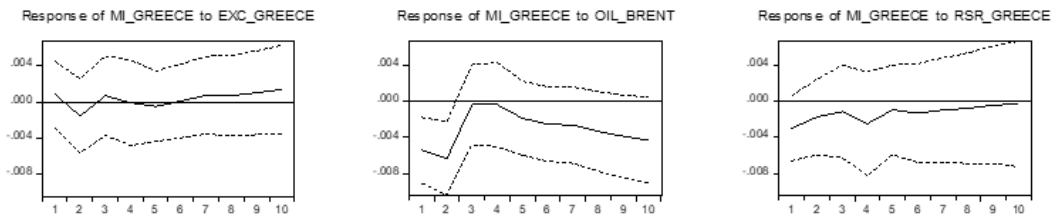
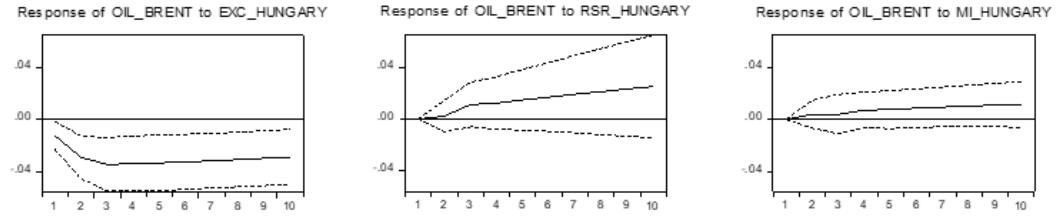


Figure B.1: Impulse Responses of Robustness Check (cont'd)

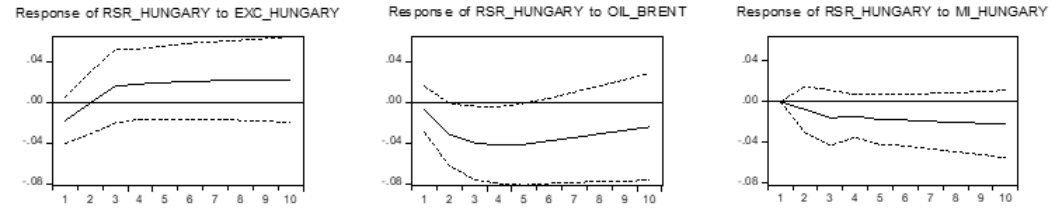
HUNGARY

Responses of Exchange Rates;

Responses of Brent Oil Prices;



Responses of Real Stock Returns;



Responses of Manufacturing Indices;

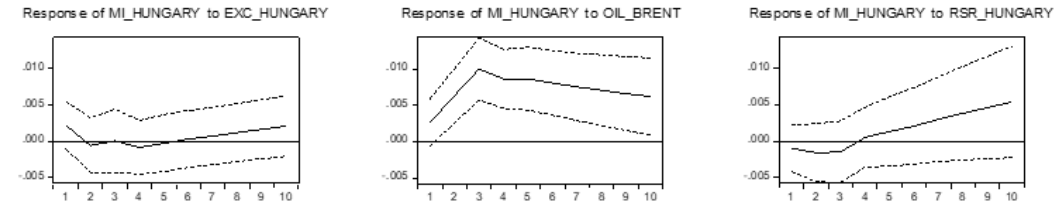
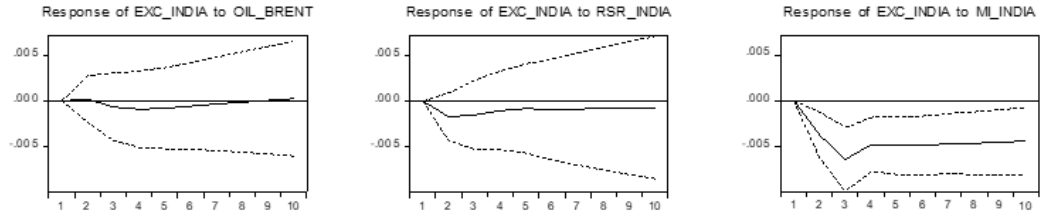


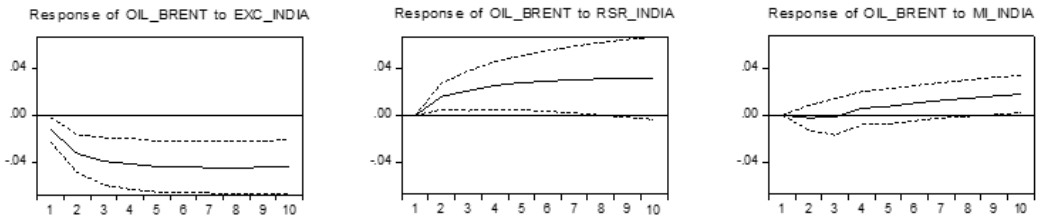
Figure B.1: Impulse Responses of Robustness Check (cont'd)

INDIA

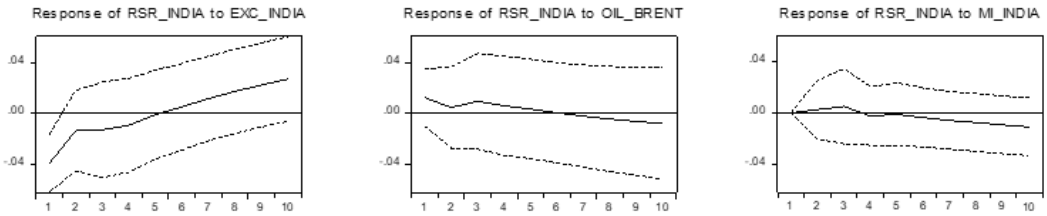
Responses of Exchange Rates;



Responses of Brent Oil Prices;



Responses of Real Stock Returns;



Responses of Manufacturing Indices;

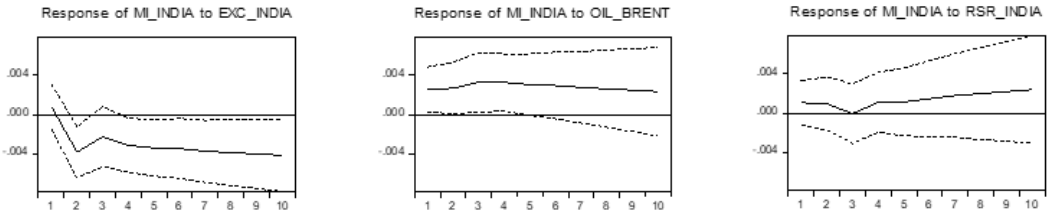
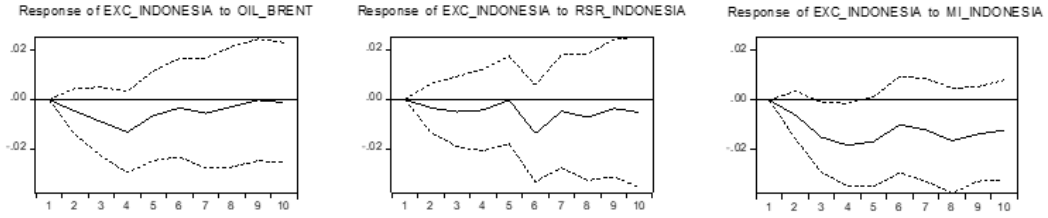


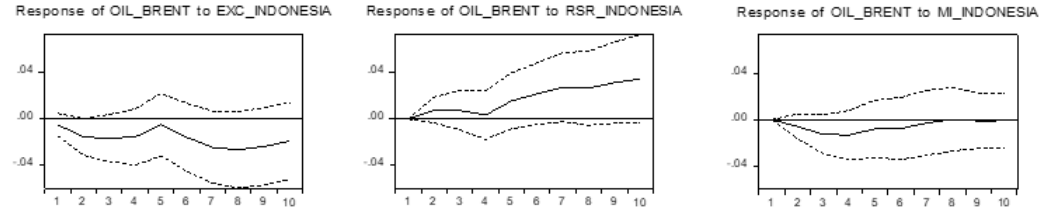
Figure B.1: Impulse Responses of Robustness Check (cont'd)

INDONESIA

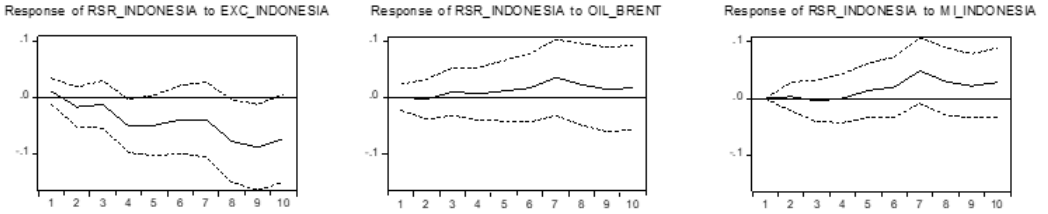
Responses of Exchange Rates;



Responses of Brent Oil Prices;



Responses of Real Stock Returns;



Responses of Manufacturing Indices;

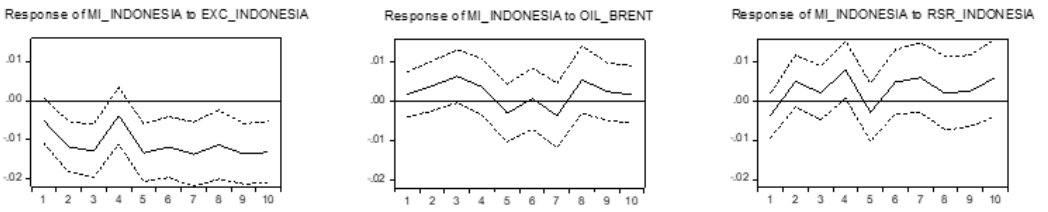
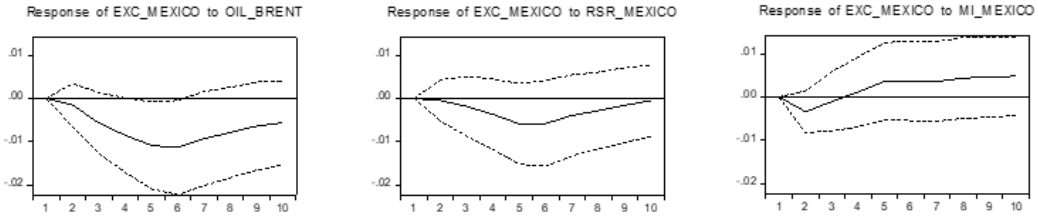


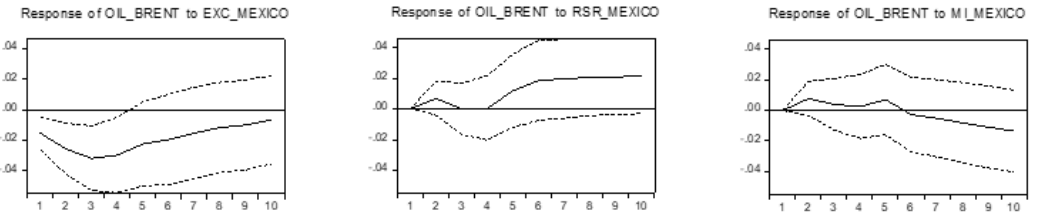
Figure B.1: Impulse Responses of Robustness Check (cont'd)

MEXICO

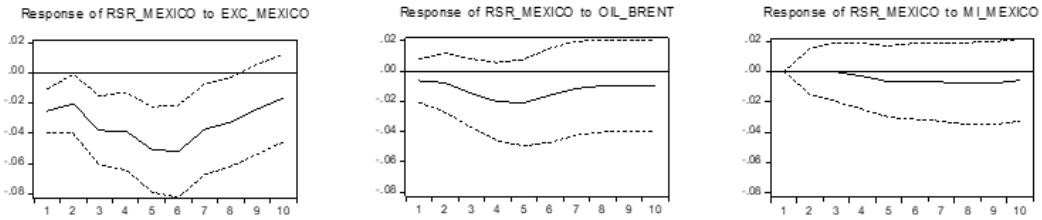
Responses of Exchange Rates;



Responses of Brent Oil Prices;



Responses of Real Stock Returns;



Responses of Manufacturing Indices;

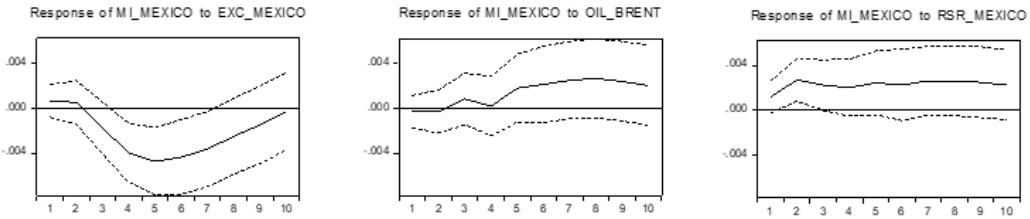
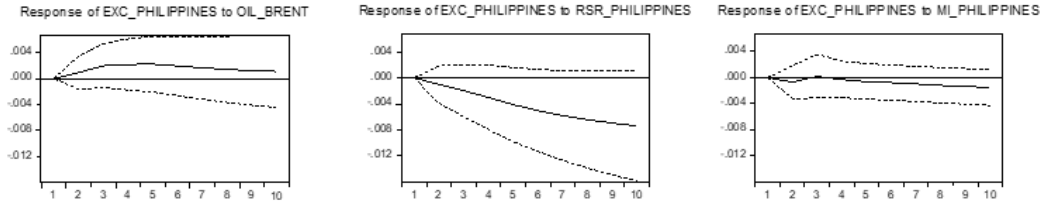


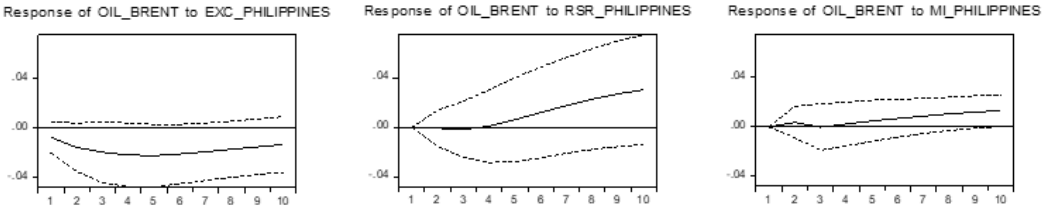
Figure B.1: Impulse Responses of Robustness Check (cont'd)

PHILLIPINES

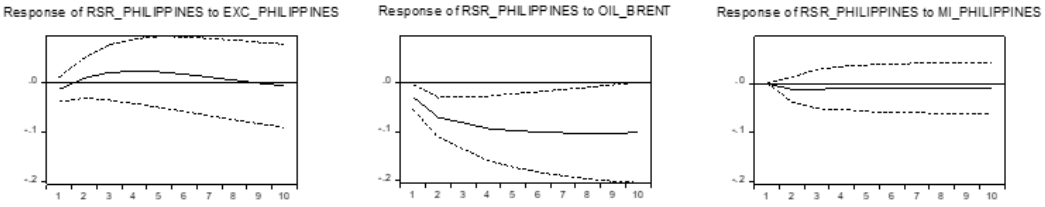
Responses of Exchange Rates;



Responses of Brent Oil Prices;



Responses of Real Stock Returns;



Responses of Manufacturing Indices;

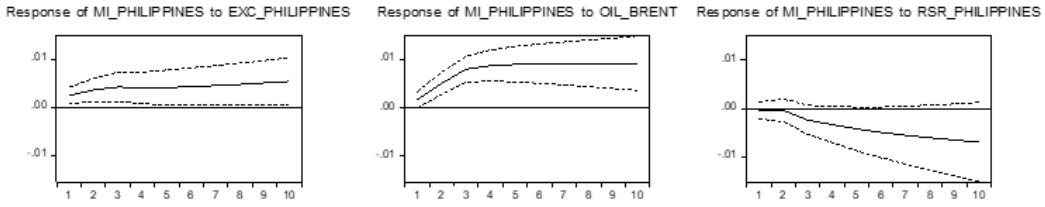
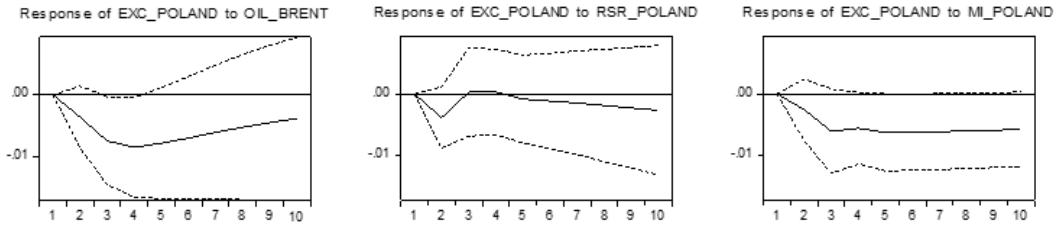


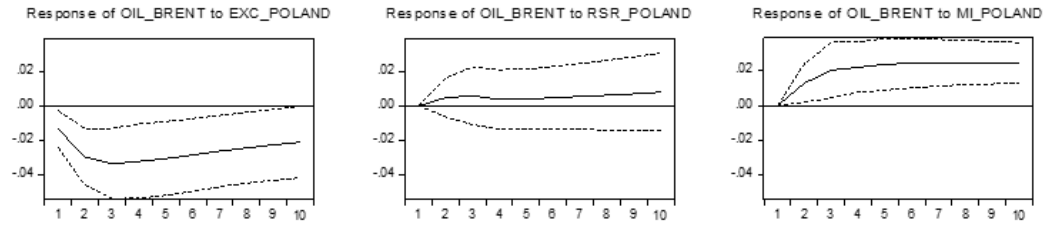
Figure B.1: Impulse Responses of Robustness Check (cont'd)

POLAND

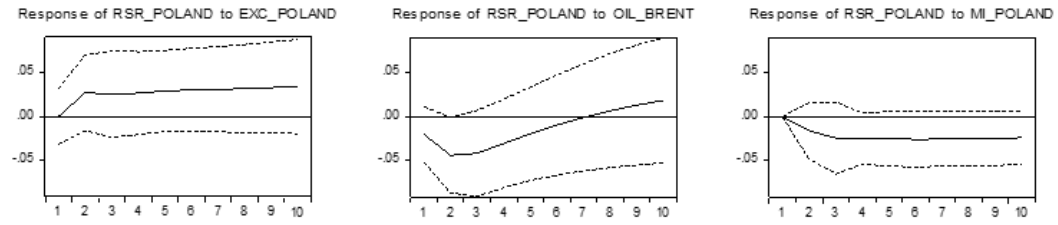
Responses of Exchange Rates;



Responses of Brent Oil Prices;



Responses of Real Stock Returns;



Responses of Manufacturing Indices;

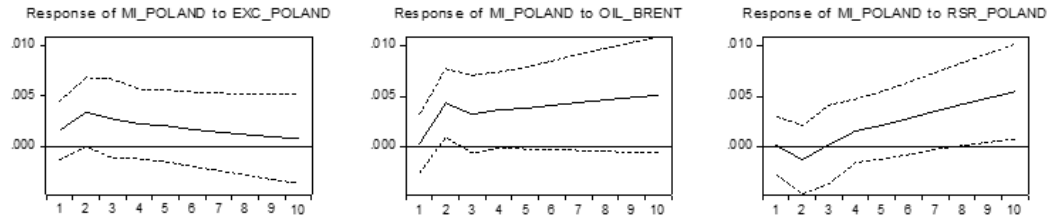
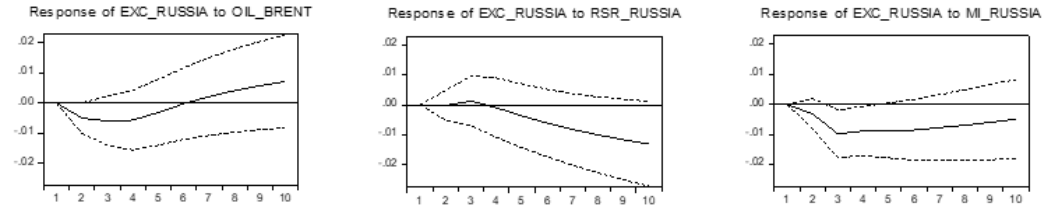


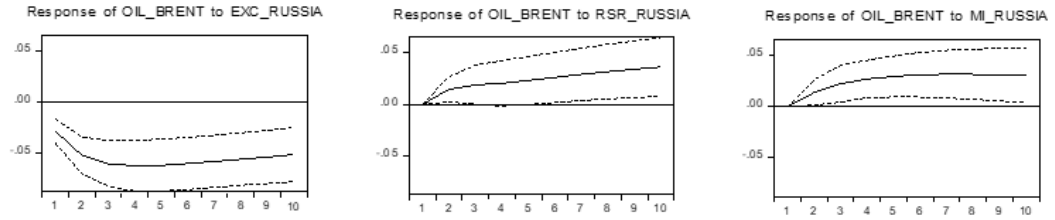
Figure B.1: Impulse Responses of Robustness Check (cont'd)

RUSSIA

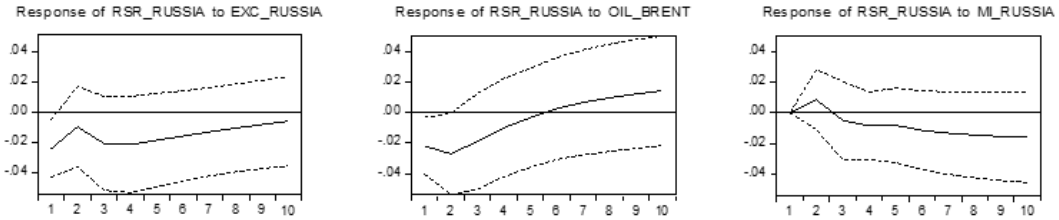
Responses of Exchange Rates;



Responses of Brent Oil Prices;



Responses of Real Stock Returns;



Responses of Manufacturing Indices;

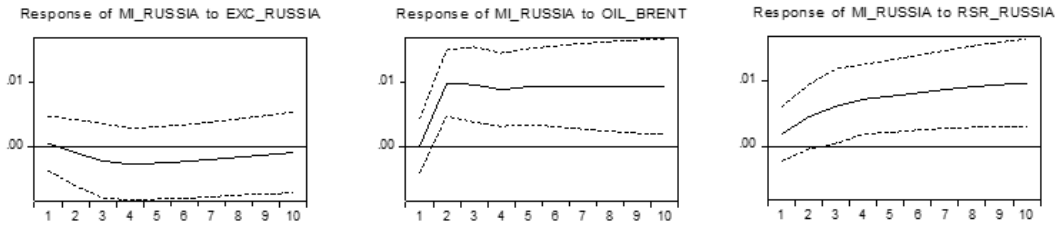
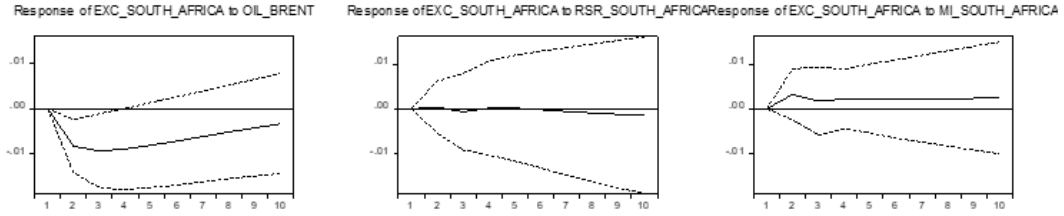


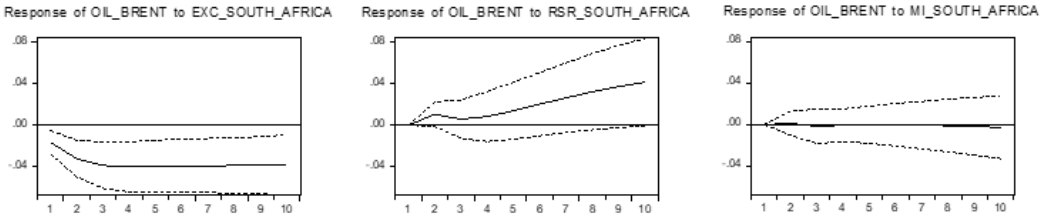
Figure B.1: Impulse Responses of Robustness Check (cont'd)

SOUTH AFRICA

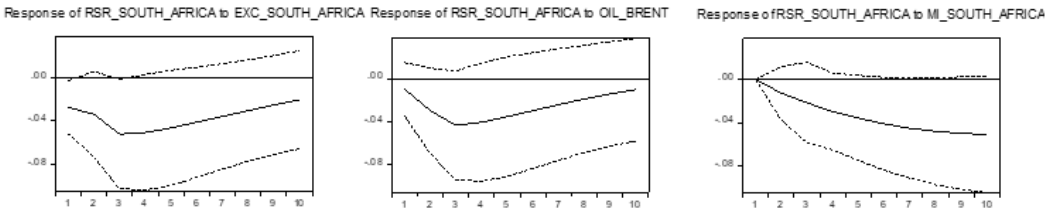
Responses of Exchange Rates;



Responses of Brent Oil Prices;



Responses of Real Stock Returns;



Responses of Manufacturing Indices;

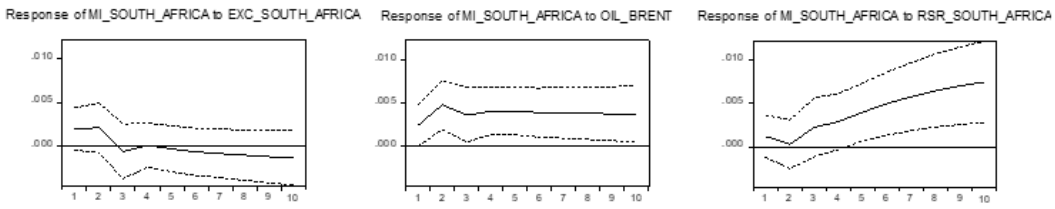
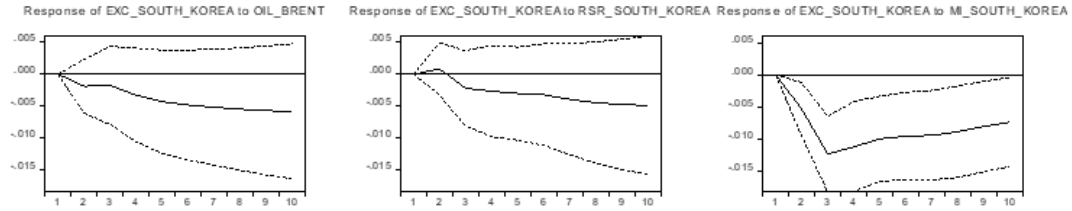


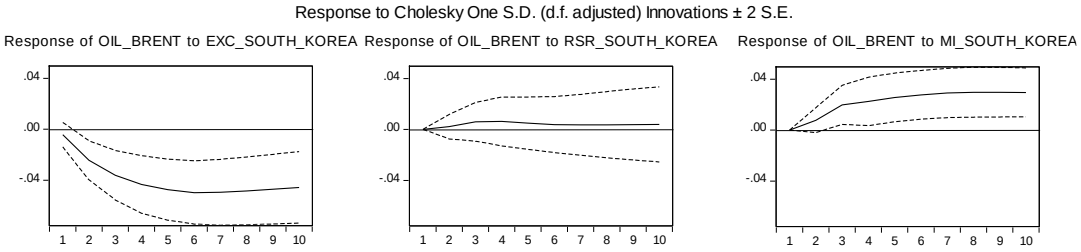
Figure B.1: Impulse Responses of Robustness Check (cont'd)

SOUTH KOREA

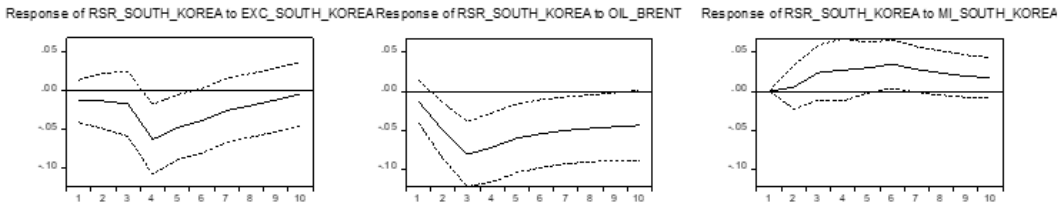
Responses of Exchange Rates;



Responses of Brent Oil Prices;



Responses of Real Stock Returns;



Responses of Manufacturing Indices;

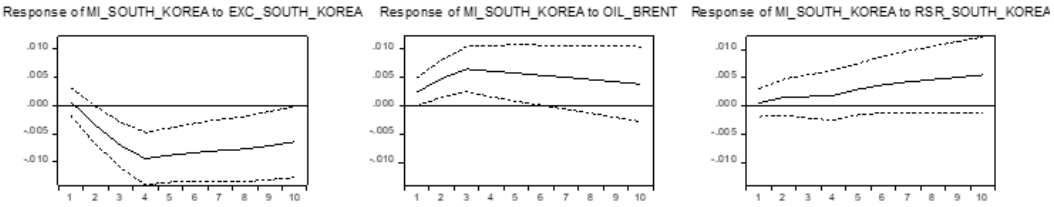
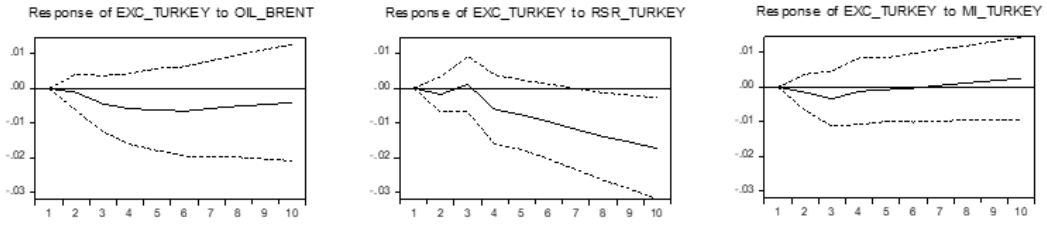


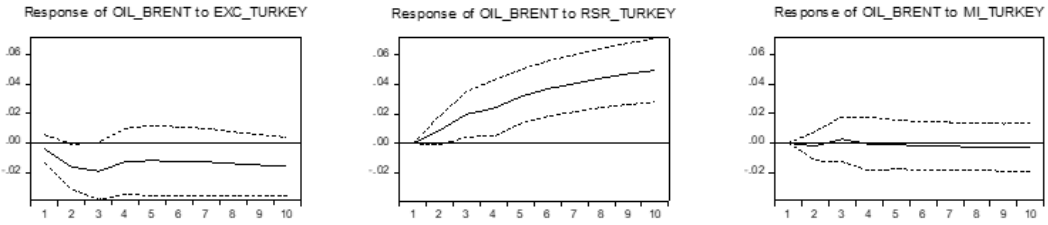
Figure B.1: Impulse Responses of Robustness Check (cont'd)

TURKEY

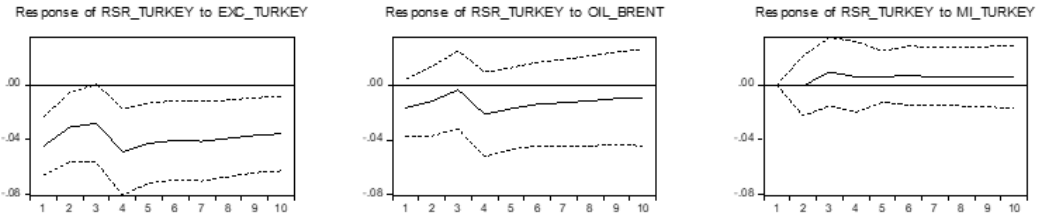
Responses of Exchange Rates;



Responses of Brent Oil Prices;



Responses of Real Stock Returns;



Responses of Manufacturing Indices;

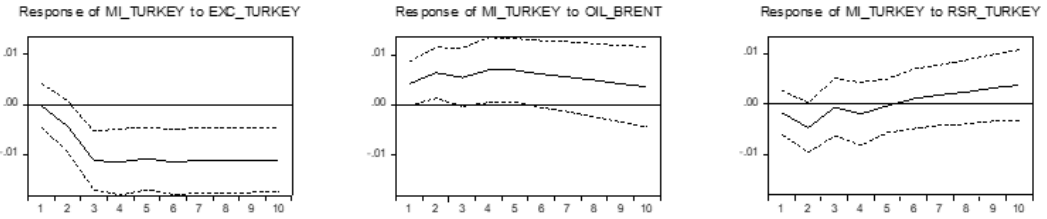


Figure B.1: Impulse Responses of Robustness Check (cont'd)

APPENDIX C: TURKISH SUMMARY/TÜRKÇE ÖZET

PETROL FİYATLARI, DÖVİZ KURLARI, HİSSE SENEDİ PİYASALARI VE ENDÜSTRİYEL ÜRETİMLER ARASINDAKİ İLİŞKİ: GELİŞMEKTE OLAN ÜLKELER ANALİZİ

1. Giriş

Petrol piyasası, bir ülkenin ekonomik ve finansal hareketlerini etkileyen güçlü bir piyasadır. Petrol piyasasının potansiyel etkilere göre belirlenmiş makroekonomik değişkenlerle olan ilişkisini inceleyen oldukça fazla sayıda çalışma bu konuya dikkat çekmiştir. Literatürde, ham petrol fiyatları ve makroekonomik değişkenler arasındaki bağlardan biri petrol fiyatları ve döviz kurları arasındaki ilişkiyle dikkat çekilmiştir. Döviz kurlarındaki herhangi bir değişikliğe sebep olan aksaklık petrol bağımlı ülkeler üzerinde finansal baskı yaratır açıklamasıyla petrol fiyatlarının döviz kurları üzerindeki etkisi açıklanabilir. Bu etkinin yanında, bir ülkenin ticaret dengesi döviz kurlarındaki dalgalanmalardan etkilenebilir ve bu denge yerel para birimi dengesine Fratzscher (2014)'in çalışmasında yansıtılmıştır. Bunun yanı sıra, arz talep zinciri bu dalgalanmalara göre şekillenmektedir ve bu durum ülkelerin doğrudan üretim sürecini etkilemektedir. Bu bağlamda endüstriyel üretim maliyetleri de petrol fiyatlarını imalat endekslerine bağlayan ayırt edici bir faktör olarak görünmektedir.

Ayrıca, literatürde üretim süreçleri ve bu hareketlenmelerin hisse senedi piyasasındaki getirisi arasındaki ilişki de incelenmiştir. Tüketici taleplerinin sektörlerdeki üretim ile bağdaştırılmasından ve ülkenin ekonomik durumuna yansımasından dolayı endüstriyel üretim ekonomik büyüme için öncü bir faktör olarak durmaktadır. Bu sebepten ekonomik ve finansal performanslar, endüstriyel üretim ve

reel hisse senedi getirileri değişkenleri ile birbirine bağlanabilir. Drobetz (2000), sadece endüstriyel üretimin bir ülkenin ekonomik gelişimi hakkında verebilmesini değil, nakit akışının gelecek beklentisinin de üretim seviyesini şekillendirebileceğini öngörmüştür. Bu iddia hisse senedi getirilerinin tahmin edilebilmesi ve yorumlanabilmesine imkân sağlamaktadır.

Döviz kuru seviyelerinde karşılaşılan bu değişimlere göre yatırımcılar, yabancı sermayeler yoluyla desteklenecek ve ekonomik fırsat yaratacak yatırım karalarını gözden geçirebilirler. Gelişmekte olan ülkeler için yatırım fırsatlarını elde tutabilmek gözden geçirilmeye değerdir ve yabancı yatırımcılara bu atraksiyonları sağlamak ekonomik refahı arttırabilmek için önemli bir konudur. Hisse senedi piyasaları ve döviz kurlarının birbirlerini nasıl etkilediğini anlayabilmek araştırılması önemli bir kavram olarak yerini korumaktadır. Üretim ve hisse senedi getirilerinin yakın ilişkisi nedeniyle bir ülkenin üretim seviyesinin hisse senedi getirileri üzerinde önemli bir etkisi olduğu varsayılabilir.

Bu çalışmanın amacı daha önce birçok çalışmada araştırılmış değişkenler arasındaki ilişkileri birleştirmektir. Bu çalışmaya bir değişken daha eklenerek kapsamının genişletilmesi analizi güçlendirebilir ve bir ülkenin iç dinamiklerini açıklamakta daha kesin sonuçlar sağlayabilir. Bunun yanında, her değişken ampirik araştırmanın sonuçlarındaki yorumları tamamlayabilir ve bir değişkenin analizden çıkarılması analizi eksik kalması için yatkın hale getirebilir.

Gelişmekte olan ülkeler, ekonomik ve finansal fırsatları takip etmek için gelişmiş ülkelerden daha istekli çabalar ortaya koyabilir. Gelişmiş ülkelerin daha durağan dengeleri olmasına rağmen gelişmekte olan ülkeler bir şok ile karşılaşması durumunda tanzim edilmemiş dengeleri sebebiyle daha kırılgan ve kararsız bir durum ortaya koyabilirler. Bir değişkende gerçekleşen değişikliğin gözlemi diğer değişkene olan bağlılığı gösterebilir ve değişkenler arasındaki ilişki gelişmekte olan ülkeler için daha düzgün bir şekilde incelenebilir. Ayrıca, literatürde değişkenler arasındaki ilişkilerin bir kısmı çalışılmıştır ve gelişmekte olan ülkeler için değişkenleri tamamen birleştiren bir çalışma bulunmamaktadır. Bu çalışma, farklı disiplinleri birleştirerek ve ham petrol fiyatları, döviz kurları, hisse senesi getirileri, ve endüstriyel üretim arasındaki ilişki hakkında ampirik sonuçlar sunarak oluşan boşluğu tamamlayabilir.

Gelişmekte olan ülkeler, Ocak 1990 ve Aralık 2016 arasındaki aylık veriyi kapsayacak şekilde seçilmiştir. Döviz kurları, petrol fiyatları, hisse senedi getirileri ve endüstriyel üretim arasında yakın bir ilişki olduğu varsayılmıştır ve her nedensellik ilişkisi, ilişkinin yönünün belirlenmesi için incelenmiştir. Toda Yamamoto Wald test prosedürü bu yapı için takip edilmiştir. Değişkenler arasındaki analizi tamamlamak için Eviews aracı olan Etki Tepki fonksiyonu kullanılmıştır ve grafikler sonuçlardan elde edilen yorumları desteklemek için çizilmiştir.

2. Literatür Taraması

Enerji fiyatları, hisse senedi getirileri, döviz kurları ve belirlenen çalışma alanının dinamikleriyle değerlendirilen ekonomik faaliyet arasındaki ilişkiye odaklanan çok sayıda araştırma yürütülmüştür. Belirlenen zaman aralıklarında değişkenlerin kısa ve uzun dönem etkilerine dikkate değer bir önem verilmiştir. Panel veri tahminlenmesi ve genellikle zaman serileri analizleriyle bu ilişkiyi inceleyebilmek için geniş bölgeler araştırılmıştır.

Bu amaçla, İslami ve Welfens (2013) hisse senedi getirileri ve döviz kurları arasındaki ilişkiyi dört ülke, Çek Cumhuriyeti, Macaristan, Polonya ve Slovenya, için incelemiştir. Benzer değişkenler Huang ve Yang (2000) tarafından hisse senedi piyasaları ve döviz kurları arasında incelenmiştir. Elde ettikleri sonuçlar, hisse senedi piyasasındaki değişikliklerin döviz kurlarını etkilediğini ya da tam tersi yöndeki etkileşimin de gerçekleştiğini göstermektedir.

Hisse senedi ve endüstriyel üretim Tsagkanos ve Siriopoulos (2015)'in çalışması ile Kuzey ve Güney Avrupa bölgesi için bağdaştırılmıştır. Değişkenlerde meydana gelen bir şok sonucu hisse senedi fiyatları ve endüstriyel üretimin dengeye gelme hızı uzun dönemde panel ve kümeleme yönteminde farklılık göstermektedir. Endüstriyel üretim ve hisse senedi piyasası arasındaki bağlantı Chang ve Pinegar (1989) çalışmasında da vurgulanmıştır. Büyük ölçekteki firmaların hisse senedi getirilerinin reel büyüme üzerinde mevsimsel bir etkisi olduğu sonucuna dikkat çekmişlerdir.

Degiannakis, Filis ve Kizys (2014) petrol fiyatları ve hisse senedi piyasalarındaki oynaklık ilişkiyi Avrupa bölgesi için yürütmüşlerdir. Değişkenler arasında bağ

kurabilmek için petrol fiyatlarında yaşanan şokları Brent petrol fiyatları üzerinden tanımlanmışlardır. Bulmuş oldukları sonuçlara göre, arz yanlı ve petrol özelinde yaşanan talep şokları hisse senedi oynaklığından önemli bir etki yaratamamaktadır. Bir diğer yaklaşım Guesmi ve Fattum (2014) tarafından 10 OECD ülkesinde petrol fiyatlarındaki değişikliğin hisse senedi getirileri üzerinde etkisi olup olmadığı incelenmiştir. Bulguları göstermektedir ki küresel petrol piyasasında petrol fiyatlarında bir şok gözlemlendiğinde, ham petrol fiyatları ve hisse senedi arasındaki ilişki en çok petrol fiyatlarındaki değişimden etkilenmektedir.

Petrol fiyatları ve makroekonomik değişkenler arasındaki ilişkiyi açıklayan öncü çalışma Hamilton (1983) tarafından yapılmıştır. Granger nedensellik sonuçlarına göre, petrol fiyatlarında gerçekleşen bir değişiklik şok ile karşılaşılan periyodu takiben makroekonomik değişkenleri harekete geçirmektedir. Makroekonomik değişkenlerde gözlenen dramatik bir değişikliğin petrol fiyatlarının tahmin edilmesini etkilemesinde az sayıda kanıt bulunmuştur fakat makroekonomik değişkenler tamamen bağımsız olarak değerlendirilmemiştir.

Papapetrou (2001), petrol fiyatları ve hisse senedi piyasaları, endüstriyel üretim, istihdamı içeren ekonomik gelişme arasındaki bağı incelemeyi amaçlamıştır. Papapetrou, gelişmekte olan ülke olarak Yunanistan'ın araştırma sonuçlarını sunmuştur. Bulgularına göre, petrol fiyatlarında karşılaşılan şokların sadece endüstriyel üretim üzerinde değil istihdam ölçümlerinde de önemli etkisi bulunduğunu görülmektedir. Ayrıca, pozitif bir petrol fiyatı şoku ile karşılaşıldığında reel hisse senedi getirileri azalmaktadır.

Bu konuya paralel olarak, Sarı ve Soytaş (2006) hisse senedi getirileri, ham petrol fiyatları ve faiz oranları arasındaki ilişkiyi açıklamak için gelişmekte olan ülke olarak Türkiye verilerini kullanmıştır. Değişkenler arasındaki ilişkiyi ispat edebilmek için zaman serisi analizi, varyans ayrıştırma ve genelleştirilmiş etki tepki metodunu kullanılmışlardır. Çalışmaları, petrol fiyatlarında yaşanan şokların Türkiye'deki hisse senedi piyasası üzerinden önemli bir etkisi olmadığını göstermektedir.

3. Veri Seçimi ve Yöntem

Bu çalışma için gelişmekte olan MSCI ülkelerin döviz kurları, reel hisse senedi getirileri, ham petrol fiyatları ve imalat endeksleri kullanılmıştır ve veri 1990:01 tarihi ile 2016:12 tarihi arasını kapsamaktadır. Gelişmekte olan MSCI ülkeleri Tablo 3.1 içerisinde liste olarak gösterilmiştir. Veri yetersizliği sebebiyle gelişmekte olan ülkelerin birkaçı veri seti içerisinden çıkarılmıştır.

Table 3.1: Morgan Stanley Capital International tarafından belirlenen gelişmekte olan ülkeler

MSCI GELİŞMEKTE OLAN ÜLKELER			
1	Brezilya	9	Meksika
2	Çek Cumhuriyeti	10	Macaristan
3	Endonezya	11	Polonya
4	Filipinler	12	Rusya
5	Güney Afrika	13	Şili
6	Güney Kore	14	Türkiye
7	Hindistan	15	Yunanistan
8	Kolombiya		

Döviz kurları (EXC), her ülke için ulusal para biriminin US dolar karşılığı olarak elde edilmiştir ve döviz kurlarının doğal logaritması alınmıştır. Döviz kurlarına ait veriler Bloomberg veritabanından alınmıştır.

Reel hisse senedi getirileri (RSR), Sarı ve Soytaş (2006) ile Papapetrou (2001) çalışmalarında açıklandığı şekilde takip edilmiştir. Hisse senedi getiri hesaplaması her ülke için hisse senedi piyasa endeksinin (SMI) doğal logaritmasının çıkarımı ile elde edilmiştir. Reel hisse senedi getirileri Tüketici Fiyat Endeksine göre hesaplanan enflasyon oranının (INF) hisse senedi getirilerinden çıkarılması ile hesaplanmıştır. Hesaplama için kullanılan formülasyonlar aşağıdaki gibidir;

$$\text{Hisse Senedi Getirisi} = LN\left(SMI_t / SMI_{t-1}\right)$$

$$\text{Reel Hisse Senedi Getirisi} = LN\left(SMI_t / SMI_{t-1}\right) - LN\left(INF\right)$$

Hisse senedi endeks değerleri ulusal para biriminin US dolar karşılığı olarak alınmıştır ve enflasyon oranları Bloomberg veritabanından çekilmiştir.

West Texas Intermediate Spot Ham Petrol Fiyatları (OIL), Federal Reserve Bank of St. Louise veritabınından çekilmiştir. WTI Ham Petrol Brent Fiyatları (BOIL) dayanıklılık testi için kullanılmıştır.

Ekonomik aktiviteyi ölçmek için kullanılan bir diğer değişken olan İmalat Endeksi doğal logaritması ile kullanılmıştır. Büyük çoğunluktaki ülkeler için veriler OECD İstatistik kaynağından alınmıştır. Filipinler'in İmalat Endeksi ulusal istatistik kanallarından alınmıştır.

Ekonomik değişkenlerin kendi geçmişi üzerinde bir etkisi olup olmadığını ve hangi yönde ilerlediklerini kontrol edebilmek için birçok yol bulunmaktadır. Bilinen yöntem olarak, zaman serileri birim kök testleri ile incelenmektedir. Birim kök testleri ilgili zaman serisinin bütünleşme derecesini belirlemeye imkan tanır. Johannsen eşbütünleşme testleri değişkenler arasında eşbütünleşme olup olmadığını tespit edebilmek için yürütülmektedir. Birim kök ve eşbütünleşme testleri VAR modeli kurabilmek ve değerlendirebilmek için önem taşımaktadır. Değişkenler eşbütünleşik bulunduğunda, hata düzeltme modeli (ECM) araştırılmak için akılda bulundurulabilir.

Toda ve Yamamoto (1995) çalışmasında açıklandığı gibi test etmek için güçlü zaman serileri süreci yoksa birim kök testleri test öncesi yanılmalara maruz kalabilir. Bu durumdan kaçınmak için Toda Yamamoto artırılmış Granger nedensel olmayan Wald test prosedürü döviz kurları, ham petrol fiyatları, reel hisse senedi getirileri ve imalat endeksi arasındaki ilişkiyi tespit etmek için gelişmekte olan ülkeler için kullanıldı.

4. Bulgular

4.1 Birim Kök Test Bulguları

Toda Yamamoto prosedürüne göre her ülke için bütün değişkenlerin bütünleşme derecesini belirlemek için birim kök testleri yapılmıştır. Bu nedenle, Artırılmış Dickey-Fuller (ADF), Dickey Fuller Genelleştirilmiş en küçük kare (DFGLS) ve Phillips Perron (PP) birim kök testleri bütünleşme derecesini bulmak için uygulanmıştır ve durağanlık koşulunun sağlanıp sağlanmadığı garantiye alınmıştır. ADF, DFGLS ve PP testleri durağanlık için farksızlık hipotezi aşağıdaki gibidir;

H_0; serinin birim kökü vardır

ve alternatif hipotez aşağıdaki gibidir;

H_1; serinin birim kökü yoktur

Farksızlık hipotezinin reddi serinin durağanlığını göstermektedir. Akaike Bilgi Kriteri (AIC), her seri için ADF ve DFGLS birim kök testlerinde gecikme uzunluğunu belirlemek için seçilmiştir. Newey-West bant genişliği, PP birim kök testi için tercih edilmiştir.

Ham petrol fiyatları ve Brent petrol fiyatları her ülke için ortak değişken olarak tanımlanmıştır. ADF, DFGLS ve PP birim kök test sonuçları %10 anlamlılık düzeyinde petrol fiyatları için durağanlık konusunda tutarlılık göstermektedir.

Birinci farklar düşünüldüğünde, değişkenler ADF, DFGLS ve PP birim kök testlerinde durağan olarak gözlenmektedir. Hisse senedi getirisi değişkeni için ADF ve PP birim kök testleri Şili ve Yunanistan dışında birbirleriyle tutarlıdır.

4.2 Kontrol Test Bulguları

Toda Yamamoto prosedürü göz önüne alındığında, prosedürün ilk adımı her değişken için maksimum bütünleşme derecesini (m) birim kök test sonuçlarına göre belirlemektir. İkinci adım ise uygun gecikme uzunluğunu belirleyebilmek için Eviews Akaike Bilgi Kriteri (AIC)'nden faydalanılarak optimal gecikme uzunluğunu (n) belirlemektir. Gredenhoof ve Karlsson (1997) çalışmasında belirtildiği üzere gecikme uzunluğu ele alınmasında ve model kurulmasında önemli bir konudur çünkü gecikme uzunluğu model yorumlamalarında yanıltıcı olabilir. Scwarz ya da diğer adıyla Bayesian Bilgi Kriteri (SC ya da BIC)'ni ve Akaike Bilgi Kriteri (AIC)'ni uygun gecikme uzunluğunu belirlemek için karşılaştırmışlardır. Buldukları sonuçlar Scwarz kriteri kullanıldığında modelin gerçek gecikme uzunluğunun düşük olarak tahmin edildiğini ve modelin sonuçları hakkındaki yorumların gerçek sonucu yansıtmadığını göstermektedir. Hipotez testi ve model hakkındaki yorumlamalar düşünüldüğünde Scwarz gecikme kriteriyle yapılan seçimlerdeki model güvenilir sonuçlar sunmayabilir. Bir modelin gecikme uzunluğunun belirlenirken gerçek gecikme uzunluğu seçilip seçilmediği tam anlamıyla bilinmemesine rağmen Akaike Bilgi Kriteriyle (AIC), SC Kriterinden daha doğru çıkarımlar yapılmaktadır.

Akaike (1974), bilgi kriterini (AIC) aşağıdaki gibi tanımlamaktadır;

$$\text{AIC} = \frac{-2\log(maksimum\ benzerlik)+2k}{N}$$

K içsel değişkenlerin sayısı, N gözlem sayısıdır.

$$\log(maksimum\ benzerlik) = -\frac{N}{2}\{k(1+\log 2\pi)+\log|\sum \epsilon|\}$$

$|\sum \epsilon|$ aşağıdaki gibi tanımlanmaktadır;

$$\left|\sum \epsilon\right| = \det\left(\frac{1}{N-(pk+d)}\sum \epsilon_t \epsilon_t'\right)$$

p eklenmiş gecikme, d dışsal C keseni ve $\sum \epsilon_t \epsilon_t'$ artıkların toplamıdır. Gecikme uzunluğu kriteri Eviews araçları kullanılarak kara verilmiştir ve sonuçlar Appendix Table A.6 da sunulmuştur.

Prosedüre VAR kararlılık araştırmasıyla devam edilmiştir. Arttırılmış VAR kararlılığını kontrol edebilmek için VAR$(m+n)$ kurulmuştur. İlgili VAR kökleri gözden geçirilerek kararlılık koşulu kontrol edilmiştir. VAR denklemleri bütünleşme derecesine göre kurulmuştur ve gecikme uzunluğu kriteri ile desteklenmiştir. Analizde kullanılan denklemler aşağıdaki gibidir.

İlk VAR denklem aşağıdaki gibi kurulmuştur;

$$\mathrm{EXC} = \sum_{s=1}^{m+n} \alpha_s \mathrm{EXC}_{t-s} + \sum_{s=1}^{m+n} \beta_s \mathrm{OIL}_{t-s} + \sum_{s=1}^{m+n} \gamma_s \mathrm{RSR}_{t-s} + \sum_{s=1}^{m+n} \theta_s \mathrm{MI}_{t-s} + \text{Kukla Değişken} + \mathrm{C}$$

$\alpha, \beta, \gamma, \theta$ katsayıları sırasıyla döviz kurları, ham petrol fiyatları, reel hisse senedi getirileri ve imalat endeksi değişkenlerine temsil etmektedir. m, daha önce tarif edildiği şekilde her değişken için maksimum bütünleşme derecesini ve n optimal gecikme uzunluğunu temsil etmektedir.

Sırasıyla, reel hisse senedi getirilerinden döviz kurlarına ve imalat endekslerinden döviz kurlarına olan nedensellik aynı şekilde takip edilmiştir.

İkinci VAR denklemi aşağıdaki gibi kurulmuştur;

$$\mathrm{OIL} = \sum_{s=1}^{m+n} \alpha_s \mathrm{EXC}_{t-s} + \sum_{s=1}^{m+n} \beta_s \mathrm{OIL}_{t-s} + \sum_{s=1}^{m+n} \gamma_s \mathrm{RSR}_{t-s} + \sum_{s=1}^{m+n} \theta_s \mathrm{MI}_{t-s} + \text{Kukla Değişkeni} + \mathrm{C}$$

Ham petrol fiyatlarından diğer değişkenlere olan nedensellik bu denklem ve hipotez kullanılarak belirlenmiştir.

Üçüncü VAR denklemi aşağıdaki şekilde kurulmuştur;

$$\mathrm{RSR} = \sum_{s=1}^{m+n} \alpha_s \mathrm{EXC}_{t-s} + \sum_{s=1}^{m+n} \beta_s \mathrm{OIL}_{t-s} + \sum_{s=1}^{m+n} \gamma_s \mathrm{RSR}_{t-s} + \sum_{s=1}^{m+n} \theta_s \mathrm{MI}_{t-s} + \text{Kukla Değişken} + \mathrm{C}$$

Dördüncü VAR denklemi aşağıdaki şekilde kurulmuştur;

$$\mathrm{MI} = \sum_{s=1}^{m+n} \alpha_s \mathrm{EXC}_{t-s} + \sum_{s=1}^{m+n} \beta_s \mathrm{OIL}_{t-s} + \sum_{s=1}^{m+n} \gamma_s \mathrm{RSR}_{t-s} + \sum_{s=1}^{m+n} \theta_s \mathrm{MI}_{t-s} + \text{Kukla Değişken} + \mathrm{C}$$

Her VAR denklemin kritik noktaları, ayrık serisel korelasyonları elde edilmediğine emin olmak ve tek bir regresyon doğrusu elde edebilmek için kukla değişkenler belirlemekte ve denklemlere eklemekte kullanılmıştır. Kritik nokta belirlemesi, VAR denklemlerine kukla değişkenleri eklemek için kullanılmıştır ve kukla değişkenler sonuçları çarpıtmamak için her denkleme bağımsız değişken olarak eklenmiştir. Quandt-Andrews kritik nokta testi her VAR denklemi için yapılmıştır.

Köklerin kararlılığı ve VAR denklemlerinin kurulmasının ardından, Toda Yamamoto prosedürü otokorelasyon, heteroskedastisite ve parametre kararlılık testleri ile devam edilmiştir. Breusch-Godfrey serisel korelasyon testi, değişkenler arasında bir ilişki olup olmadığını ve kendi geçmişleriyle bağlantısı olup olmadığını tespit edebilmek için kullanılmıştır. Breusch-Godfrey farksızlık hipotezi aşağıdaki gibidir;

H_o; Serisel korelasyon vardır

Alternatif hipotez aşağıdaki gibi tanımlanmıştır;

H_1; Serisel korelasyon yoktur

Ki-Kare (Chi-Square) olasılık değerinin %5 anlamlılık değerinin altında olduğu belirlendiğinde farksızlık hipotezi reddedilir. Serisel korelasyon gözlenmemiştir çıkarımı yapılır ve her değişken bağımsız olarak tanımlanabilir.

Artıkların varyansı orantılı olarak dağılmamış ve denklemlerin kararlılığı bu sebepten bozulmuş olabilir. Artıkların dağılımını araştırmak ve yapılan değerlendirmelerin güvenilirliğini gözlemlemek için heteroskedastik kontrol uygulanmıştır. Breusch-Pagan-Godfrey heteroskedastik test her VAR denklemi için incelenmiştir. Breusch-Pagan-Godfrey farksızlık hipotezi aşağıdaki gibi tanımlanmıştır;

H_o; Artıklar homoskedastiktir

alternatif hipotez aşağıdaki gibi tanımlanmıştır;

H_1; Artıklar heteroskedastiktir

Ki-Kare (Chi-Square) olasılık değeri %5 anlamlılık düzeyinin altında elde edilmişse artıkların homoskedastik dağıldığını gösteren farksızlık hipotezi reddedilir. VAR denklemlerin artık sonuçları Appendix Table A.5 içerisinde sunulmuştur.

Artık testleri değişkenin gözlemlenen (gerçek) değeri ile beklenen (tutturulmuş) değeri arasındaki farkı göstermesinden dolayı dikkat edilmesi faydalı bir testtir. VAR denklem artıklarının grafiksel gösterimiyle heteroskedastisite problemi tespit edilebilir.

4.3 Wald Test Bulguları

Toda Yamamoto prosedürüne göre incelenen her iki yönlü nedensellik ilişkileri, Wald test sonuçları ile analiz edilmiştir. Her ilişki için özet tablolar Appendix Table A.8'de raporlanmıştır.

Her değişken arasındaki nedensellik ilişkisini belirlemek için kullanılan Wald katsayı testinin farksızlık hipotezi aşağıdaki gibidir;

H_0; diğer değişkenin ilk m parametre sıfıra eşittir

Alternatif hipotez aşağıdaki gibi tanımlanmıştır;

H_1; diğer değişkenin ilk m parametresi sıfıra eşit değildir

Ki-Kare olasılık değeri %5 anlamlılık düzeyinin altında olan nedensellik ilişkiler istatistiksel olarak dikkate değer olarak değerlendirilmektedir. Wald katsayı testinin tanımlanan farksızlık hipotezinin reddedilmesi diğer değişkenin ilk m parametresinin sıfıra eşit olmadığına işaret etmektedir. Test edilmiş değişken ve ülke için Wald test sonuçları iki değişken arasında nedensellik ilişkisinin olduğuna açıklık getirmektedir.

Gelişmekte olan ülkeler dış kaynaklara bağlı olarak süregeldiklerinden yabancı yatırımcılar ile yakın ilişkiler kurulması ülkenin gelişimi için fırsat olarak değerlendirilmektedir. Ekonomik bağlılık göz önünde bulundurulduğunda, döviz

kurlarında yaşanacak bir şokun bu çalışmada incelenen diğer değişkenlerde bir değişiklik yaratması beklenmektedir. Bunu yanında, gelişmekte olan ülkelerin endüstrileri çoğunlukla petrol bağımlı şirketlere dayanmaktadır. Bu bağın bir sonucu olarak petrol fiyatları ve üretim arasında hem petrol fiyatlarında üretime hem de üretimden petrol fiyatlarına güçlü bir ilişki olması beklenmektedir.

Wald katsayı test sonuçları göstermektedir ki en güçlü nedensellik ilişkisi döviz kurları ile imalat endeksi arasında, nedenselliğin yönü imalat endekslerinden döviz kurlarına olacak şekilde, gözlemlenmiştir. Sekiz gelişmekte olan ülkelerden Brezilya, Endonezya, Filipinler, Güney Kore, Kolombiya, Meksika, Polonya ve Türkiye bu iddiayı anlamlı olasılık değerleri ile desteklemektedir. Buna karşın, sadece Hindistan, Güney Kore ve Kolombiya ters yöndeki nedensellik ilişkisinde %1 anlamlılık düzeyinde kalmıştır.

Ayrıca, sonuçlar hakkında genel çerçevede değerlendirildiğinde imalat endekslerinden petrol fiyatlarına olan nedensellik altı gelişmekte olan ülke ile ikinci güçlü bağlantı olarak gözlemlenmiştir. Brezilya, Güney Kore, Meksika, Polonya, Rusya ve Şili belirtilen yön için anlamlı nedensel ilişkiler sunmaktadır. Ham petrol fiyatlarından imalat endeksleri olan ters yönde, beş gelişmekte olan ülke sırasıyla Brezilya, Filipinler, Macaristan, Polonya ve Rusya değişkenler arasında yakın ilişkiler olduğu göstermektedir. Buna karşılık değişkenler arasındaki birkaç ilişki istatiksel olarak anlamsız ya da zayıf sonuçlar göstermektedir. Gelişmekte olan ülkelerin hiçbirinde imalat endekslerinden reel hisse senedi getirilerinde anlamlı bir nedensellik ilişkisi ölçümlenmemiştir. Tam tersi yönde, sadece Endonezya reel hisse senedi getirilerinden imalat endekslerine %5 anlamlılık düzeyinde bir kayda değer bir bağlantı göstermiştir.

Ham petrol fiyatlarından döviz kurlarına olan anlamlı bağlantı sadece Güney Afrika'da, buna rağmen tersi yönde, döviz kurlarından ham petrol fiyatlarına nedensellik ilişkisinde, gelişmekte olan ülkelerden Brezilya, Güney Kore, Kolombiya, Rusya ve Yunanistan'da uzun dönemde anlamlı ilişkiler gözlemlenmiştir.

Ek olarak, Polonya reel hisse senedi getirilerinden döviz kurlarına olan nedensellik ilişkisinde ve %5 anlamlılık düzeyinde tek ülke olarak gösterilmiştir. Hâlbuki tersi yönde dört gelişmekte olan ülkede, Brezilya, Endonezya, Güney Kore ve Meksika

olarak gösterilmekte, döviz kurlarından reel hisse senedi getirilerine istatistiksel anlamlı nedensellik ilişkileri bulunmuştur. Bu ampirik sonuçlar ve iddialar, BRICS ülkelerinde reel hisse senedi getirilerinin döviz kurları değişikliklerinden etkilemediğini kanıtlayan Chkili ve Nguyen (2014) çalışmasıyla desteklenmektedir.

İncelenen son nedensel ilişki reel hisse senedi getirileri ve ham petrol fiyatları arasında olup aynı çerçevede açıklanabilir. Ham petrol fiyatları ve reel hisse senedi getirileri arasındaki nedenselliğin yönü Wald test sonucundaki %5 anlamlılık düzeyi ile Güney Kore için ölçümlenmiştir. Diğer gelişmekte olan ülkeler potansiyel nedensellik ilişkisindeki sonuçlara katkıda bulunmamaktadır. Sonuçlar, Sarı ve Soytaş (2006) çalışmasında Türkiye için petrol fiyatlarının reel hisse senedi getirilerinde meydana gelen değişiklikleri açıklamakta payı olmadığı analizi ile tutarlıdır. Buna rağmen, reel hisse senedi getirilerinin ham petrol fiyatlarına %5 anlamlılık düzeyinde üç gelişmekte olan ülkede sebep olduğu kanıtlanmıştır. Endonezya, Hindistan ve Türkiye'deki nedensellik ilişkisinin sonuçları uzun dönemdeki ilişkisi doğrulamaktadır.

4.4 Etki Tepki Bulguları

Nedensellik bağlarının analizinin yanı sıra, Lüktepohl (2005)'te ele alındığı üzere, etki tepki analizler değişkenlerin birbirlerine olan bağımlılıkları hakkında genel bir çerçeve sağlayabilir. Etki tepki fonksiyonu, bir değişkenin diğerini etkileyip etkilemediğini ve bu tepkilerin zaman içerisindeki değişimini gözlemlemek için oluşturulmuştur.

Ham petrol fiyatlarının reel hisse senedi getirilerine tepkisi Brezilya ve Filipinler dışında her ülke için pozitif olarak çizilmesine rağmen nedensellik sonuçları önemsiz olarak değerlendirilmiştir. Sadece Güney Kore nedensellik ilişkisi de göz önünde bulundurulduğunda istatistiksel olarak anlamlı bulunmuştur. Brezilya'nın aynı etkiye ilk tepkisi negatif olmuştur ve tepki 4. periyottan sonra pozitife dönmektedir. Benzer şekilde, Filipinler'in durumunda ilk tepki negatif bölgede başlamakta ve yönünü 7. periyotta değiştirmektedir.

Ham petrol fiyatlarının döviz kurlarına tepkisi uzun dönemdeki nedensellik ilişkisini tamamlayıcı şekilde pozitif olarak gözlemlenmiştir. Güney Afrika bu nedensellik analizinde anlamlı olarak görülen tek gelişmekte olan ülkedir.

Dikkat çekici bir nokta olarak, Wald katsayı test sonuçları imalat endeksleri ile reel hisse senedi getirileri arasında uzun dönemde anlamlı nedensellik ilişkisi olmadığını ifade etmektedir fakat reel hisse senedi getirilerinin imalat endekslerine olan tepkisi ülkeden ülkeye değişkenlik göstermektedir. İmalat endekslerinde yaşanan bir şok Filipinler ve Yunanistan ülkelerinde negatif tepki ile karşılanmaktadır. Diğer yandan, Hindistan, Güney Afrika, Güney Kore, Meksika, Rusya ve Türkiye'nin reel hisse senedi getirilerine tepkisi pozitif olarak yansımaktadır. Çizilen grafikler göstermektedir ki tepkiler güven aralığında kalan ülkeler için yönünü değiştirmektedir.

4.5 Dayanıklılık Kontrolü

Tanımlanmış olan değişkenlerden elde edilen sonuçlar, Brent ham petrol fiyatları ile analizin sonuçlarının ve çıkarımlarının doğru bir şekilde yapılıp yapılmadığını doğrulamak amacıyla tekrar elde edilmiştir. Dayanıklılık kontrolünün çıktıları ilk analizdeki sonuçlarla büyük oranda tutarlı olduğu görülmüştür. Brent ham petrol fiyatları ile elde edilen nedensellik sonuçları ve özet tabloları Appendix'te sunulmuştur.

Brent petrol fiyatları ve döviz kurları arasındaki ilişli incelendiğinde Brent fiyatlarından döviz kurlarına olan nedensellik ilişkisi petrol fiyatları ile yapılan incelemedeki bütün ülkeler ile tutarlılık göstermektedir. Reel hisse senedi getirilerinden döviz kurları olan nedenselliğin zayıf ilişkisi daha önce belirtilen durumu korumaktadır. Reel hisse senedi getirileri ve ham petrol fiyatları arasında güçlü nedensellik ilişkisinin bulunması sonucu Brent petrol fiyatları için geçerli olmaktadır. Ayrıca, imalat endeksleri ve ham petrol fiyatları arasındaki ilişki birçok ülkede yorumlandığı gibidir fakat Kolombiya, Meksika ve Güney Kore için tam tersi durum ifade edilmiştir. Reel hisse senedi getirileri ve imalat endeksleri arasındaki nedensellik, tutarlıklık sebebiyle ham petrol fiyatları ile elde edilen sonuçlardan farklılaşmamaktadır.

5. Tartışma

Bu çalışma, döviz kurları, reel hisse senedi getirileri, ham petrol spot fiyatları ve üretim faktörünü temsil eden imalat endeksleri arasındaki ilişkileri MSCI tarafından belirlenen gelişmekte olan ülkeler için incelemektedir. Belirlenmiş değişkenler için veriler aylık bazda alınarak analiz gerçekleştirilmiştir. Metodoloji için, Toda Yamamoto prosedürü her ülke için ilk olarak bütünleşme derecesi belirlenerek takip edilmiştir. VAR denklemleri uzun dönemde değişkenler arasında anlamlı nedensellik ilişkisini tahmin edebilmek için kurulmuştur. Etki Tepki Fonksiyonunu grafiksel gösterimi ve yorumlaması sonuçların genle çerçevesini elde edebilmek için incelenmiştir.

Gelişmekte olan ülkelerin iç dinamiklerini daha iyi yorumlayabilmeye imkan tanıyan en önemli ilişkilerden biri imalat endeksleri ve WTI spot petrol fiyatları arasındadır. Bu çalışmada elde edilen bulgulara göre sadece imalat endekslerinden petrol fiyatlarına değil tam tersi yön olan petrol fiyatlarından imalat endekslerinde de bir değişkende meydana gelen değişim diğer değişkeni anlamlı yönde etkilemektedir. Ayres (2013) analizinde enerji fiyatlarının ekonomik gelişme, bu çalışmada imalat endeksi olarak alınmıştır, üzerindeki önemli etkisini desteklemektedir. Buna karşın, Çek Cumhuriyeti, Endonezya, Filipinler, Hindistan, Güney Afrika, Kolombiya, Macaristan, Türkiye ve Yunanistan için anlamlı bir ilişki bulunmamıştır. Bu durum ekonomilerinin dışa bağımlı olmasıyla yani yabancı yatırımlarla bağlı olmakla açıklanabilir ya da petrol fiyatlarındaki dalgalanmalardan etkilenebilecek yeterince güçlü endüstriyel üretimlerinin olmamasıyla açıklanabilir.

Fratzscher, Schneider ve Robays (2014) çalışmasında, döviz kurlarındaki dalgalanma ithalatçıların üzerinde bütçe kararlarını alırken ya da yatırım konusunda istekli olmaları konusunda baskı yaratmaktadır. Döviz kurlarının US dolar fiyatlama faktörü olmayan üretim süreçlerine sahip gelişmekte olan ülkeler ile potansiyel bir ilişkisi olduğu tahmin edilmektedir. İmalar endeksleri ile döviz kurları arasındaki nedensellik ilişkisi Fratzscher (2014) çalışmasıyla desteklenmektedir. Brezilya, Endonezya, Meksika, Filipinler, Polonya, Güney Kore ve Türkiye gibi birçok ülkede döviz kurları ile imalar endeksleri arasında güçlü bir nedensellik ilişkisi bulunmaktadır. Değişkenler arasında bir bağlantı bulunmayan ülkelerde ulaşılabilir ticaret fırsatları olmayabilir ya

da ithalat ve ihracat kanalları etkili bir şekilde kullanılmıyor olabilir. Ters yöndeki ilişkide birçok ülke için daha önce tariflenen kadar önemli bir bağ olmadığı görülmektedir. İmalat endeksleri ve ham petrol fiyatlarının birbirleri üzerindeki etkisini açıklamakta güçlü bir ilişkisi bulunması sebebiyle döviz kurlarındaki hareketlenmeler benzer şekilde Fratzscher(2014) çalışmasıyla açıklanabilir. Döviz kurları ve ham petrol fiyatları için Wald test nedensellik sonuçları gelişmekte olan ülkeler olan Brezilya, Güney Kore, Kolombiya, Rusya ve Yunanistan ülkelerinde istatistiksel olarak anlamlı ölçümler elde edildiğini ortaya koymaktadır.

Gelişmekte olan hiçbir ülkede imalat endekslerinden reel hisse senedi getirilerine anlamlı nedensellik ilişkisi öngörülmemiştir. Tam tersi şekilde, sadee Endonezya reel hisse senedi getirilerinden imalat endekslerine dikkate değer bir bağ göstermektedir. İmalat endeksleri ve reel hisse senedi getirileri için bulunan sonuçlar Hondroyiannis ve Papapetrou (2004) çalışması olan endüstriyel üretim ve hisse senedi getirileri arasında anlamlı bir ilişki olmadığı iddiası ile desteklenmektedir. Buldukları sonuçlar ekonomik faaliyetin hisse senedi getirileri üzerinde herhangi bir etkisi olmadığını kanıtlamaktadır. Benzer şekilde, ham petrol fiyatlarından döviz kurlarına olan anlamlı bağ sadece Güney Afrika için gözlenmiştir fakat döviz kurlarından petrol fiyatlarına olarak tanımlanan tersi yönde Brezilya, Güney Kore, Kolombiya, Rusya ve Yunanistan uzun dönemde anlamlı ilişkiler ortaya koymaktadır.

Bu tez, gelişmekte olan ülkelerin finansal ve ekonomik düzeyini açıklamada kullanılan değişkenler arasındaki bağlantıların kapsamını genişletmektedir. Daha önce yürütülmüş olan ampirik çalışmalar bu ülkelerin iç yapılarını anlamak için kurulan ilişkilerin bir kısmını ele almaktadır. Nedensellik ilişkileri, gelişmekte olan ülkelerin dinamiklerini genel çerçevede görebilmeye imkan sağlamaktadır. Bunun yanı sıra, bu çalışma politika belirleyiciler için değişkenler arasındaki bağlantıları netleştirmesi ve ampirik olarak yorumlamaya imkan sağlaması açısından finansal ve ekonomik çıkarımları da içermektedir.

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YAZARIN / AUTHOR

Soyadı / Surname : Soylu
Adı / Name : Sibel
Bölümü / Department : İşletme / Business Administration

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