THE LINKAGE BETWEEN TRADE OPENNESS, CAPITAL FORMATION, AND FOREIGN DIRECT INVESTMENT ON INDONESIAN ECONOMIC GROWTH USING VECTOR ERROR CORRECTION MODEL

THESIS

Prepared and submitted to fulfillment of the requirements to achieve the Bachelor Degree of Economics in the Department of Economics

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Sincerely,

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بِسْمِ اللهِ الرَّحْمٰنِ الرَّحِيْمِ

In the name of Allah, the Most Gracious, the Most Merciful

There is no almighty except Him, the ever living, the sustainer of [all] existence. Neither drowsiness overtakes Him nor sleep. To Him belongs whatever is in the heavens and whatever is on the earth. Who is it that can intercede with Him except by His permission? He knows what is [presently] before them and what will be after them, and they encompass not a thing of His knowledge except for what He wills. His Kursi extends over the heavens and the earth, and their preservation tires Him not. And He is the Most High, the Most Great. (QS. Al-Baqarah : 255)

And We charge no soul except [with that within] its capacity, and with Us is a record which speaks with truth; and they will not be wronged. (QS. Al Mu'minun:62)

For each one are successive [angels] before and behind him who protect him by the decree of Allah . Indeed, Allah will not change the condition of a people until they change what is in themselves. And when Allah intends for a people ill, there is no repelling it. And there is not for them besides Him any patron. (QS. Ar Ra'du:11)

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THE LINKAGE BETWEEN TRADE OPENNESS, CAPITAL FORMATION, AND FOREIGN DIRECT INVESTMENT ON INDONESIAN ECONOMIC GROWTH USING VECTOR ERROR CORRECTION MODEL

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ABSTRACT

International trade is considered as an engine to stimulate the economic growth. 1970s was the time when Indonesia became more open to international trade. This research uses Vector Error Correction Model (VECM) as methodology research by focusing on the linkage between trade openness, capital formation, and FDI on Indonesian economic growth. Using quarterly data from 1993Q1 to 2014Q4. Johansen co-integration test indicates significant long run relationship between variables. VECM stability and classical assumption prove that VECM is the proper model to be employed. Long run VECM shows that FDI has strong positive relationship with GDP, meanwhile short run VECM shows all variables have strong and positive relationship with Indonesian GDP.

Keywords: *Trade openness, capital formation, FDI, economic growth, VECM.*

This thesis has been presented in the thesis examination and successfully passed the thesis examination on January 26th, 2017.

The abstract has been approved by the advisor and examiners:

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PREFACE

بِسْمِ اللهِ الرَّحْمٰنِ الرَّحِيْمِ

All praise to be on Allah SWT, Lord of the world. I would like thanks to Allah SWT for its guidance and mercy therefore my thesis entitled **"The Linkage Between Trade Openness, Capital Formation, and Foreign Direct Investment on Indonesian Economic Growth Using Vector Error Correction Model"** has finally been accomplished on time without matter problem. This thesis is submitted as a partial requirement to acquire Bachelor Degree at Economics Department of Economic Faculty of Andalas University.

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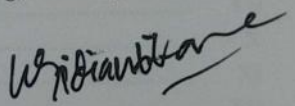

Wenny Widiantika

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CHAPTER I

INTRODUCTION

1.1 Background

Economic growth is the key indicator of economic progress. In this point of view, countries around the world would try the best to achieve higher economic growth in order to provide higher standard of living for their people. According to Case & Fair (2006) economic growth generally defined as an increase in real GDP. In short, deficiency and availability of goods and services within a country will reflect the level of economic growth.

Generally there are two kinds of economy regime hold by countries around the world, which is open economy and closed economy. A country with open economy is doing international transaction with foreign country by exporting and importing goods and services. Meanwhile, a country with closed economy is not knowing about international trade, so they can not exchange their goods and services to foreign country.

Tsegaye (2014) says international trade plays an important role in improving the economic growth or it becomes the engine to stimulate the economic growth. To this point of view, trade can have positive and significant relationship with the economic growth. Matondang, et al (1997) agrees that country with open economy can add the savings through export and import in order to rise the economic growth.

Trade openness also can make domestic product easier to be promoted through the international market (Nurrahma, 2013). When goods and services are going bigger through this market, firms can be more competitive and innovative in

create the products. The wider access of exporting goods and services on international market can increase the economic scale of firms which gives greater output for the country and end up by rising in economic growth.

According to the expenditure approach, consumption, investment, government spending, and trade (export and import) are the indicators in measuring the output (GDP) in a country with open economy. It means when trade increase, GDP also increase. The same meaning for the rest three indicators, when consumption, investment, and government spending is rising, so does economic growth rising. Meanwhile, a country with closed economy only have three indicators in measuring GDP which is consumption, domestic investment, and government expenditure.

Indonesia is considered as small open economy. In 1970s was the time when Indonesia became more open to international trade (Nurrahma 2013). The more open Indonesia towards international trade is generally because of several policies that were taken by governments. Then, in 1980s it was considered as the new transformation time of Indonesia's international trade policy.

The study about trade openness, capital formation, and foreign direct investment on economic growth conducted by Adhikary in 2011 shows a strong positive relationship in Bangladesh. Tsegaye (2014) also find positive effect of trade to robust Korea's economic growth. A research done by Matadeen, et al (2011) shows that trade openness indicates important engine of economic growth in Mauritius. The same finding also delivered by Olufemi (2004) mentioned that economic growth and trade openness are co-integrated in Nigerian economy. The policy implication of a study by Soi, at al. (2013) claims that trade openness being the robust determinants of

economic growth and it expected that government of Kenya should provide more emphasis on trade openness to increase its exports as well as rates of GDP growth.

Conversely, the study conducted by Alege and Ogundipe in 2013 where the contribution of FDI appears negatively affect in the dynamism of GDP of ECOWA. This implies that foreign direct investment failed to contribute meaningfully to ECOWAS economies. The other opposite results also found by Yaqub, Adam, and Jiimoh (2013) observed that FDI and trade openness are not strong and statistically important determinants of real GDP performance in Nigeria. It shows that FDI has very little effect on real GDP. The implication of this is that the policy linkage between GDP and FDI are weak and unpredictable. The insignificant impact of FDI on Nigeria's economic growth could be due to the fact that FDI inflow is mostly in extractive industry which is subject to vegaries of international economy. Yaqub, Adam, and Ayodele (2013) suggest that Nigeria needs to improve the infrastructural facilities and put proper policy to check massive capital flight through profit repatriation from Nigeria.

The theories and research findings above inspire the writer to analyze the same topic research by focusing on the nexus between trade openness, capital formation, and foreign direct investment on Indonesian economic growth entitled : **" The Linkage Between Trade Openness, Capital Formation, and Foreign Direct Investment on Indonesian Economic Growth Using Vector Error Correction Model".**

1.2 Research Problem

1.2.1 What is the relationship between trade openness and Indonesian economic growth?

1.2.2 What is the relationship between capital formation and Indonesian economic growth?

1.2.3 What is the relationship between foreign direct investment and Indonesian economic growth?

1.3 Research Objective

1.3.1 To analyze the relationship between trade openness and Indonesian economic growth.

1.3.2 To analyze the relationship between capital formation and Indonesian economic growth.

1.3.3 To analyze the relationship between capital formation and Indonesian economic growth.

1.4 Research Advantages

1.4.1 This research is expected to give input and additional information for the government to improve and create a proper policy to increase the Indonesia's economic growth.

1.4.2 This research is expected to be source of information and give additional knowledge for Andalas University's students about trade openness and economic growth, and also expected to give an input for those who are interested to do the same research.

1.5 Limitation of Study

For framework in this study will be restricted into the main problem in order to get a proper result. This study focuses only about the linkage between trade openness, capital formation, and foreign direct investment on Indonesian economic growth. Data employed is secondary data obtained from Bank Indonesia and Federal Reserve Economic Data (FRED. The data are real gross domestic product (GDP), trade openness (TO), capital formation (CF), and foreign direct investment (FDI) which are delivered from 1993Q1 to 2014Q4.

1.6 Research Hypothesis

Based on the research problem, theoretical framework, and some previous research, the hypothesis of this research is trade openness, capital formation, and foreign direct investment are expected to have positive and significant relationship on GDP which can stimulate Indonesian economic growth.

1.7 Writing Systematic

This research consists of six chapters from introduction to the conclusion and recommendation. The list of writing systematic are organized as follows:

Chapter I Introduction

This chapter provides the background of research, research problem, research objective, research advantage, research limitation, and hypothesis of the research.

Chapter II Theoretical Framework and Literature Review

This chapter contains definition and theory of operational variables, and also provides some previous research that relevant with this study.

Chapter III Research Methodology

This chapter explains the operational data, research methodology, and model specification that is used in this study

Chapter IV General Overview

This chapter describes the development of Indonesian economic growth, Indonesian trade openness, capital formation and FDI from 1993 to 2014.

Chapter V Research Finding

This chapter explains the research output from all the methodology steps. The data is tested starting from unit root test (stationary test), and then lag optimal test, VAR stability test, co-integration test, granger causality test, VECM stability test, classical assumption test, IRF, and variance decomposition.

Chapter VI Conclusion and Recommendation

This is the last chapter of the research contains of conclusion and recommendation that is obtained from the discussion on the previous chapters.


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CHAPTER II

THEORETICAL FRAMEWORK AND LITERATURE REVIEW

2. 1 Theoretical Framework

2.1.1 Economic Growth

The analysis of macroeconomics quote of "economic growth" has two different sides of meaning. First, in one side economic growth is used to describe how a country achieved the better and higher wealth. In the other side, economic growth is used to describe some economic problems of that country in the long run. The long run problems of economic growth can be classified into three aspects (Sukirno, 2005).

The first aspect is started from the different between potential growth and the real growth that has been achieved. The resources of a country also increases from year to year. This accretion can lead to economic growth which is the higher national productivity. Investment today can give more potential for capital goods in order to produce more goods and services. The advance of technology gives contribution on increasing productivity.

The second aspect is about the increasing of its own potential growth. Sometimes, the additional potential from the ability of obtaining national income is not enough to solve the economic problems. For example, one country needs 7% of GDP growth to decrease the unemployment problems, in fact that country only able to increase their GDP about 4%. So that, if that country can grow as fast as the

potential growth, the unemployment problem will getting worse. Thus, they need to think more to improve their economic growth.

The third aspect is about the firmness of economic growth that is valid from year to year. The economic growth is not always grow positively. It sometimes grow slowly or even negatively.

In short, economic growth of each country reflects its capacity to increase production of goods and services. The simplest definition of economic growth can be stated as the increase in the Gross Domestic Product (GDP) of that country. Nominal GDP and Real GDP are the kind indicator on calculating the economic growth. To calculate the rate of economic growth can be done by as follows (Case & Fair, 2006):

$$g = \frac{GDP_t - GDP_{t-1}}{GDP_{t-1}} \text{ x } 100\% \qquad (2.1)$$

Where :

G = Economic growth

GDP_t = GDP in current year

GDP_{t-1} = GDP in previous year

2.1.1.1 Classical Theory of Economic Growth

Adam Smith is the developer of classical economics. On his book "An Inquiry into The Nature and Causes of The Wealth of Nations" suggests that economic activities should be controlled by free market. This way leads to the effort of any

economics actors to achieve the maximum achievements. As the sellers or businessman they will try to achieve efficiency and maximum profits. Thus as the buyers or consumers they will maximize their desire from the income.

The other opinion of classical is the factor of productions decides the economic activities and national productions. The more capital stock, the higher national productions are gained. Technology helps to increase the productivity and leads to faster national productions growth.

2.1.1.2 Neo Classical Theory of Economic Growth

Neo classical theory assumes that the resource of economic growth is coming from the factors of affecting aggregate supply. The advanced of technology also the primary factor on improving the economic growth. So that, this theory is not too different with classical theory in case of technology, labor force, and capital stock. This similarity makes modern theory called as neo classical theory (Sukirno, 2005).

In fact, even classical and neo classical theory has similar theory, neo classical is more appropriate on explaining the long run economic problems. Neo classical theory also focuses on capital stock growth and technological growth on increasing the economic growth. So that, this theory can be used to make empirical research on economic growth.

2.1.2 Trade Openness

There are two kinds of economy regime hold by all of nations around the world which is open economy and closed economy. A country with open economy will interact with other countries by trading goods and services. Meanwhile, a country that hold closed economy, does not interact with the foreign countries (Mankiw,

2004). In the other words, according to open economy holder they need both domestic and international trade to improve the economic growth, while closed economy holder only need domestic trade.

According to Matondang, Amalia, and Saiman (1997), the international relationship that created through trade openness is not always trading goods and services. The other action also can be trading capital, technology, information, communication, and other things that bring right and responsibility such as loan and rent. But, the most important sector is trading goods and services and trading the capital and technology.

Buying goods from foreign country is generally called import, while selling goods to foreign country is called export. The value of export and import is calculated in net export (NX) or it also called as trade balance. When the value of export is bigger than import, then it would be trade surplus. When the value of export is balance with the value of import, it is called trade balance. Meanwhile, when the value of export is less than the value of import, then it becomes trade deficit. So, the way to calculate trade openness can be written as follows:

$$TO = \frac{X + M}{GDP} \qquad (2.2)$$

Where :

TO = Trade Openness

X = Export

M = Import

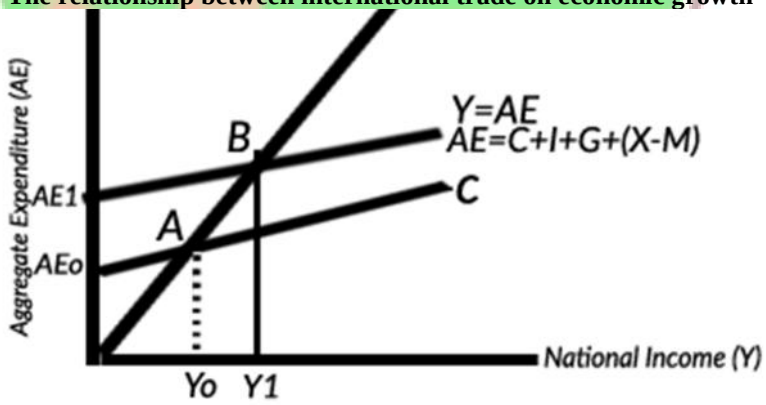
GDP = Gross Domestic Product

Factors That Affect Net Exports

1. The tastes of consumers for domestic and foreign goods,
2. The prices of goods at home and abroad,
3. The exchange rates at which people can use domestic currency to buy foreign currencies,
4. The incomes of consumers at home and abroad,
5. The costs of transporting goods from country to country
6. The policies of the government toward international trade.

2.1.2.1 The Role of International Trade on Economic Growth

Figure 2.1
The relationship between international trade on economic growth



Source: Sukirno, 2005)

The aggregate expenditure of open economy is AE = C+I+G+(X-M). The equilibrium of open economy is shown in figure 2.1 and the equilibrium level is in point A and B. When a country did not joint into international trade, the equilibrium

of the economy is in point A which aggregate is only C+I+G. At this point, their income is written as Y_0. But, if they open to international trade, the equilibrium will be at point B and the national income (Y_1) will much higher than in previous period. So that is why trade openness or the open of economy can improve the national economic growth.

2.1.3 Capital Formation

Capital formation is a term used to describe the net capital accumulation during an accounting period for a particular country, and the term refers to additions of capital stock, such as equipment, tools, transportation assets and electricity. Countries need capital goods to replace the current assets that are used to produce goods and services, and if a country cannot replace capital goods, production declines. Generally, the higher the capital formation of an economy, the faster an economy can grow its aggregate income.

Producing more goods and services can lead to an increase in national income levels. In order to add capital stock, a country needs to generate savings and investments from household savings, or based on government policy. Countries with a high rate of household savings can accumulate funds to produce capital goods faster, and a government that runs a surplus can invest the surplus in capital stock.

Capital formation also has gross fixed capital formation and net capital formation. As for narrowing the subject, in this research it only uses gross fixed capital formation (GFCF). GFCF is called gross because the measure does not make any adjustments to deduct the consumption of fixed capital (depreciation of fixed assets) from the investment figures. For the analysis of the development of the

productive capital stock, it is important to measure the value of the acquisitions less disposals of fixed assets beyond replacement for obsolescence of existing assets due to normal wear and tear. Meanwhile, net fixed investment includes the depreciation of existing assets from the figures for new fixed investment,

GFCF is not a measure of total investment, because only the value of net additions to fixed assets is measured, and all kinds of financial assets are excluded, as well as stocks of inventories and other operating costs (the latter included in intermediate consumption). If, for example, one examines a company balance sheet, it is easy to see that fixed assets are only ne component of the total annual capital outlay.

The most important exclusion from GFCF is land sales and purchases. The original reason, leaving aside complex valuation problems involved in estimating the value of land in a standard way, was that if a piece of land is sold, the total amount of land already in existence, is not regarded as being increased thereby; all that happens is that the ownership of the same land changes. Therefore, only the value of land improvement is included in the GFCF measure as a net addition to wealth. In special cases, such as land reclamation from the sea, a river or a lake, new land can indeed be created and sold where it did not exist before, adding to fixed assets.

2.1.3.1 The Role of Capital Formation on Economic Growth

In the Economic analysis, the rate of economic growth can be seen from the income per capita every year. Value of income per capita measures the economic growth achieved, meanwhile the additional income per capita reflects to the wealth achieved by citizens. So that, the production function can be written as equation (2.3).

$$Y = f(K, N)$$

$$\frac{Y}{N} = f\left(\frac{K}{N}, \frac{N}{N}\right) \qquad (2.3)$$

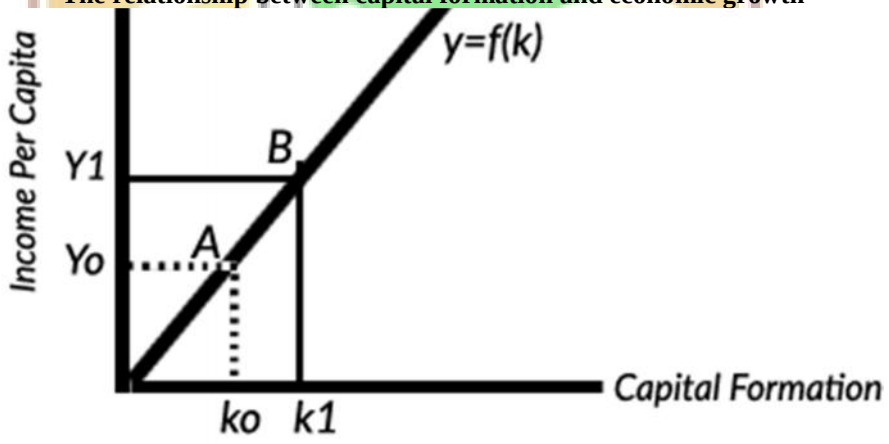
$$\frac{Y}{N} = F\left(\frac{K}{N}\right)$$

Where Y/N is income per capita and K/N is capital formation per capita or capital formation per labor (assume that all citizens equals to labor force). The equation (2.3) can be simplify as follow:

$$Y = f(k) \qquad (2.4)$$

Where y is income per capita (Y/N) and k is capital formation per capita (K/N).

Figure 2.2.
The relationship between capital formation and economic growth



Source: Sukirno, 2005

Figure 2.2 shows the relationship between capital formation and economic growth. Equation y=f(k) describes the positive relationship between capital formation and economic growth. Y_0 describes income per capita in first period, Y_1 describes income per capita in the second period. Thus, for K_0 where capital in first period and K_1 represents capital in second period. Point A means that the equilibrium of Y_0 and

$K_{0,}$ meanwhile point B means that the equilibrium of Y_1 and $K_{1.}$ The figure above explains that the higher capital formation of a country, the higher economic growth they achieved.

2.1.4 Foreign Direct Investment

The theory defined investment as the expense of buying capital goods and production equipment with purpose to exchange and add the capital goods on the economy in order to produce goods and service in the future. In the other words, investment means the expense activity to increase the capacity of productions. The expense for building paper factory and palm oil are the fund utilizing on economic theory of investment (Sukirno, 2005).

A number of theories seeking to explain the investment behavior of business firms and governments exist in the literature. Some of them include (1) Marginal efficiency of capital hypothesis (2) The Accelerator theory of investments.

a. Marginal Efficiency of Capital Hypothesis

Marginal efficiency of capital hypothesis is a Keynesian concept; that stipulates the rate of discount which equates present value of net expected revenue from an investment of capital to its cost. The concept plays a major role in the Keynesian theory of investment. The level of investment is determined by the marginal efficiency of capital relative to the rate of interest. If the marginal efficiency rate is higher than the rate of interest, investment will be stimulated, if not, investment will be discouraged. This concept is based on the ordinary mathematical technique of

computing present value of a given series of returns discounted at a specified discount rate.

b. The Accelerator Theory of Investments

The Accelerator theory of investment suggests that as demand or income increases in an economy, so does the investment made by firms. Furthermore, accelerator theory suggests that when demand levels result in an excess in demand, firms have two choices of how to meet demand. It is either to raise prices to cause demand to drop or to increase investment to match demand. The theory proposes that most companies choose to increase production thus increase their profits. The theory further explains how this growth attracts more investors, which in accelerates growth.

2.1.4.1 The Role of investment on Economic Growth

Investment enables a country to increase the production and economic activity simultaneously. This leads to give more job vacancy, national income, and increasing the rate of wealth. Its resource is coming from three important functions of investment. First, investment is the one of the main aggregate expenditure. So, the increasing of investment will increase the aggregate demand and national income. This accretion always lead to the additional of job vacancy. Second, the growth of capital goods will give more production capacity in the future. Third, investment always followed by technological development. These developments give big contribution to the economic growth of a nation.

2.2 Literature Review

Adhikary (2011) examines the linkage between FDI, trade openness, capital formation, and economic growth rates in Bangladesh over a period 1986 to 2008

using Vector Error Correction Model. The empirical results trace a strong long-run equilibrium relationship between GDP growth rates and the explanatory variables with unidirectional casual flows. The volume of FDI and level of capital formation are found to have significant positive effect on changes in real GDP. The degree of trade openness unleashes negative but diminishing influence on GDP growth rates. He concludes that Bangladesh should formulate FDI led polices and ensure higher degree of capital formation to enhance the economic growth rates at large.

Soi, et al. (2013) conducts a research about the impact of openness, foreign direct investment, and gross capital formation on economic growth in Kenya with the years under consideration being 1960 to 2010. There are many components of international trade that effect economic growth, but this paper examined the effect impact of openness, foreign direct investment, gross capital formation on Kenyan economic growth. A multiple linear regression model, Barro growth model, was used to estimate the existing the relationship between variables then ordinary least square method was applied. The findings are trade openness affect the Kenyan economic growth, but unfortunately foreign direct investment and gross capital formation had no significant effect on GDP growth rate. Thus, trade openness is major determinant of economic growth particularly in developing countries. This study recommended the policy makers and the government to emphasize trade openness being the robust determinants of economic growth.

A study focuses on empirical analysis to find out the role of trade openness, inflation, imports, exports, real exchange rate and foreign direct investment in enhancing economic growth in Pakistan conducted by Bibi (2014) started from 1980

to 2011 data by using DOLS technique. The results found that imports and exports are growth promoter due to the positive connection with real gross domestic product. Similarly, foreign direct investment is also a strong growth indicator. According to the study results foreign direct investment have positive impact but not significant. Unfortunately, trade openness proved to be highly negative because of the trade deficit and changes in exchange rate. Exchange rate has positive but not significant relationship with economic growth as its local economic performance is so much sensitive to the variation in exchange rate in the long-run period. So, all the results are according to the formulated hypothesis. This might determine that foreign direct investment financed in Pakistan was fascinated by the economic growth and policy of foreign trade.

Yusoff and Febrina (20120 made a research about trade openness in Indonesia. The evidences suggest that trade openness, gross domestic investment, and exchange rate are important determinant of economic growth and therefore policy makers should seriously take these variables into account in their policy construct in order to achieve a sustained economic growth in Indonesia. Specifically, Indonesia should liberalize foreign trade, improve the domestic investment climate, and maintain exchange rate stability.

Zekarias (2015) on her paper by using GMM confirms that FDI has positive and marginally significant effect of FDI on East African economic growth. She concludes that FDI is a key deriver of economic growth and a catalyst to economic conditional convergence in Eastern Africa the sub region need to attract more FDI by

improving investment environment, strengthening regional integration, developing human capital and basic infrastructure, and promoting export-oriented investment.

Olufemi (2004) finds that an increasing level of openness will be beneficial, depending on the level of economic development in Nigeria. The research involves the data from 1993 to 2000 using Vector Error Correction Model. The result is robust across different measures of openness and analytical techniques. The policy implication that emerged from this study is that, the trade-growth relationship could be model led in a single equation, as no interactive (feedback) nexus exist between trade and growth variables considered in this paper. The Nigerian government also needs to moderate its trade liberalization policy as the economy seems too weak to absorb the negative shocks from external trade. Most importantly, adequate fiscal and monetary policies should be put in place to offset the likely negative effects of exposing the economy to external influences.

The relationship between trade and productivity has not been established by Yeboah et al, (2012). Their study used a Cobb-Douglas production function to estimate the impact of FDI, exchange rate, capital-labor ratio and trade openness on GDP for 38 African countries from 1980 to 2008. The results found trade openness has a strong positive relationship with GDP. Exchange rate exhibited positive and significant impacts on GDP/capita. But, FDI has negative sign implying no effect on GDP per capita. The effect of trade on productivity is much greater in outwardly-oriented economies than the inwardly-oriented nations.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CHAPTER III

RESEARCH METHODOLOGY

3.1 Types and Source of Data

The data used in this research are secondary data which is provided quarterly started from 1993Q1 to 2014Q4. The kind of data is time series with 88 numbers of observations. The data are obtained from some official sources such as Bank Indonesia (BI) and Federal Reserve Economic Data (FRED). The dependent variable in this research is gross domestic product (GDP), and the independent variables are trade openness (TO), capital formation (CF), and foreign direct investment (FDI).

3.2 Research Variable and Operational Definition

3.2.1 Gross Domestic Product (GDP)

Gross Domestic Product is one of indicator that reflects a nation's economic welfare. There are two kinds of GDP which is nominal and real GDP, but for this research will use the real GDP. The data is obtained from Bank Indonesia quarterly from 1993Q1 to 2014Q4 which is measured in billion rupiah. In this research, GDP is employed as dependent variable.

3.2.2 Trade Openness (T0)

Trade openness is an indicator to measure the trade activity of a nation with foreign countries. It usually gives positive output to a nation's economic growth. The data is obtained from Bank Indonesia which is measured by the summation of trade (export and import) by Indonesia's GDP. In this research, TO is employed as independent variable.

3.2.3 Capital Formation (CF)

Capital formation is almost alike with investment where society does not spend all their money but they will directly invest them into capital goods such as buildings, equipment, transport facilities, and so on. The data is obtained from Federal Reserve Economic Data (FRED) that is measured in trillion rupiah. In this research, CF is employed as independent variable.

3.2.4 Foreign Direct Investment (FDI)

Foreign direct investment is an activity where foreign company directly invests their asset by building the sub company or even a new company in domestic country. The data is obtained from Federal Reserve Economic Data (FRED) that is measured in US dollar. FDI is employed as independent variable.

3.3 Research Methodology

This research tries to focus on the relationship between trade openness, capital formation, and FDI on Indonesian economic growth. The model of this research refers to the previous study written by Adhikary (2011) where the function of GDP is written as follows :

$$\ln GDP_t = \alpha + \beta \ln TO + \beta \ln CF + \beta \ln FDI + \mu_t \quad (3.1)$$

Where :

GDP = Gross Domestic Product

TO = Trade Openness

CF = Capital Formation

FDI = Foreign Direct Investment

α = Intercept

β = Sign of parameter

μ = Error term

t = Time (period)

Then, to obtain the better result of analysis, the data calculated with rupiah or USD should be converted into natural logarithm (ln). Meanwhile, data formed by percent will not be necessary to be logged.

3.4 Methodology Analysis

3.4.1 General Form of VECM Estimation

The methodology of VECM is the development of VAR model. VECM is useful for knowing the long run relationship and short run relationship of research variables. The difference between VAR model and VECM is on co-integration test which is to know the long run relationship. According to Ajija, et al (2011), if the result indicates co-integration, then we should continue by using VECM, but if it does not indicate co-integration, we should stay by using VAR methodology. The co-integration test can be done by using Johansen co-integration which has two different statistics value. They are trace statistic and maximum eigenvalue. The result is considered by looking at the trace statistic value and its critical value. If the value of trace statistic bigger than the critical value, it means data are co-integrated. But, in the opposite if value of trace statistic less than critical value means that data are not co-integrated.

The Johansen co-integration analysis involves VECM model as follows (Ajija, et al. 2011):

$$\Delta Y_t = \sum_{i=1}^{k-1} \Gamma_I \Delta Y_{t-I} + \prod Y_{t-1} + \lambda D + \varepsilon_t \qquad (3.2)$$

Where Yt is vector of non stationer variable, λ is matrix of parameter, where the ranking of matrix Π decides the long run relationship and it can be decompositioned where $\Pi = \alpha \beta'$, where $\alpha \beta$ contains the adjustment and each vector co-integration. Meanwhile, D is deterministic vector variable that can include constant, tren linier, and dummy variable Δ, and the last, εt shows difference and error level.

Ajija, et al (2011) explains VECM methodology as the equation below:

$$\begin{bmatrix} y_{1t} \\ y_{2t} \\ x_{1t} \\ x_{2t} \end{bmatrix} = \begin{bmatrix} y_{1t-1} \\ y_{2t-1} \\ x_{1t-1} \\ x_{2t-1} \end{bmatrix} + \begin{bmatrix} 11 \\ 21 \\ 31 \\ 41 \end{bmatrix} \times \begin{bmatrix} 11 & 21 & 31 & 41 \end{bmatrix} \times \begin{bmatrix} y_{1t-1} \\ y_{2t-1} \\ x_{1t-1} \\ x_{2t-1} \end{bmatrix}$$

Short Run Equation — Long Run Equation

According to the VECM formulated by Ajija, et al (2011) above, so the VECM on this research can be written as follow:

$$\underbrace{\begin{bmatrix} gdp\ t \\ to\ t \\ cf\ t \\ fdi\ t \end{bmatrix} = \begin{bmatrix} gdp\ t-1 \\ to\ t-1 \\ cf\ t-1 \\ cad\ t-1 \end{bmatrix}}_{\text{Short Run Equation}} + \underbrace{\begin{bmatrix} 11 \\ 21 \\ 31 \\ 41 \end{bmatrix} x[ai\ \ bi\ ci\ di]\ x \begin{bmatrix} gdp\ t-1 \\ to\ t-1 \\ cf\ t-1 \\ fdi\ t-1 \end{bmatrix}}_{\text{Long Run Equation}}$$

Where:

Γ	: coefficient of matrix (p x p); i = 1, 2, 3, 4.
Variable a_i b_i c_i d_i	: constant on every variable in the t equation.
α	: matrix of error correction coefficient
Δ	: the rank of changes
gdp $_t$, to $_t$, cf $_t$, fdi $_t$,	: vector of non stationer variable
gdp $_{t-1,}$ to $_{t-1}$, cf $_{t-1}$, fdi $_{t-1}$,	: error correction term, which is the amount of average reversal on vector co-integration in the data t-1.

3.4.2 Vector Error Correction Model (VECM)

The model of VEC in this research is the specification estimation model used by Adhikary (2011), so that the model formed is written as follows :

$$\Delta lngdp_t = \alpha + \sum_{i=1}^{n} a\ i\ \Delta\ lngdp_{t-1} + \sum_{i=1}^{n} b\ i\ \Delta\ lnto_{t-1} + \sum_{i=1}^{n} c\ i\ \Delta\ lncf_{\ t-1} + \sum_{i=1}^{n} d\ i\ \Delta\ lnfdi_{\ t-1} + u_{1t} \quad \text{……………………………...……..…………(3.5)}$$

$$\Delta lnto_t = \alpha + \sum_{i=1}^{n} a\,i\,\Delta\,lngdp_{t-1} + \sum_{i=1}^{n} b\,i\,\Delta\,lnto_{t-1} + \sum_{i=1}^{n} c\,i\,\Delta\,lncf_{t-1} + \sum_{i=1}^{n} d\,i\,\Delta\,lnfdi_{t-1} + u_{1t} \quad \ldots\ldots(3.6)$$

$$\Delta lncf_t = \alpha + \sum_{i=1}^{n} a\,i\,\Delta\,lngdp_{t-1} + \sum_{i=1}^{n} b\,i\,\Delta\,lnto_{t-1} + \sum_{i=1}^{n} c\,i\,\Delta\,lncf_{t-1} + \sum_{i=1}^{n} d\,i\,\Delta\,lnfdi_{t-1} + u_{1t} \quad \ldots\ldots(3.7)$$

$$\Delta lnfdi_t = \alpha + \sum_{i=1}^{n} a\,i\,\Delta\,lngdp_{t-1} + \sum_{i=1}^{n} b\,i\,\Delta\,lnto_{t-1} + \sum_{i=1}^{n} c\,i\,\Delta\,lncf_{t-1} + \sum_{i=1}^{n} d\,i\,\Delta\,lnfdi_{t-1} + u_{1t} \quad \ldots\ldots(3.8)$$

The model above shows some relationship between variables, where the definitions are :

1. Δ lngdp : the first different of lngdp
2. Δ lnto : the first different of lnto
3. Δ cf : the first different of lncf
4. Δ fdi : the first different of lnfdi

Meanwhile, the variable a_i, b_i, c_i, d_i are constant at every variable towards time (t), α is intercept where i = 1, 2, 3, 4 is the assumption for white noise, and u_t is correlating serial error.

3.5 Stationary Test

The primary precaution before embarking any econometric analysis that utilize time series data is to check the stationary of data. In general, time series data tends to have unit root that will show spurious regression, which will deliver fake significant relationship between variable. Thus, the Augmented Dickey Fuller (ADF)

test is applied to check this stationary of data. ADF was found by David Dickey and Wayne Fuller so it called Dickey-Fuller test. ADF test is applied when error term are correlated. According to Gujarati (2004), the unit root model of ADF test are:

$$\Delta Y_t = \beta_1 + \beta_{2t} + \delta Y_{t-1} + \alpha_i \sum_{i=1}^{m} Yt - 1 + \varepsilon t \qquad (3.9)$$

Where :

Y_t : Form of first different

β_1 : Intercept

Y : Variable tested

εt : Error term

In general, unit root model can be written as follow:

a. Model by intercept

$$\Delta Y_t = \beta_1 + \delta Y_{t-1} + \alpha_i \sum_{i=1}^{m} Yt - 1 + \varepsilon t \qquad (3.10)$$

b. Model by intercept and trend

$$\Delta Y_t = \beta_1 + \beta_{2t} + \delta Y_{t-1} + \alpha_i \sum_{i=1}^{m} Yt - 1 + \varepsilon t \qquad (3.11)$$

c. Model with none (without intercept and trend)

$$\Delta Y_t = \delta Y_{t-1} + \alpha_i \sum_{i=1}^{m} Yt - 1 + \varepsilon t \qquad (3.12)$$

Y_t is an observation at t period, Y_{t-1} is the value of Y at previous period. β_1 is constant, β_2 is coefficient trend, β_i is lagged coefficient of Y, m is the length of period, and εt is error term. Data is said stationer if mean, variant, and covariant of

the data are constant along period. Mathematically, data is stationer when the probability is less than α (5%). Here are two hypothesis:

$H_0 : \beta_1 = 0$ (contains unit root, thus data is not stationer) (3.13)

$H_0 : \beta_1 \neq 0$ (contains no unit root, thus data is stationer) (3.14)

3.6 Lag Optimal Test

Lag optimal test is applied to know the amount of lag that gives significant result on the next step procedure. The significant result will happen when the amount of lag utilized is optimal. If we keep going to use inappropriate lag, so it will cause some problem on other procedure such as autocorrelation test and heteroscedasticity test. Autocorrelation is the correlation among variable arranged by period like time series. Meanwhile, heteroschedasticity is condition where all problems appeared on regression function does not have the same variants. The determination of lag optimal can be achieved by using criteria available. There are Aikake Information Criterion (AIC), Schrawz Information Criterion (SIC), Hannan-Quin Criterion (HQC), Final Prediction Error (FPE), and Corrected Verition of AIC.

1. Akaike's Information Criterion $AIC_p = n \ln (\overline{\sigma^2}) + 2p$ (3.15)
2. Schrawz Information Criterion $SIC_P = n \ln (\overline{\sigma^2}) + n^{-1} p \ln (n)$ (3.16)
3. Hannan-Quin Criterion $HQC_p = n \ln (\overline{\sigma^2}) + 2n^{-1} p \ln (n)$ (3.17)
4. Final Prediction Error $FPE_P = \ln (\overline{\sigma^2}) + (n + p)(n - p)^{-1}$ (3.18)
5. Corrected Version $AIC_P = n \ln (\overline{\sigma^2}) + n \frac{1+p/n}{1-(p+2)/n}$ (3.19)

In general, the equation of AIC is:

$$AIC = 2k-2\ln(L) \qquad (3.20)$$

Where k is the number of parameter on statistic model, and L is the maximum of likelihood function for estimation model. The election of AIC is lag of minimum AIC.

3.7 VAR Stability Test

The next step after determined the lag optimal is VAR stability test. This step is important to see the validity of the data. VAR stability test can be done through VAR Stability Condition Check by calculating roots from Characteristic Polynomial. It is said stable if all the roots are less than one (<1). This test can be seen through AR Roots table and AR roots graph where all the dots are inside the unit circle.

3.8 Johansen Co-integration Test

Co-integration test determines the validity of long run relationships between variables, given all variables are at non stationary level. If there is a co-integration, means that there is a long run relationship between variables. Co-integration test was developed by Johansen in 1988 and he suggests two tests for determining the number of co-integrated vector which are Trace test and Maximum Eigen Value Test. The trace test examines the hypothesis that there are at most r co-integrating vectors while the Maximum Eigen Value tests the hypothesis that there are r+1 co-integrating vectors.

In short, the purpose of identifying the co-integrating vectors id therefore to reveal the existence of long run relationship between variables included in the model. The existence of co-integrated variable guides to select between VAR and VEC model for efficient estimation and forecasting (Tsegaye, 2014). In this study, Johansen co-integration will be employed to examine whether variables are co-integrated.

3.9 Granger Causality Test

Granger causality test is employed to know whether there is one way or two way relationship between variables. According to Ajija, et al (2011), granger causality test mainly purposed to see the effect of past variable to other variable in present time. This test employed value of alpha 1%, 5% and 10% where, if the value of probability less than $\alpha = 1\%$, $\alpha = 5\%$, or $\alpha = 10\%$, it means that there is granger causality (null hypothesis rejected). For further explanation, here are some probability of granger causality result (Gujarati, 2003) :

1. One way relationship between variable A and variable B (unidirectional causality from A to B), when A's past affect variable B, but B does not affect variable A.
2. One way relationship between variable B and variable A (unidirectional causality from B to A), when B's past affect variable A, but A does not affect variable B.
3. Two way relationship between variable A and variable B (bidirectional causality), when both variables affecting each other. A's past will affect variable B, and B's past will affect variable A.

4. No granger causality between variables. In this point, the value of probability is bigger than alpha (α = 1%, 5%, 10%)

3.10 VECM Stability Test

The next step is determining the VECM stability. This test is quite similar with VAR stability test which is by checking its AR roots table and AR roots graph. It is said to be stable if the value of modulus is less than one and all the dots are located inside the AR roots circle. According to Becketti (2013) and Altaee, et al (2015), they said that VEC model can be stable with one modulus if only it passes the classical test, such as multicolinearity test, autocorrelation test, and heteroscedasticity test. If it passes all classical test, so that the model is stable and can be continued to the next steps.

3.11 Classical Assumption Test

3.11.1 Multicollinearity Test

Multicolinearity means there is a perfect relationship among all the variables described in the regression model. A regression model can be said to be good if there are no correlation among the independent variables. The presence or absence of multicolinearity can be seen in correlation coefficients of each independent variable. One method used is to look at the value of the correlation matrix between variables. According to Ajija, et al (2011), if the correlation coefficient between variable is less than 0.8, the model can be said to be free from multicolinearity. In the opposite, if it has more than 0.8 then it is assumed that there is a very strong correlation between variables and multicolinearity is existed.

3.11.2 Heteroscedastisity Test

Heteroscedasticity is a condition where all the problems appeared from regression function does not have the same variant. White with no cross term is employed in this test. Here are some hypothesis of the result:

H_0 : Heteroscedastisity does not exist (3.21)

H_1 : Heteroscedastisity existed (3.22)

The criteria to reject or accept H_0 hypothesis is by examining the F and Obs*R-squared. If p-value of Obs*R-squared > α, then H_0 is accepted (there is no heteroscedastisity).

3.11.3 Autocorrelation Test

Autocorrelation shows correlation between observation that is arranged by time and space. For knowing the existence of autocorrelation, it can use VEC residual correlation LM test with the hypothesis as follows:

H_0 : No Autocorrelation existed (3.23)

H_1 : Autocorrelation existed (3.24)

The criteria to reject or accept the H_0 hypothesis is by examining the F and Obs*R-squared. If p-value of Obs*R-squared > α, then H_0 is accepted (there is no Autocorrelation).

3.12 Impulse Response Function (IRF)

Impulse response function (IRF) purposes to know how variable respond to the shock of other variables. The outcome is whether the attacked variable responds positively or negatively to the shock. Moreover, it also shows how long the variable experiences the shock until it is back to the normal point (stable point). IRF result is delivered into graph so that the responses can be seen better.

3.13 Variance Decomposition (VD)

Variance decomposition is needed to know the information about the contribution of each variable on affecting the other variable. In simplicity, variance decomposition will show how strong variables affecting one variable from past period until present period. This test is validated to all the variables in the study. Variance decomposition is presented on table and the numbers refer to percentage.

3.14 Robustness Test

Robustness test can be described as the ability to reproduce the analytical method in different laboratories or under different circumstances without the occurrence of unexpected difference in the obtained result. Robustness test examines the potential sources of variability in one or a number of responses of the method. Thus robustness test was considered a part of method validation. According to Heyden, et al. 2001, the way to check the robustness test is by identifying the impulse response function from lag optimum and two lags between lag optimum. Robustness test is shown by figures and look at the growth of response. If the growth of response is similar in all lags, it means that the model is valid.


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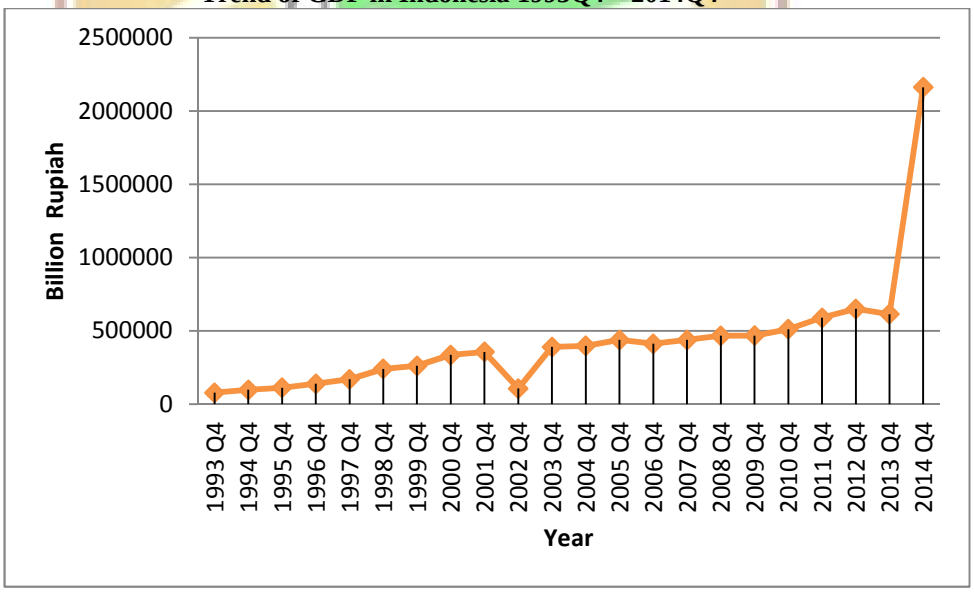
CHAPTER IV

GENERAL OVERVIEW

4.1 Real Gross Domestic Product

Economic growth in detail from year to year is presented through Gross Domestic Product (GDP) regularly. GDP is defined as the total market value of all final goods and services produced within a given country in a given period of time. Despite, Gross Domestic Product not fully describe the welfare of country, but at least it can be used as indicator that can reflect a country economic progress. Indonesia continues to maintain the economic growth by improving the gross domestic product.

Figure 4.1
Trend of GDP in Indonesia 1993Q4 – 2014Q4



Source: Bank of Indonesia, 2016

This research uses Indonesian real gross domestic product as the proxy of Indonesian economic growth. The fourth quarter of each year represents the growth

of Indonesian economic growth. Figure 4.1 shows the trend of GDP in Indonesia from 1993Q4 to 2015Q4. The year of 1993 was the lowest rank of Indonesian economic growth compared to the other years which is Rp.77.523 billion in fourth quarter. Generally, Indonesian economic growth is increasing every year, but there are several conditions where the economic growth decreased.

Started from 1993 to 1998 Indonesian economic growth tends to be increase and slowly decreased in 1999. The worse condition of Indonesian economic growth is along 2002 where economic growth rate fell due to the recession of world economy. This condition happened because the weakening of international confidence driven by declining investment in technology. The tragedy is exacerbated by the WTC (World Trade Center) in the third quarter to capital markets in the four attacks on New York and Washington DC where the economic situation will be worse off. Then in 2003, the rate of economic growth increased. It showed by the strengthening exchange rate, declining interest rates, rising external reserves and inflation were quite small.

However, in 2003 to 2004 Indonesia got up from the fall where the real GDP started to increase. In 2005 Indonesia also show a good economic progress where the performances of the government under President SBY are very moderate and effective, plus an experienced and strong economic team. But it does not stop here, in 2009, the economic back to slowdown caused by the global economic crisis of 2008, known as sub-prime mortgage crisis in the USA, namely housing loans given to borrowers who have a poor credit portfolio. In fact, this crisis does not make Indonesian economy into a very bad condition.

In 2013, the decline in economic growth dropped from 6.11% to 5.61%, this indicates that there are some conditions of the economy that depreciate of rupiah, and decrease of export activity while investment increased from the previous year. However, this condition has not been able to improve the performance of the GDP. In terms of the financial sector, bank loans were the equivalent of 26% of Indonesia's GDP in 2013. This is similar to the Philippines, but low compared to China, Singapore, South Korea, Malaysia and Thailand where average debt to GDP in 2012 ran at 99% to 127%.

The year of 2014 seems to be the best performance of Indonesian GDP which reach Rp.2.161.458 Billion in the last quarter. According to Indonesia ministry of finance (2015), the increasing of GDP in 2014 was caused by several vocations growth in Indonesia. In the service vocations, the growth of communication and information sector increase 10.02%, services sector increases about 9.81%, and other service contributes around 8.92%. Next, from manufacture industry contributes around 21.02%, from agriculture, forestry, and fishery sectors contribute about 13.38%, and from transportation sector contribute around 13.38%. Meanwhile, the household consumption increases into 56.07%, and export rising to 23.72% on goods and services.

4.2 Trade Openness

Figure 4.2
Trend of Trade Openness in Indonesia 1993Q4 – 2014Q4

Source: Bank of Indonesia, 2016

The international trade is already occurred far from last centuries, but it depended by the primitive ways certainly. The old international trade was bartering goods and services between countries. Nowadays, as the advance of human civilization it enlarges the changes of international trade by knowing the technical term of export and import. In this modern life, a country often difficult to fulfill their needs without collaborating with other country so that trade is very helpful for both nations. Together with the technology progress, the distribution of goods and services become easier and could enlarge the specialization commodity development.

For Indonesia, trading with foreign countries is not a new issue. Long time ago Indonesia already joined to international trade with some countries, especially with neighbor countries, even with European nations, Africa, and America, Australia, and Latin America. According to Matondang et al. (1997), Indonesia's export

included spices, camphor, natural commodities, especially rattan that was grown higher.

In fourth quarter of 2003, trade openness is decrease strongly, with the level at 17%. It happened because of the competitiveness of domestic product with foreign product like China's product which is very cheap and same quality with domestic product. It makes the demand for import higher because the power of consumer choice on choosing the cheaper price.

But, Indonesian trade openness come back again with higher rate of TO in 2010 by 55%. Indonesian export is greater in this year where foreigner like Indonesian products. In the next three years Indonesia keep growing its trade openness, until 2014 Indonesian trade openness fell into 16%. This decline actually is hard to examine because TO is the summation of export and import over GDP. So, it is difficult to see whether import or export has the biggest value in this result. But, the bigger value of export than import is much better for Indonesia.

4.2.1 Trade Policy in Indonesia

Indonesia's trade policy has been changed simultaneously during the past sixty years. Indonesia for the first time interested with international trade around 1960s. Indonesia shows the progress of the openness in 1970s and more open due to the trade liberalization policies that were taken. Around 1980s become a new stage of Indonesia to the transformation of trade openness. According to Nurrahma (2013), Indonesia experienced several stages of taking the international trade policies from 1982 until nowadays.

1. The New Stage of Trade Openness (1982 – 1985)

Before 1980s, Indonesia took a high protection on international trade. The import tariff was really expensive, especially with the same commodity produced in domestic. Importer also faced difficulty in non-tariff problem such as the import license. The import mechanism was also not very clear that made trading process disturbed.

Since 1982, the world oil price started to be decreasing. This phenomenon became the main cause of the direction transformation of Indonesia trade policy. Indonesia also experienced the descend of world oil price where Indonesia was a member of Organization of Petroleum Exporting Countries (OPEC). The national source of income decreased rapidly because oil and gas sector were the biggest source of national income. This is when deregulation was needed, where private role would be increase and government's role would become the facilitators for healthy business.

Indonesia kept decreasing the tariff range and tariff level on March 1985. Tariff range decreasing to be 0 – 60%, and tariff level decreasing to be 11%. This policy made Indonesia decrease the protection to the industry.

2. Trade Liberalization with Effective and Rapid Growth (1986- 1990)

As the continuance of Inpres No 4 1985, government validated the other five deregulation of trade. The policy package 6 Mei 1986 was made together with Indonesia's Finance Minister and Trading Minister. This policy gave the opportunity to all exporter businessman for importing the goods needed for production. This

mechanism was called as Badan Pelayanan Kemudahan Ekspordan Pengolahan Data (BAPEKSTA). The exporters can doing the import without exporter license.

On October 25th , 1986 government kept making the policy. For the first time government decreased the limitation of import volume and non-tariff barrier for some commodities. The trade barrier was replaced by tariff. In this time, government gave the ease to domestic producers indirectly for importing goods.

As the continuance of previous policy, government stated the policy of January, 15 1987. This policy replaced the previous policy that restrict the quantity of goods imported by barrier on tariff. Beside that, this policy had the objective to protect the domestic industry more efficiently in providing the goods for production.

The next deregulation was policy of December, 24 1987, where including the continuance of non-tariff barrier into tariff barrier. And then, government also made some decision on license simplification. On November 21st , 1988 was a strong policy affecting the Indonesia trade liberalization. This policy discussed many abolishment of non-tariff barrier for various commodity, such as plastic and steel. The abolishment of non-tariff on plastic goods caused psychological effect on business aspect because of the seriousness of government on doing deregulation.

Next, policy package in Mei 28th, 1990 aimed to increasing the product competitiveness by changing 'Tata Niaga Impor' system with cost tariff, license procedure simplification, lowering tariff and additional tax. By this deregulation, industrialization in Indonesia changed from import substitution into export oriented.

Unfortunately, this policy could not be done fully because there was still exist non-tariff barrier.

3. The Saturation of Deregulation (1991 – 1995)

The policy package on June 1991 opened the opportunity for foreign investment to some sectors that was closed before. This policy continued by policy package on July 1992, June and October 1993, June 1994, and Mei 1995. These policies still included the lowering tariff and abolishment of non-tariff barrier for some commodities and increasing trade facility.

The saturation of deregulation was closed by Policy Package on Mei 1995. For the first time, Indonesia set a schedule on lowering the tariff for period of 1995 – 2003. By that planning, Indonesia will have 10% of maximum tariff, except for automotive industry and its components.

4. The Continuing of Trade Openness (1995 – 1997)

On January 1st, 1995 Indonesia joined the world trade organization (WTO). As the member of WTO, Indonesia should adjust the tariff maximum at 40%. But this decision was not affecting Indonesia trade policy, because Indonesia tariff was already around 15% in the 1994. Due to the non-tariff abolishment, Indonesia cut the import producer policy on some vital sectors, such as electronic industry, metal industry, machine, and other weight goods industry. By participating with WTO, Indonesia had benefit by gaining the more open external market. Moreover, Indonesia

was more discipline on internal domestic market. Because government could not rising the tariff in order to protect domestic industry.

In the 1994, there were three pillars of cooperation on APEC. First, trade liberalization and investment, second, business facility, third, economic cooperation and technique. During 1995 and 1996, the real framework and agenda were arranged on liberalization, facility, and cooperation among APEC member. In this period, APEC showed the role of international cooperation is creating and giving the climate and peer pressure on the development process of trade liberalization and investment among members.

5. The More Integrated and Accelerated Trade Liberalization (1998 – Now)

Indonesia economy had down due to the financial crisis in 1997 and 1998. This problem lead Indonesia to joined International Monetary Fund (IMF). The first agreement (Letter of Intent (LOI)) was giving the loan for Indonesia around 43 million USD for stabilizing Indonesia exchange rate on October 1997. The second agreement, Indonesia should do some commitment one of them was to do trade liberalization policy on January 1998. Indonesia did the reformation on investment, lowering tariff and non-tariff abolishment. In the end of IMF program, Indonesia was expected to be a country with trade openness regime like China and Singapore. After the crisis, Indonesia begun to join other international trade organization such as ASEAN-Korea, ASEAN-India, and ASEAN-New Zealand.

4.3 Capital Formation

Figure 4.3
Trend of Capital Formation in Indonesia 1993Q4 - 2014Q4

Source: Federal Reserve Economic Data (FRED), 2016

The Indonesian GDFCF consists of the acquisition of new capital goods domestically produced, and new or second-hand capital goods imported from abroad. Capital goods are buildings and structure, and machinery and equipment used in the process of production of Indonesian economy. The method applied to estimate GDFCF of Indonesia is commodity flow approach. This approach utilized the data on supply of goods (fixed assets) intended for capital formation. Manufacturing Industries statistics and Foreign Trade statistics are the main sources of data for the measurement of GDFCF. Beside, information and parameters also derived from various special surveys designed for the compilation of GDP, Input-Output Table, Social Accounting Matrix, Flow of Funds Accounts and other related macro economic indicators (Saleh, 1997).

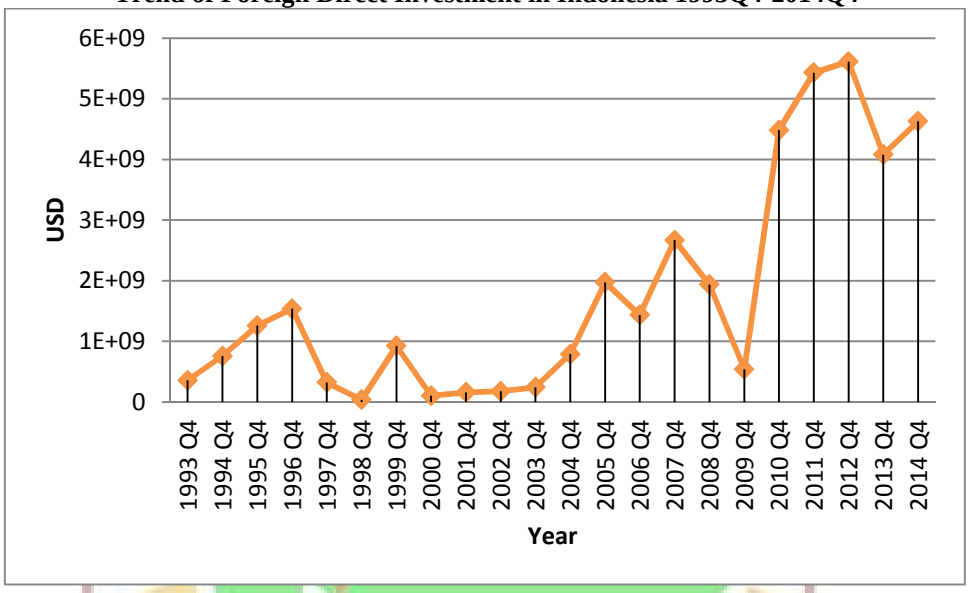
Buildings and structures as capital goods are the output of construction sector. This output is calculated by the sum of the value of material input for the construction of buildings and structures, and expenses on services and primary input (gross value added) of the sector. Included in construction materials are machineries and equipment directly installed in construction/building.

Capital formation, in the form of construction at constant prices, is based on the construction sector output at 1993 constant market prices, for which the calculation is separated for each component. Construction materials of domestic manufacturing production and several other commodities are calculated by extrapolation, using the production indices of the respective types of goods as the extrapolator.

The trend of capital formation in Indonesia tends to be stable and increase over year. Started from 1993, Indonesian capital formation was Rp.30.5644565 trillion, and then increasing to be Rp.128.5712372 trillion in third quarter of 2003. Going to 2008, the capital formation of Indonesia was increasingly better with Rp.461.7455207 trillion in the last quarter. At last, the highest rank achieved is in 2014 with 2 times higher than 2008 which is Rp.896.987672 Trillion.

4.4 Foreign Direct Investment

Figure 4.4
Trend of Foreign Direct Investment in Indonesia 1993Q4-2014Q4



Source: Federal Reserve Economic Data (FRED), 2016

There are several sectors interested by foreign investor non ASEAN on doing investment in Indonesia. First is manufacturing sector within six years which portion is 37.95% from total. Second is mining sector with 21.4% from total. Third is transportation, warehousing, and communication with 12.51%. Fourth is financing agent with 11.95%. Fifth is wholesale and retail, household equipment, and motorbike services with 9.235.

Figure 4.4 shows that the decline of FDI in 2006 and 2009 from 2667 million USD (2007Q4) to 1435 million USD (2006Q4) and 540 million USD (2009Q4).The cause of declining in FDI also stimulated by the electricity sector, gas, and water. This problem arises because these three sectors still monopolized by BUMN which

are PLN, PGN, and Pertamina, and PAM, so that it is become the obstacle to foreign investor on investing in such sectors. The other complaint also stated by Japan that things to be obstacle in Indonesia are: (1) infrastructure especially electricity supply, (2) law certainty, (3) fluctuation of Indonesia Rupiah, (4) labor force problem, (5) double tax (center tax and regional tax), and (6) copyright problem (Kemu, 2011).

The year of 2011 and 2012 seem like the shining years of FDI in Indonesia. It shows the highest rank of FDI which is increasing from 4483 million USD (2010Q4) to 5428 million USD (2011Q4) and 5612 million USD (2012Q4). Singapore – Indonesia made ten projects in 2011 including chemistry industries, oil and gas, machineries, jewelry industries, cold storage services and warehousing services, EO and world trade services, pump systems, management industries, safety mirrors, and automation industries.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CHAPTER V

EMPIRICAL RESULT

This chapter explains the empirical result of the research. The study uses methodology of Vector Error Correction (VEC) with the data of Indonesian economy started from 1993Q1 to 2014Q4. The discussion will be presented in the following explanations.

5.1 Stationary Test

The primary precaution before embarking any econometric analysis that utilize time series data is to check the stationary of data. It is necessary to determine the stationary and order of integration of each seriesof the variables to avoid spurious regression. The time series property of each variable is investigated under a univariate analysis by implementing ADF test for the unit root (non stationary).

Table 5.1

Result of Unit Root Test (Augmented Dickey Fuller)

Variables	Level		First Difference	
	P-value	Information	P-value	Information
LN GDP	0.1334	Non Stationer	0.0001	Stationer
LN TO	0.0002	Stationer	0.0001	Stationer
LN CF	0.8345	Non Stationer	0.0001	Stationer
LN FDI	0.3792	Non Stationer	0.0001	Stationer

Source: Appendix 3, data proceed 2016

Based on the level result of ADF test, shows that only trade openness is stationer with probability less than α = 5%. So that, all of the variable should be tested in the first difference in order to get a proper result of unit root test. After tested by first difference, GDP, trade openness, capital formation, and foreign direct investment indicates stationer with all probability is less than α = 5%. So that, all the variables in this research are using the variable that integrated in the first degree (I). In short, ADF test shows all variable is significant and the next tests can be continued.

5.2 Lag Optimal Test

Table 5.2

Result of Lag Optimal Test

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-120.1339	NA	0.001272	4.684298	4.832999	4.741481
1	87.94944	376.9057	9.07e-07*	-2.56413	-1.820624*	-2.278213*
2	100.3983	20.66972	1.05e-06	-2.430123	-1.091811	-1.915473
3	108.0156	11.49790	1.48e-06	-2.113797	-0.18068	-1.370413
4	128.1005	27.28513	1.34e-06	-2.267943	0.259978	-1.295827
5	151.9918	**28.84983***	1.09e-06	**-2.565727***	0.557000	-1.364877

Source: Appendix 4, data processed 2016

Lag optimal test is applied to know the amount of lag that gives significant result on the next step procedure. The significant result will happen when the amount of lag utilized is optimal. The determination of lag optimal can be achieved by using criteria available. There are Aikake Information Criterion (AIC), Schrawz Information Criterion (SIC), Hannan-Quin Criterion (HQC), Final Prediction Error

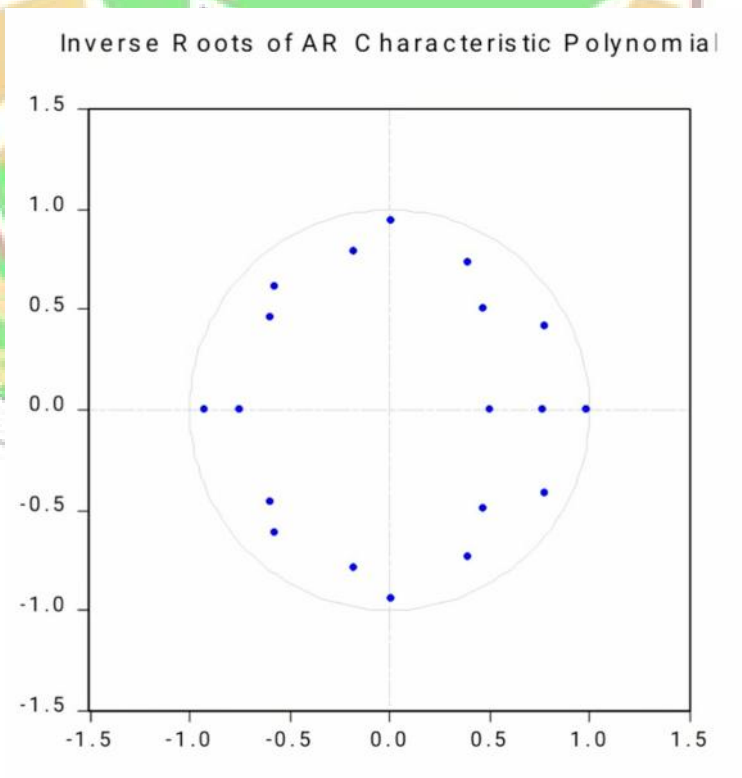
(FPE), and Corrected Verition of AIC. In this research, the lag optimal suggested by eviews is lag 5.

5.3 VAR Stability Test

This step is important to see the validity of the data. VAR stability test can be done through VAR Stability Condition Check by calculating roots from Characteristic Polynomial. It is said stable if all the roots are less than one (<1). This test can be seen through AR Roots table and AR roots graph where all the dots are inside the unit circle.

Figure 5.1

Result of VAR Stability Test (AR Root Graph)



Source: Appendix 5, data processed 2016

Table 5.3
Result of VAR Stability Test (AR Roots Table)

Root	Modulus
0.991828	0.991828
0.984123	0.984123
0.013636 + 0.942428i	0.942527
0.013636 - 0.942428i	0.942527
-0.924579	0.924579
0.780308 - 0.415318i	0.883951
0.780308 + 0.415318i	0.883951
-0.566658 - 0.613961i	0.835494
-0.566658 + 0.613961i	0.835494
0.390726 - 0.734799i	0.832224
0.390726 + 0.734799i	0.832224
-0.171326 - 0.793530i	0.811814
-0.171326 + 0.793530i	0.811814
0.772291	0.772291
-0.596670 - 0.466337i	0.757288
-0.596670 + 0.466337i	0.757288
-0.749233	0.749233
0.469591 - 0.499569i	0.685627
0.469591 + 0.499569i	0.685627
0.503232	0.503232

Source: Appendix 4, data processed 2016

Based on the result, both AR roots table and AR roots graph indicate the stability of VAR. This outcome can be seen from the modulus numbers are less than one, and all the dots are located inside the circle. So that, VAR model is already stable and can be estimated to the next steps.

5.4 Johansen Co-integration Test

Co-integration test determines the validity of long run relationships between variables, given all variables are at non stationary level. If there is a co-integration, means that there is a long run relationship between variables. Co-integration test was developed by Johansen in 1988 and he suggests two tests for determining the number of co-integrated vector which are Trace test and Maximum Eigen Value Test. The trace test examines the hypothesis that there are at most r co-integrating vectors while the Maximum Eigen Value tests the hypothesis that there are r+1 co-integrating vectors.

According to the table 5.4 and 5.5 shows that there is co-integration result and supported by two co-integrating equations. The result can be seen from trace and max eigenvalue where the trace statistics are bigger than α=5%. So that, the proper model for this research is Vector Error Correction Model (VECM). This findings also supported by Adhikary (2011) and Soliu, at al (2014).

Table 5.4

Result of Co-integration Test (Trace)

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.432263	50.48534	47.85613	0.0277
At most 1	0.304797	21.61443	29.79707	0.3204
At most 2	0.058128	3.073294	15.49471	0.9635
At most 3	0.000375	0.019103	3.841466	0.8900
Trace test indicates 1 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

Source: Appendix 6, data processed 2016

Table 5.5

Result of Co-integration Test (Maximum Eigen Value)

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.432263	28.87091	27.58434	0.0340
At most 1	0.304797	18.54114	21.13162	0.1109
At most 2	0.058128	3.054191	14.26460	0.9431
At most 3	0.000375	0.019103	3.841466	0.8900
Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

Source: Appendix 6, data processed 2016

5.5 Granger Causality Test

Granger causality test is employed to know whether there is one way or two way relationship between variables. According to Ajija, et al (2011), granger causality test mainly purposed to see the effect of past variable to other variable in present time. This test employed value of alpha 1%, 5% and 10% where, if the value of probability less than α = 1%, α = 5%, or α = 10%, it means that there is granger causality (null hypothesis rejected)

Table 5.6

Result of Granger Causality Test

Null Hypothesis:	Obs	F-Statistic	Prob.
LNTO does not Granger Cause LNGDP	83	2.54356	****0.0355**
LNGDP does not Granger Cause LNTO		2.14651	*****0.0695**
LNCF does not Granger Cause LNGDP	83	3.41232	***0.008**
LNGDP does not Granger Cause LNCF		1.37394	0.2442
LNFDI does not Granger Cause LNGDP	53	1.14417	0.3525
LNGDP does not Granger Cause LNFDI		1.14517	0.352

Source: Appendix 7, data processed 2016

Where :

***α = significant at 10%

**α = significant at 5%

*α = significant at 1%

Based on the table 5.6, there are three granger causality in this research. First, in the α = 10% trade openness and gross domestic product have one way relationship,

where the changes of trade openness in the past will affect GDP in present time. Meanwhile, in α = 5% GDP has one way relationship with trade openness, where the changes in GDP in the past will affect the trade openness in present time. In summary, both trade openness and GDP is affecting each other. Next, in α = 1% GDP has one way relationship with capital formation, where the changes of GDP in the past will affect capital formation in present time. This result can be seen from the probability is 0.008 (< 1%).

5.6 VECM Stability Test

This test is quite similar with VAR stability test which is by checking its AR roots table and AR roots graph. It is said to be stable if the value of modulus is less than one and all the dots are located inside the AR roots circle. However, according to Becketti (2013) and Altaee, et al (2015), they said that VEC model can be stable with one modulus if only it passes the classical tests, such as multicolinearity test, autocorrelation test, and heteroscedasticity test. If it passes all classical test, so that the model is stable and can be continued to the next steps.

Table 5.7

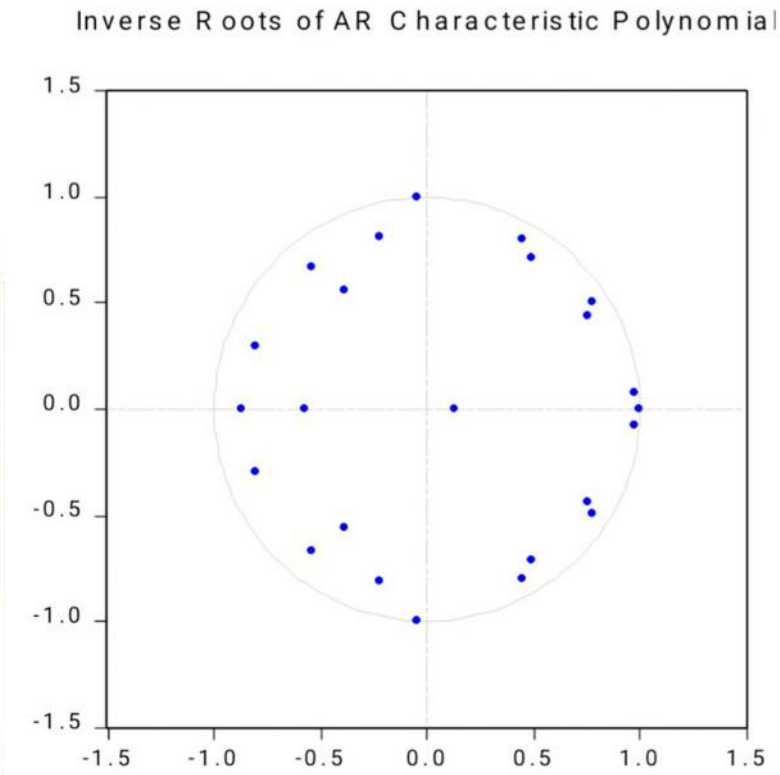
Result of VECM Stability (Unit Root Table)

Root	Modulus
1.000000	1.000000
-0.041574 + 0.997327i	0.998193
-0.041574 - 0.997327i	0.998193
0.973658 - 0.078220i	0.976795
0.973658 + 0.078220i	0.976795
0.779804 - 0.499744i	0.926196
0.779804 + 0.499744i	0.926196
0.453014 + 0.802161i	0.921241
0.453014 - 0.802161i	0.921241
0.759296 - 0.437455i	0.876297
0.759296 + 0.437455i	0.876297
-0.873209	0.873209
0.491820 - 0.715820i	0.868496
0.491820 + 0.715820i	0.868496
-0.534383 - 0.673916i	0.860075
-0.534383 + 0.673916i	0.860075
-0.798797 - 0.298703i	0.852819
-0.798797 + 0.298703i	0.852819
-0.221340 - 0.810012i	0.839709
-0.221340 + 0.810012i	0.839709
-0.384324 + 0.561625i	0.680535
-0.384324 - 0.561625i	0.680535
-0.571338	0.571338
0.127817	0.127817

Source: Appendix 8, data processed 2016

Figure 5.2

Result of VECM Stability (AR Root Graph)



Source: Appendix 8, data processed 2016

The result shows that there is one modulus in the AR roots table and a half dots are outside the circle. This result also found by Altaee, et al (2015) on their research entitled Financial Development, Trade Openness and Economic Growth: A Trilateral Analysis of Bahrain. They employed VECM to estimate their model, and indicate modulus in the AR root table. So, the solution for this matter is to try all the classical consumption tests, such as multicolinearity test, heteroscedasticity test, and autocorrelation test. The further explanation also revealed by Becketti (2013) where he evaluating the classical assumption tests. The result shows that no matter appears

in the classical tests which means the VECM is stable. The same solution also adopted by the writer of this research in order to get a proper result.

5.7 Classical Assumption Test

5.7.1 Multicolinearity Test

Table 5.8 Result of multicolinearity test

1.000000	-0.669274	-0.309727	-0.144585
-0.669274	1.000000	0.375535	0.140548
-0.309727	0.375535	1.000000	0.064695
-0.144585	0.140548	0.064695	1.000000

Source: Appendix 9, data processed 2016

According jo Ajija, et al (2011), the result can be free from multicolinearity if all the numbers are less than 0.8. Table 5.5 explains that this model is free from multicolinearity.

5.7.2 Heteroscedasticity Test

To see the validity of data and free from hetercedasticity, it can be seen from the probability of estimation. The probability should be bigger than α=5% (p>5%). As the table above, this result shows it is free from heteroscedasticity because the probability is 0.5025 which is bigger than 5%.

Table 5.9 Result of heteroscedasticity test

			Chi-sq	df	Prob.
			459.1414	460	0.5025
Individual components:					
Dependent	R-squared	F(46,3)	Prob.	Chi-sq(46)	Prob.
res1*res1	0.913639	0.689956	0.7592	45.68196	0.4855
res2*res2	0.889791	0.526545	0.8570	44.48957	0.5356
res3*res3	0.969099	2.045308	0.3083	48.45495	0.3742
res4*res4	0.904816	0.619955	0.8007	45.24081	0.5040
res2*res1	0.903683	0.611895	0.8056	45.18415	0.5063
res3*res1	0.954594	1.371109	0.4602	47.72972	0.4023
res3*res2	0.962887	1.692063	0.3760	48.14437	0.3861
res4*res1	0.959044	1.527160	0.4160	47.95220	0.3936
res4*res2	0.927408	0.833194	0.6797	46.37041	0.4570
res4*res3	0.993841	10.52345	0.0376	49.69204	0.3284

Source: Appendix 9, data processed 2016

5.7.3 Autocorrelation Test

Table 5.10 Result of autocorrelation test

Lags	LM-Stat	Prob
1	20.10371	0.2156
2	13.51768	0.6346
3	10.41989	0.8438
4	13.12838	0.6633
5	6.436978	0.9827

Source: Appendix 9, data processed 2016

Autocorrelation test can be seen from the probability of result (p>5%. This research employed lag 5 as the optimum lag, so it has to look at the probability in lag 5. The result shows that estimation is free from autocorrelation which probability is 0.9827 (p>5%).

5.8 VECM Result

5.8.1 Long Run VECM

Table 5.11

Result of Long Run VECM

CointegratingEq:	CointEq1	CointEq2	CointEq3
DLNGDP(-1)	1.000000	0.000000	0.000000
DLNTO(-1)	0.000000	1.000000	0.000000
DLNCF(-1)	0.000000	0.000000	1.000000
DLNFDI(-1)	1.899923	1.667498	-3.565852
	(0.60245)	(0.37127)	(0.75936)
	***[3.15367]	[4.49133]	[-4.69585]

Source: Appendix 10, data processed 2016

Where :

***α : significant at 10% : 1.29125 (t table)

**α : significant at 5% : 1.66235 (t table)

*α : 1% : significant at 2.36947 (t table)

In the long run estimation of VECM shows that there is one variable has long relationship with GDP. Foreign direct investment is the only variable that affect GDP in the long run by considering the trace statistic bigger than t-table (3.15367 > 2.36947).meanwhile, trade openness and capital formation does not affect GDP in the long run relationship. In short, this result proves the theory of FDI and economic growth that increasing in FDI will led to increasing of GDP. The same result also found by Soliu, et al (2014) and Adhikary (2011), Zekarias (2015).

5.8.2 Short Run VECM

Table 5.12

Result of Short Run VECM (Trade Openness)

Trade Openness		
Variable	Coefficient	Trace Statistic
D(DLNTO(-1))	-0.001924	-0.00177
D(DLNTO(-2))	-0.328159	-0.28476
D(DLNTO(-3))	0.013930	0.01382
D(DLNTO(-4))	0.210791	0.21781
D(DLNTO(-5))	1.918269	**1.86102

Source: Appendix 9, data processed 2016

In the short run estimation of VECM explains that trade openness has strong and positive relationship with GDP in Indonesia. This result shown in table 5.12 where the trace statistic is bigger than t table (1.86102 > 1.66235).so that, the findings prove the theory of trade openness and GDP. This result also found by Soliu, et al (2014), Soi, et al (2013), Yeboah, et al (2012)

Table 5.13

Result of Short Run VECM (Capital Formation)

Capital Formation		
Variable	Coefficient	Trace Statistic
D(DLNCF(-1))	-1.649045	-0.83150
D(DLNCF(-2))	2.320595	**1.38907
D(DLNCF(-3))	4.781691	*3.13551
D(DLNCF(-4))	4.615590	*2.65847
D(DLNCF(-5))	6.843435	*2.91810

Source: Appendix 10, data processed 2016

Capital formation as expected has positive relationship with economic growth. The estimation result of short run VECM explains that capital formation has strong and positive relationship with GDP almost at all lags. The t statistics are 1.38907,

3.13551, 2.65847, and 2.91810 which mean bigger than t table (1.66235 and 2.36947). Thus, the result also proves the theory between capital formation and GDP. This result also found by Adhikary (2011).

Table 5.14

Result of Short Run VECM (Foreign Direct Investment)

Foreign Direct Investment		
Variable	Coefficient	Trace Statistic
D(DLNFDI(-1))	0.300835	**1.84351
D(DLNFDI(-2))	0.14535	0.90238
D(DLNFDI(-3))	-0.115362	-0.71837
D(DLNFDI(-4))	-0.116379	-0.71028
D(DLNFDI(-5))	0.000213	0.00144

Source: Appendix 10, data processed 2016

The last variable shows that FDI has positive and significant relationship with GDP where the t statistic is bigger than t table (1.84351 > 1.66235). Foreign direct investment naturally should increase the nation's economic growth. Thus, this findings prove the theory of FDI and economic growth. This result also found by Soliu, et al (2014) and Adhikary (2011), Zekarias (2015).

5.9 Impulse Response Function

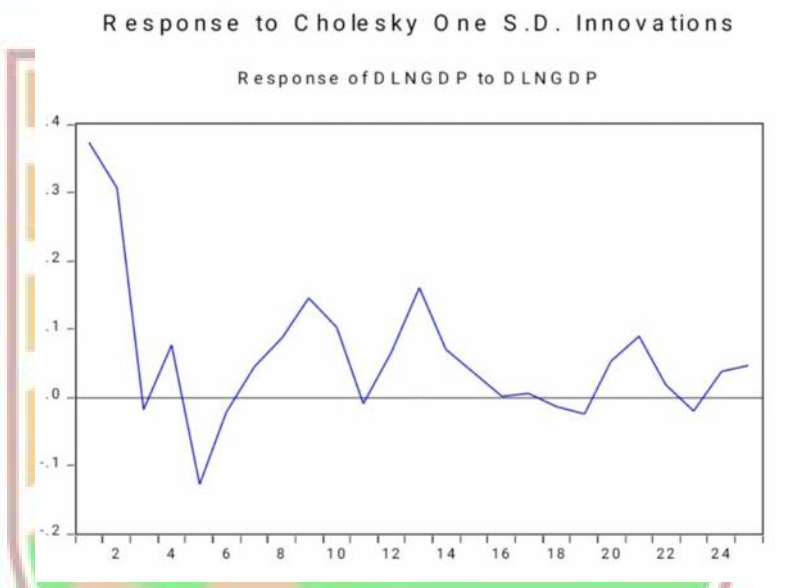
Impulse response function is aimed to see the respond from variable against the shock of other variables. The outcome is whether the attacked variable responds positively or negatively to the shock. Moreover, it also shows how long the variable experiences the shock until it is back to the normal point (stable point). IRF result is delivered into graph so that the responses can be seen better. In this research the

shock of variables will be seen from first period to the 25th period by focusing on shock of GDP, trade openness, capital formation, and FDI on GDP.

5.9.1 Impulse Response Function of GDP to GDP

Figure 5.3

Impulse Response Function of GDP to GDP



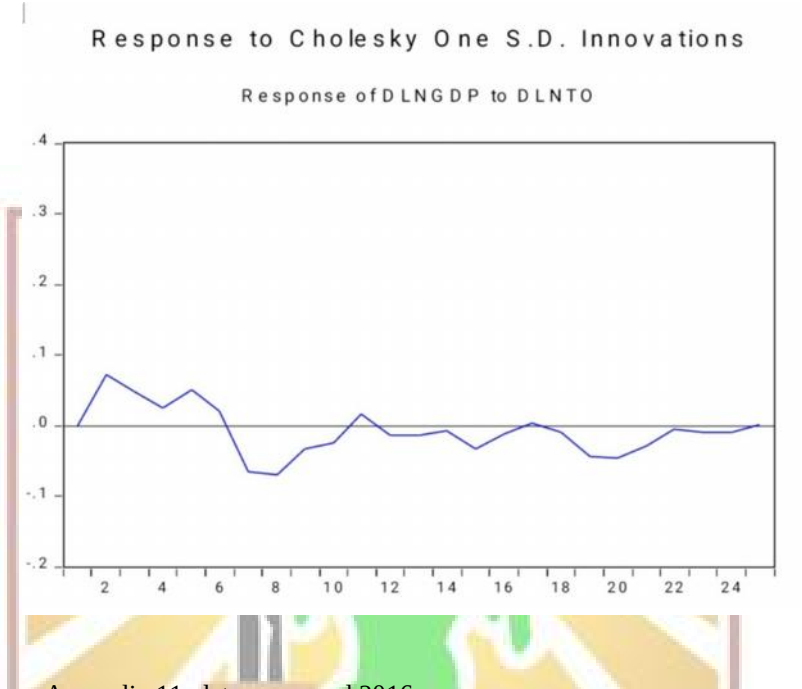
Source: Appendix 11, data processed 2016

Based on the figure 5.3 the respond of GDP against the shock itself tends to be fluctuated. In the first period to the third period, GDP responds negatively which cause GDP fall almost in the natural line. But in the 6th period to 9th period GDP responds positively to the shock until the last period (25th), GDP shows a stable respond.

5.9.2 Impulse Response Function of GDP to TO

Figure 5.4

Impulse Response Function of GDP to TO

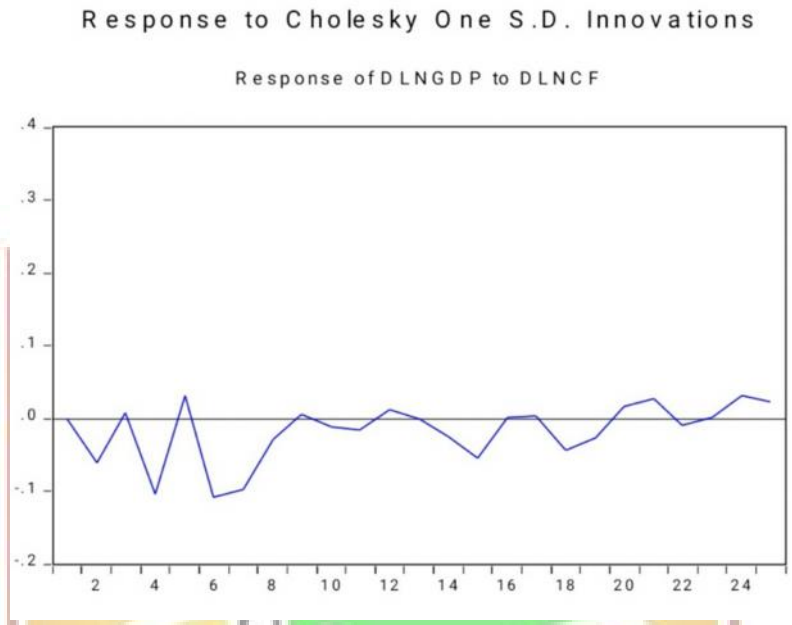


Source: Appendix 11, data processed 2016

The second respond of GDP shows in the figure 5.4. GDP slightly respond positively and negatively to trade openness in a small range of shock. In the first period, GDP responds positively to trade openness until the fifth period. And then negatively respond to the shock by sixth period until tenth period. The fluctuation kept growing until it reached the stable condition in 25th period.

5.9.3 Impulse Response Function of GDP to CF

Figure 5.5
Impulse Response Function of GDP to CF



Source: Appendix 11, data processed 2016

In this tets, GDP tends to respond negatively to the shock of capital formation. The worse number reached is in minus 1.2 in seventh period. The negative respond kept growing until it finds 19th period. This is caused by the economic crsis in Indonesia where all goods and services become extinct and expensive. According to busines review (2010), the biggest reason of economic crisis in Indonesia were the large stock private foreign debt between 1992 to 1997, the weaknesses of banking system in Indonesia, the lack of political change, and fourth is the political situation has been getting warmer due to the crisis.

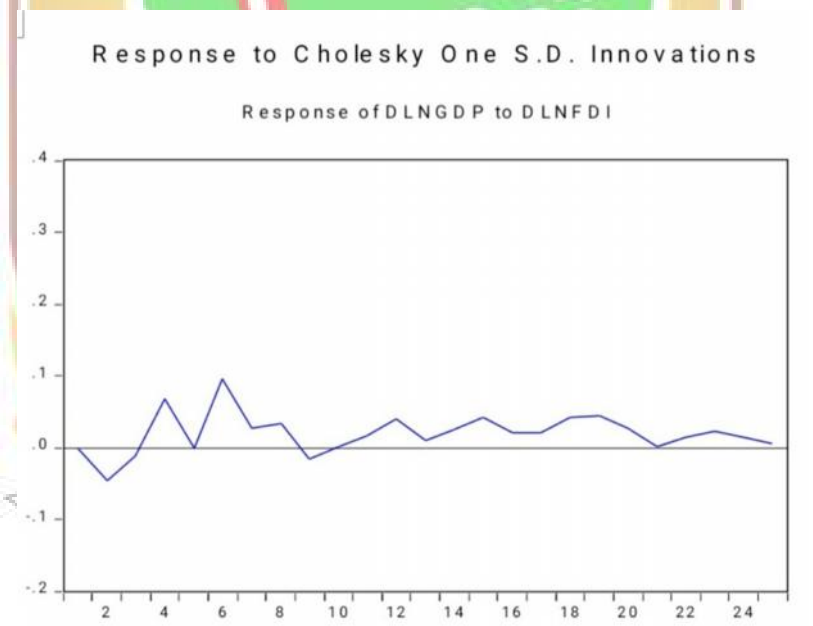
The negative response of GDP to shock by capital formation is because the economic crisis in Indonesia. Moreover, inflation was really high and harm the society to purchase goods and services. Government also weak to solve this problem. The form Capital formation can be as building, land, machinary, and equipment.

Because there were a crises and inflation made the price of capital is higher. This what reflects to the greater capital formation in that time. But, because the expensive price of capital made the demand decrease as the theory of demand supply explained. Producers or firms also could not make bigger production of goods and services because the expensive price of raw materials. Production decrease, gross domestic product also decrease. That is why economic growth respond negatively to capital formation in the crisis period. However, in the next period, GDP starts to respond positively to capital formaation and reach stable point at 25th period.

5.9.4 Impulse Response Function of GDP to FDI

Figure 5.6

Impulse Response Function of GDP to FDI



Source: Appendix 11, data processed 2016

In figure 5.6 looks like GDP is in most stable condition. Because, the shock of foreign direct investment is slightly small but significant and it does not disturb the growth of GDP. GDP responds negatively to FDI from the first period until third

period, The negative response of GDP to shock by FDI was because the attraction of “dynamic conomies’ in Indonesia. So that in this period, GDP tends to respond negatively to FDI.

FDI originally comes from foreign country to domestic country. In this case, Indonesia is the home country. It has similar reason to previous explanation why GDP respond negatively to FDI. The economic crisis of Indonesia made Rupiah more depreciate against USD. Indonesia also faced the big foreign debt. Foreign debt was paid into USD, meanwhile Rupiah tends to depreciate by the crisis. This made foreign debt getting worse at that time. So that, to solve this problem, government increased the tax for FDI. The bigger tax may affect the income of labor to be lower. The lower income may cause the lower gross domestic product. In short, economic growth responds negatively to FDI in the crisis period. However, after that period GDP kept stable and positively responds the FDI.

5.10 Variance Decomposition

Variance decomposition is needed to know the information about the contribution of each variable on affecting the other variable. In simplicity, variance decomposition will show how strong variables affecting one variable from past period until present period. This test is validated to all the variables in the study. Variance decomposition is presented on table and the numbers refer to percentage.

5.10.1 Variance Decomposition of GDP

Table 5.15

Variance Decomposition of GDP

Variance Decomposition of DLNGDP					
Period	S.E.	DLNGDP	DLNTO	DLNCF	DLNFDI
1	0.37364	100	0	0	0
6	0.557917	82.46638	3.680612	8.601552	5.251453
10	0.61283	79.3708	5.848034	9.830316	4.950846
16	0.650312	79.16763	5.629332	9.615133	5.587905
20	0.662209	77.16032	6.317497	9.939658	6.58253
25	0.674763	77.02052	6.298555	10.10376	6.577161

Source: Appendix 12, data processed 2016

According to the table, variable that has strong contribution on affecting GDP is GDP itself as much as 100% in the first period. Continued by the 6th until 25th period, the contribution of GDP is the biggest on affecting itself. Meanwhile, the second variable that has strongest effect is capital formation which affects the GDP about 8% and 10% until the last period. Trade openness and FDI is the last variable that affect the GDP with almost the same amount of contribution about 3% to 6%. The result shows that the increasing of GDP will lead to increasing of GDP in the next period, so as the other variables even they are not as much as GDP. These results also found by Adhikary (2011) and Soliu, et al (2014).

5.10.2 Variance Decomposition of TO

Table 5.16

Variance Decomposition of TO

Variance Decomposition of DLNTO					
Period	S.E.	DLNGDP	DLNTO	DLNCF	DLNFDI
1	0.396959	93.94915	6.05085	0	0
6	0.577235	82.84256	3.303404	8.474041	5.379994
10	0.631544	76.18362	8.446337	9.643675	5.726368
16	0.672022	73.99344	10.17625	9.485614	6.344697
20	0.690965	70.72841	12.14697	9.679435	7.445191
25	0.704778	69.63035	13.15163	9.680541	7.537478

Source: Appendix 12, data processed 2016

Based on the table, variable that has strong contribution on affecting trade openness is GDP as much as 93% in the first period. Continued by the 6th until 25th period, the contribution of GDP is the biggest on affecting trade openness. This result shows that compared to TO itself, GDP is more powerful on contributing TO, where the increasing of GDP will affect increasing of trade openness.

Meanwhile, the second variable that has strongest effect is trade openness itself which affects it about 6% and 13% until the last period. It means that, trade openness is not as strongest as GDP on affecting itself. Capital formation contributes to trade openness by 8% to 9%, and FDI contributes trade openness around 5% to 7%.

5.10.3 Variance Decomposition of CF

Table 5.17

Variance Decomposition of CF

Variance Decomposition of DLN CF					
Period	S.E.	DLNGDP	DLNTO	DLNCF	DLNFDI
1	0.027564	9.593106	9.376757	81.03014	0
6	0.087879	8.146058	59.81684	31.01095	1.026155
10	0.108858	11.54057	62.06304	24.32786	2.068533
16	0.143367	7.62177	66.99325	20.9947	4.390279
20	0.164744	6.688553	70.2585	17.68588	5.36707
25	0.188882	5.607675	72.3068	15.24324	6.842288

Source: Appendix 12, data processed 2016

Table 5.17 explains that capital formation is the most powerful on contributing itself from the first period CF contributes 81%. But, followed by trade openness the contribution is remaining constant and increasing until last period started from 9%, 50%, and 72%. It means that, the greater TO will make the greater capital formation.

Variable that has strong contribution on affecting trade openness is GDP as much as 93% in the first period. Continued by the 6th until 25th period, the contribution of GDP is the biggest on affecting trade openness. This result shows that compared to TO itself, GDP is more powerful on contributing TO, where the increasing of GDP will affect increasing of trade openness. And followed by GDP contributes around 9% descends to 5%, and FDI contributes around 1% until 6%.

5.10.4 Variance Decomposition of FDI

Table 5.18

Variance Decomposition of FDI

Variance Decomposition of DLNFDI					
Period	S.E.	DLNGDP	DLNTO	DLNCF	DLNFDI
1	0.3342	2.090488	0.000272	0.046483	97.86276
6	0.436125	3.979754	15.99687	3.010811	77.01257
10	0.51228	5.863853	33.54343	3.766584	56.82613
16	0.538714	10.46621	30.72161	4.572907	54.23927
20	0.551238	12.18575	30.6065	5.027752	52.18
25	0.563102	13.35785	29.6383	6.864609	50.13924

Source: Appendix 12, data processed 2016

Table 5.18 shows the contribution of FDI is the biggest on affecting FDI itself around 97%, 77%, and 50%. The result means that the increasing of FDI will impact to bigger FDI. And then, trade openness is in second position contributing the FDI by 0%, 33%, and descends to 29%. Meanwhile, CF and GDP contributes to FDI as much as 2%, 6%, and 10%.

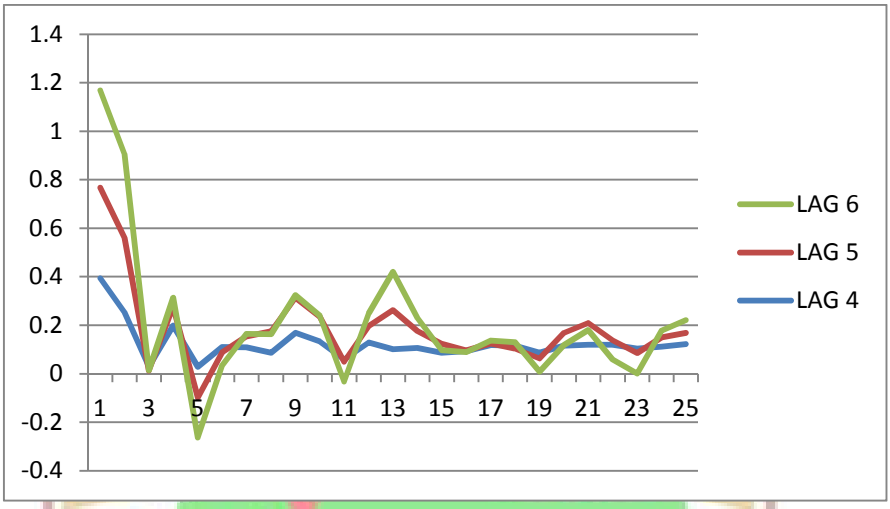
5.11 Robustness Test

Robustness test has purpose to see the validation of model by looking at the impulse response function. The lag optimal of this research is lag 5, so for testing robustness it needs lag 4 and lag six as the comparison. The Conditional is if the response of each lag is similar or shows similar movements, it means the model is valid.

5.11.1 Robustness Test of GDP

Figure 5.7

Result of robustness test of GDP

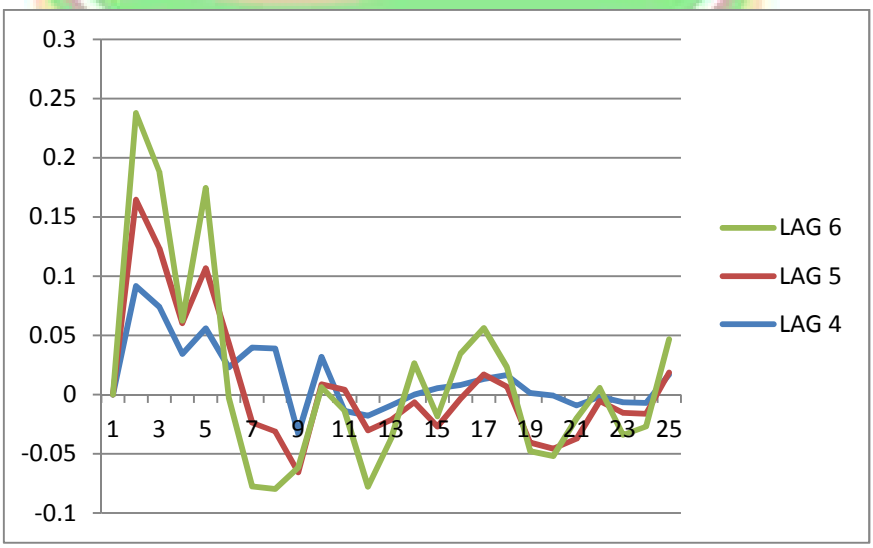


Source: Appendix 13, data processed 2017

5.11.2 Robustness Test of TO

Figure 5.8

Result of robustness test of TO

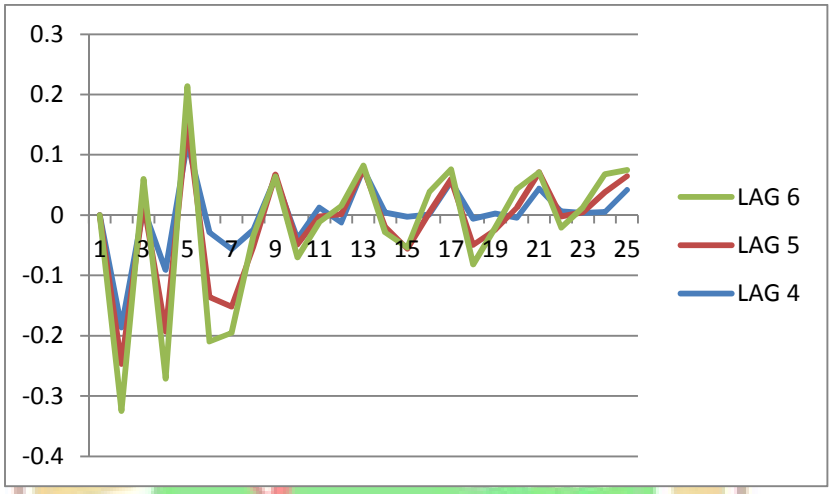


Source: Appendix 13, data processed 2017

5.11.3 Robustness Test of CF

Figure 5.9

Result of robustness test

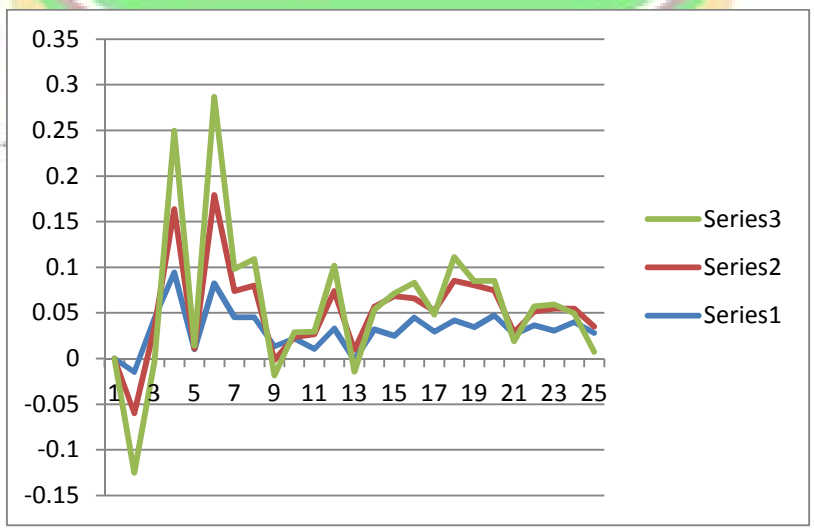


Source: Appendix 13, data processed 2016

5.11.4 Robustness Test of FDI

Figure 5.10

Result of robustness test



Source: Appendix 13, data processed 2016

Figure 5.7, 5.8, 5.9, and 5.10 show the result of robustness test. First, the robustness test of GDP in figure 5.7 shows that all lags have the same movements form first period to 25th period. The blue line indicates lag 4, red line indicates lag 5, and the green line indicates lag 6. Overall this findings prove the validity of VEC model, because when lag 5 is increase, lag 4 and 6 also increase in the same period. When lag 5 is decrease, the lag 4 and six also follow to decrease. The same meaning also shown by figure 5.8, 5.9, and 5.10 where robustness of trade openness, capital formation, and foreign direct investment have the same movements with lag 4 and lag 6. This means that robustness test is success and brings the validity of VECM.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CHAPTER VI

CONCLUSION AND RECOMMENDATION

6.1. Conclusions

The aim of this research is to estimate the effect of trade openness, capital formation, and foreign direct investment on Indonesian economic growth by quarterly data from 1993 to 2014. This study used Vector Error Correction Model (VECM) to get a proper estimation result. Based on the regression, it concludes some results as follow:

1. ADF unit root test shows that all variables are stationer at first difference where it is significant at 5%. As the consequences, this paper employed the first difference variables.
2. Johansen Co-integration test indicates significant long run relationship between variables. This finding supported by the two co-integrating equations.
3. VECM stability imposes one unit root of modulus, however it is free from any problems that proved by classical assumptions tests and supported by the same findings from Becketti (2013) and Altaee, et al (2015).
4. The long run VECM shows that only foreign direct investment has strong and positive relationship with gross domestic product. Where the trace statistic (3.15367) is bigger than t table (2.36947 significant at 1%). This explains that the increasing of FDI will lead to the increasing of national's GDP.

5. The short run VECM shows all variables have strong and positive relationship with Indonesian GDP.Trade openness significantly has relationship with GDP where t statistic is bigger than t table (1.86102 > 1.66235) at alpha 5%. Manwhile capital formation shows strong relationship in almost lag (lag 2, 3, 4, 5) where t statistics are 1.38907, 3.13551, 2.65847, and 2.91810 which mean bigger than t table (1.66235 and 2.36947). lastly, FDI also show positive and significant relationship with GDP where the t statistic is bigger than t table (1.84351 > 1.66235). These findings also supported by some previous literature review about trade openness and gross domestic product
6. Impulse response function of GDP to capital formation and FDI shows negatively in first period. This finding conctradicts with theory that CF and FDI has positive relationshp with GDP. This response is caused by the economic crisis in Indonesia that make some problems and cause economic growth decrease.
7. The robustness test is employed to see the validity of model. Figure 5.7, 5.8, 5.9, and 5.10 show the robustness test of each variable. The result is lag 4 and lag 6 have same movements with lag optimal which is lag 5. This proves that vector correction model is valid.

6.2 Recommendations

Based on the analysis and discussion, it can give some suggestions that may be useful for:

1. Government - as consideration for increasing Indonesian economic growth by improving trade openness, capital formation, and foreign direct investment.
2. Society – as reference and knowledge about economic growth, trade openness, capital formation, and FDI.
3. Future Researchers - as reference material for further research. It advised to try using another methods and variable or more variables used in this study, in order to get various result.This research also expected to give information for the political sector, investment sector, and other analysis policy to compare with this study.

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APPENDIX

APPENDIX 1

Research Variables

PERIOD	GDP (Billion Rupiah)	Trade Openness	CF (Trillion Rupiah)	FDI (USD)
1993 Q1	71417	0.155317902	24.86053148	552000000
1993 Q2	74725	0.152136042	24.76617375	616000000
1993 Q3	78351	0.149327603	27.41054924	478000000
1993 Q4	77523	0.148235408	30.5644565	358000000
1994 Q1	84699	0.143857346	27.56164577	520000000
1994 Q2	89760	0.147564095	31.40771667	305000000
1994 Q3	95972	0.137465632	32.5319394	525000000
1994 Q4	97508	0.146646961	39.33389047	759000000
1995 Q1	6458	2.330643256	36.2593182	978000000
1995 Q2	106653	0.155447417	37.57759507	765000000
1995 Q3	111824	0.152491717	42.44558506	1344000000
1995 Q4	112344	0.15373984	44.1475006	1259000000
1996 Q1	120124	0.148294631	40.70542979	1990000000
1996 Q2	125601	0.14786027	44.20821236	1024000000
1996 Q3	133680	0.136318193	54.05953224	1640000000
1996 Q4	139515	0.137361712	56.76039822	1540000000
1997 Q1	139251	0.137000739	50.86465387	2342000000
1997 Q2	144406	0.134782733	55.09622577	1267000000
1997 Q3	153858	0.153677621	57.75202351	1392000000
1997 Q4	169635	0.223148627	56.89311982	324000000
1998 Q1	187997	0.353468529	81.55773485	501800000
1998 Q2	190408	0.467208563	70.29824994	367000000
1998 Q3	237292	0.271521422	79.11002074	144000000
1998 Q4	240324	0.200241785	70.78431643	38000000
1999 Q1	263212	0.198359185	66.89752272	294000000
1999 Q2	259533	0.151293525	65.67645915	536000000
1999 Q3	256814	0.206204263	67.77107669	698443000
1999 Q4	260985	0.181498619	74.62368296	925178000
2000 Q1	285581	0.186975203	76.35355796	173840000
2000 Q2	256442	0.260209952	82.87997331	447970000
2000 Q3	286028	0.266910312	88.46530321	942945000
2000 Q4	335522	0.242585903	94.82135368	105600000
2001 Q1	313384	0.268569014	100.9527067	107960000
2001 Q2	321676	0.26195316	105.1575598	101770000

2001 Q3	336125	0.173267505	95.78000949	558434000
2001 Q4	355733	0.188604938	100.2169669	159234000
2002 Q1	104917	0.645338782	104.8430691	533258000
2002 Q2	106277	0.610887583	107.9559623	220217000
2002 Q3	109199	0.637005502	111.470241	279147000
2002 Q4	106345	0.658175702	115.198308	178980000
2003 Q1	386722	0.183791873	116.3811897	405942000
2003 Q2	392607	0.15998746	119.0474352	257215000
2003 Q3	402661	0.158725965	123.6666595	202792000
2003 Q4	390168	0.176538648	128.5712372	245405000
2004 Q1	385659	0.190949078	144.98166	348163000
2004 Q2	392230	0.230418526	154.8531878	408556000
2004 Q3	404619	0.253336336	166.200472	347947000
2004 Q4	397600	0.268896867	173.8359929	791416000
2005 Q1	427760	0.278319874	184.8635105	857549000
2005 Q2	434998	0.256223269	198.5306837	3746510000
2005 Q3	448287	0.275658613	208.0006664	1757000000
2005 Q4	438500	0.290594607	222.8807706	1975200000
2006 Q1	378965	0.290851347	235.1986747	1335670000
2006 Q2	381675	0.342085811	245.0484137	1088240000
2006 Q3	410396	0.315809296	255.1591046	1054800000
2006 Q4	412410	0.318304736	265.0173257	1435490000
2007 Q1	401425	0.341059229	278.5684261	1036770000
2007 Q2	424787	0.323003999	292.6151355	1033570000
2007 Q3	428677	0.346455146	311.9319374	2190690000
2007 Q4	438354	0.378014104	340.5895377	2667450000
2008 Q1	422764	0.490148675	377.9250368	2360000000
2008 Q2	474292	0.474858178	416.4329479	1633000000
2008 Q3	486207	0.450041167	445.709611	3388000000
2008 Q4	466477	0.400774567	461.7455207	1937000000
2009 Q1	450165	0.401350847	465.3712145	1904000000
2009 Q2	468976	0.366901062	464.6863598	1447000000
2009 Q3	488238	0.368149419	473.0573158	987000000
2009 Q4	467879	0.475990031	475.965246	540000000
2010 Q1	479438	0.454095477	497.0951895	2983000000
2010 Q2	508646	0.423940822	525.0033354	3350000000
2010 Q3	521652	0.377277229	540.8454697	2955000000
2010 Q4	511140	0.522125788	564.8966874	4483000000
2011 Q1	521834	0.516886377	590.0813552	5311000000
2011 Q2	532036	0.530595787	600.5538787	5034000000

2011 Q3	558605	0.514512292	616.4688359	3469000000
2011 Q4	588281	0.493584298	644.8099479	5428000000
2012 Q1	546698	0.565222173	666.5450122	4482000000
2012 Q2	588502	0.510205185	694.1224364	3201000000
2012 Q3	586773	0.513321379	721.137176	5843000000
2012 Q4	649493	0.451235673	737.2218431	5612000000
2013 Q1	582979	0.500711318	736.1323737	3996000000
2013 Q2	618820	0.480762325	751.8004169	4601000000
2013 Q3	622593	0.551531661	775.0229858	5768000000
2013 Q4	613753	0.625101686	796.824763	4079000000
2014 Q1	2060482	0.166113969	828.5842521	3885000000
2014 Q2	2139301	0.171509722	845.9546174	3939000000
2014 Q3	2206875	0.165552963	862.5980546	5498000000
2014 Q4	2161458	0.163837595	896.987672	4628000000

Source : Bank Indonesia (BI), and Federal Reserve Economic Data (FRED).

APPENDIX 2

Research Variables Transformed into Natural Logarithm (LN)

PERIOD	LN GDP	LN TO	LN CF	LN FDI
1993 Q1	11.17629122	-1.862281282	3.213281465	20.1290586
1993 Q2	11.22156999	-1.882980144	3.20947876	20.23875752
1993 Q3	11.26895401	-1.901612712	3.310927948	19.98512129
1993 Q4	11.25832995	-1.908953677	3.419837781	19.69604354
1994 Q1	11.34685907	-1.938933124	3.31642516	20.06933937
1994 Q2	11.40489472	-1.913492655	3.447053616	19.53582233
1994 Q3	11.47181176	-1.984381344	3.482222358	20.07890882
1994 Q4	11.4876897	-1.919727209	3.6720865	20.44751234
1995 Q1	8.773074951	0.846144305	3.590696402	20.70102023
1995 Q2	11.57733585	-1.861447761	3.626407997	20.45538639
1995 Q3	11.62468149	-1.880645	3.748222904	21.01891608
1995 Q4	11.62932087	-1.872493456	3.787536314	20.95358359
1996 Q1	11.69627982	-1.908554234	3.706361494	21.41140048
1996 Q2	11.74086549	-1.91148757	3.788910572	20.74698236
1996 Q3	11.80320416	-1.992763471	3.990085888	21.21796208
1996 Q4	11.8459274	-1.985137599	4.038838868	21.15504825
1997 Q1	11.84403334	-1.987768959	3.929168259	21.5742711
1997 Q2	11.88038406	-2.00409118	4.009081216	20.95991774
1997 Q3	11.94378538	-1.87289824	4.056158388	21.0540074
1997 Q4	12.04140435	-1.499917239	4.041174417	19.59625407
1998 Q1	12.14418128	-1.039960825	4.401311173	20.03371219
1998 Q2	12.15692442	-0.76097952	4.252746904	19.72087241
1998 Q3	12.37704673	-1.303714242	4.370839551	18.78532386
1998 Q4	12.38974329	-1.60822972	4.259637457	17.45309672
1999 Q1	12.48071507	-1.617675826	4.203161937	19.49909033
1999 Q2	12.46663914	-1.888533452	4.184740553	20.09964472
1999 Q3	12.45610737	-1.578888033	4.216135506	20.36436413
1999 Q4	12.47221821	-1.706507235	4.312457923	20.64549671
2000 Q1	12.56228098	-1.676779275	4.335374631	18.97364589
2000 Q2	12.4546578	-1.346266465	4.417393456	19.92023682
2000 Q3	12.56384499	-1.320842587	4.482610421	20.66451851
2000 Q4	12.72344281	-1.41639939	4.551994634	18.47516893
2001 Q1	12.65518455	-1.314647363	4.614652157	18.49727135
2001 Q2	12.68130011	-1.33958957	4.655459795	18.43822592
2001 Q3	12.72523839	-1.752918609	4.562053994	20.140647

2001 Q4	12.78193573	-1.668100724	4.607337504	18.88588538
2002 Q1	11.56092484	-0.437979856	4.652464652	20.09451592
2002 Q2	11.57380417	-0.492842325	4.681723387	19.21012398
2002 Q3	11.60092718	-0.450976986	4.713757658	19.44724908
2002 Q4	11.5744438	-0.418283359	4.746655061	19.00278463
2003 Q1	12.86546137	-1.693951284	4.756870922	19.82172085
2003 Q2	12.88056439	-1.832659841	4.779522029	19.36542287
2003 Q3	12.9058503	-1.840576056	4.817589716	19.12769138
2003 Q4	12.87433269	-1.734215459	4.856483126	19.31842046
2004 Q1	12.86270884	-1.655748494	4.976607252	19.66818132
2004 Q2	12.87960368	-1.467857945	5.042477493	19.82813955
2004 Q3	12.91070116	-1.373037281	5.113194722	19.66756073
2004 Q4	12.89320175	-1.313427365	5.158112285	20.4893343
2005 Q1	12.96631757	-1.278984201	5.219617772	20.56958888
2005 Q2	12.98309671	-1.361706071	5.290943666	22.04409058
2005 Q3	13.01318893	-1.288592088	5.337541284	21.28687365
2005 Q4	12.99111509	-1.235826085	5.406636968	21.4039355
2006 Q1	12.84519913	-1.234942978	5.460430581	21.01269888
2006 Q2	12.85232474	-1.072693665	5.501455798	20.80782755
2006 Q3	12.92487783	-1.15261674	5.54188729	20.77661701
2006 Q4	12.92977328	-1.144746066	5.579795204	21.08477209
2007 Q1	12.902776	-1.075699124	5.629663724	20.75937595
2007 Q2	12.95934315	-1.130090574	5.678858215	20.75628467
2007 Q3	12.968459	-1.060001918	5.742785015	21.5074824
2007 Q4	12.99078208	-0.972823771	5.83067805	21.7043888
2008 Q1	12.95456938	-0.713046515	5.934695861	21.58192746
2008 Q2	13.06957844	-0.744739092	6.031725459	21.21368465
2008 Q3	13.09438974	-0.798416218	6.099667644	21.94350561
2008 Q4	13.05296399	-0.914356186	6.135013918	21.38440622
2009 Q1	13.01736946	-0.912919304	6.142835398	21.36722277
2009 Q2	13.05830687	-1.002663054	6.141362683	21.09275828
2009 Q3	13.09855827	-0.999266394	6.159216556	20.7101806
2009 Q4	13.05596499	-0.742358368	6.165344839	20.1070797
2010 Q1	13.08036986	-0.7894478	6.208781536	21.81619534
2010 Q2	13.13950757	-0.858161405	6.263404616	21.93222618
2010 Q3	13.16475598	-0.974775007	6.2931336	21.80676449
2010 Q4	13.1443988	-0.649846747	6.33664286	22.2235583
2011 Q1	13.16510481	-0.659932203	6.380260418	22.39304598
2011 Q2	13.18446644	-0.633754778	6.397852361	22.33948073
2011 Q3	13.23319788	-0.664535832	6.424007771	21.9671322

2011 Q4	13.28496	-0.706061617	6.468955619	22.41483658
2012 Q1	13.21165183	-0.570536399	6.502107673	22.22333521
2012 Q2	13.2853356	-0.672942311	6.542648366	21.8867291
2012 Q3	13.28239331	-0.666853159	6.580829377	22.4885102
2012 Q4	13.38394734	-0.795765519	6.602888855	22.448173
2013 Q1	13.27590644	-0.691725556	6.601409958	22.1085597
2013 Q2	13.33556972	-0.732382259	6.622470886	22.24953951
2013 Q3	13.34164829	-0.595056034	6.652892688	22.47559124
2013 Q4	13.32734785	-0.469840945	6.680634784	22.1291177
2014 Q1	14.53845049	-1.795081168	6.719718524	22.08038882
2014 Q2	14.5759897	-1.763115328	6.740465714	22.09419272
2014 Q3	14.60708805	-1.798464119	6.759948829	22.42765023
2014 Q4	14.58629355	-1.808879616	6.799042118	22.25539065

Source : Bank Indonesia (BI), and Federal Reserve Economic Data (FRED).

APPENDIX 3

Unit Root Test

1. Real GDP

- Level

Null Hypothesis: LNGDP has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.442078	0.1334
Test critical values:	1% level	-3.507394	
	5% level	-2.895109	
	10% level	-2.584738	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNGDP)
Method: Least Squares
Date: 11/25/16 Time: 17:35
Sample (adjusted): 1993Q2 2014Q4
Included observations: 87 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNGDP(-1)	-0.145452	0.059561	-2.442078	0.0167
C	1.867880	0.750511	2.488811	0.0148

R-squared	0.065562	Mean dependent var	0.039195
Adjusted R-squared	0.054568	S.D. dependent var	0.482558
S.E. of regression	0.469207	Akaike info criterion	1.347174
Sum squared resid	18.71317	Schwarz criterion	1.403861
Log likelihood	-56.60205	Hannan-Quinn criter.	1.370000
F-statistic	5.963743	Durbin-Watson stat	2.556581
Prob(F-statistic)	0.016675		

- First Difference

Null Hypothesis: D(LNGDP) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-13.76059	0.0001
Test critical values:	1% level	-3.508326	
	5% level	-2.895512	
	10% level	-2.584952	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNGDP,2)
Method: Least Squares
Date: 11/25/16 Time: 17:37
Sample (adjusted): 1993Q3 2014Q4
Included observations: 86 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNGDP(-1))	-1.385502	0.100686	-13.76059	0.0000
C	0.054504	0.048748	1.118061	0.2667

R-squared	0.692706	Mean dependent var	-0.000768
Adjusted R-squared	0.689048	S.D. dependent var	0.807946
S.E. of regression	0.450535	Akaike info criterion	1.266221
Sum squared resid	17.05050	Schwarz criterion	1.323299
Log likelihood	-52.44751	Hannan-Quinn criter.	1.289192
F-statistic	189.3539	Durbin-Watson stat	2.148452
Prob(F-statistic)	0.000000		

2. Trade Openness (T0)

- Level

Null Hypothesis: LNTO has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.760603	0.0002
Test critical values:	1% level	-3.507394	
	5% level	-2.895109	
	10% level	-2.584738	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNTO)
Method: Least Squares
Date: 11/25/16 Time: 17:38
Sample (adjusted): 1993Q2 2014Q4
Included observations: 87 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNTO(-1)	-0.419841	0.088191	-4.760603	0.0000
C	-0.533211	0.122058	-4.368521	0.0000

R-squared	0.210502	Mean dependent var	0.000614
Adjusted R-squared	0.201214	S.D. dependent var	0.503114
S.E. of regression	0.449657	Akaike info criterion	1.262058
Sum squared resid	17.18630	Schwarz criterion	1.318746
Log likelihood	-52.89954	Hannan-Quinn criter.	1.284885
F-statistic	22.66334	Durbin-Watson stat	2.172424
Prob(F-statistic)	0.000008		

- First Difference

Null Hypothesis: D(LNTO) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-12.85912	0.0001
Test critical values:	1% level	-3.508326	
	5% level	-2.895512	
	10% level	-2.584952	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNTO,2)
Method: Least Squares
Date: 11/25/16 Time: 17:39
Sample (adjusted): 1993Q3 2014Q4
Included observations: 86 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNTO(-1))	-1.326260	0.103138	-12.85912	0.0000
C	0.001104	0.051890	0.021271	0.9831

R-squared	0.663134	Mean dependent var	0.000120
Adjusted R-squared	0.659123	S.D. dependent var	0.824201
S.E. of regression	0.481207	Akaike info criterion	1.397941
Sum squared resid	19.45102	Schwarz criterion	1.455019
Log likelihood	-58.11147	Hannan-Quinn criter.	1.420912
F-statistic	165.3570	Durbin-Watson stat	2.118724
Prob(F-statistic)	0.000000		

3. Capital Formation (CF)

- Level

Null Hypothesis: LNCF has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.724022	0.8345
Test critical values:	1% level	-3.507394	
	5% level	-2.895109	
	10% level	-2.584738	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNCF)
Method: Least Squares
Date: 11/25/16 Time: 17:40
Sample (adjusted): 1993Q2 2014Q4
Included observations: 87 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNCF(-1)	-0.004870	0.006726	-0.724022	0.4710
C	0.065895	0.034847	1.891005	0.0620

R-squared	0.006129	Mean dependent var	0.041216
Adjusted R-squared	-0.005563	S.D. dependent var	0.067316
S.E. of regression	0.067503	Akaike info criterion	-2.530580
Sum squared resid	0.387311	Schwarz criterion	-2.473893
Log likelihood	112.0802	Hannan-Quinn criter.	-2.507754
F-statistic	0.524208	Durbin-Watson stat	2.556805
Prob(F-statistic)	0.471040		

- First Difference

Null Hypothesis: D(LNCF) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-12.24677	0.0001
Test critical values:	1% level	-3.508326	
	5% level	-2.895512	
	10% level	-2.584952	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNCF,2)
Method: Least Squares
Date: 11/25/16 Time: 17:41
Sample (adjusted): 1993Q3 2014Q4
Included observations: 86 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNCF(-1))	-1.279370	0.104466	-12.24677	0.0000
C	0.053260	0.008247	6.458216	0.0000

R-squared	0.641000	Mean dependent var	0.000499
Adjusted R-squared	0.636726	S.D. dependent var	0.108198
S.E. of regression	0.065213	Akaike info criterion	-2.599320
Sum squared resid	0.357235	Schwarz criterion	-2.542242
Log likelihood	113.7708	Hannan-Quinn criter.	-2.576349
F-statistic	149.9834	Durbin-Watson stat	1.996473
Prob(F-statistic)	0.000000		

4. Foreign Direct Investment (FDI)

- Level

Null Hypothesis: LNFDI has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.798123	0.3792
Test critical values:	1% level	-3.508326	
	5% level	-2.895512	
	10% level	-2.584952	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNFDI)
Method: Least Squares
Date: 11/25/16 Time: 17:43
Sample (adjusted): 1993Q3 2014Q4
Included observations: 86 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNFDI(-1)	-0.113363	0.063045	-1.798123	0.0758
D(LNFDI(-1))	-0.279698	0.106742	-2.620308	0.0104
C	2.378789	1.306672	1.820494	0.0723

R-squared	0.148765	Mean dependent var	0.023449
Adjusted R-squared	0.128253	S.D. dependent var	0.688056
S.E. of regression	0.642420	Akaike info criterion	1.987111
Sum squared resid	34.25435	Schwarz criterion	2.072728
Log likelihood	-82.44577	Hannan-Quinn criter.	2.021568
F-statistic	7.252682	Durbin-Watson stat	2.026489
Prob(F-statistic)	0.001250		

- First Difference

Null Hypothesis: D(LNFDI) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-13.05557	0.0001
Test critical values:	1% level	-3.508326	
	5% level	-2.895512	
	10% level	-2.584952	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNFDI,2)
Method: Least Squares
Date: 11/25/16 Time: 17:44
Sample (adjusted): 1993Q3 2014Q4
Included observations: 86 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNFDI(-1))	-1.340142	0.102649	-13.05557	0.0000
C	0.032540	0.070242	0.463260	0.6444

R-squared	0.669873	Mean dependent var	-0.003279
Adjusted R-squared	0.665943	S.D. dependent var	1.126176
S.E. of regression	0.650903	Akaike info criterion	2.002070
Sum squared resid	35.58872	Schwarz criterion	2.059148
Log likelihood	-84.08902	Hannan-Quinn criter.	2.025041
F-statistic	170.4478	Durbin-Watson stat	2.063250
Prob(F-statistic)	0.000000		

APPENDIX 4

Lag Optimal Test

VAR Lag Order Selection Criteria
Endogenous variables: LNGDP LNTO LNCF LNFDI
Exogenous variables: C
Date: 11/25/16 Time: 18:03
Sample: 1993Q1 2014Q4
Included observations: 53

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-120.1339	NA	0.001272	4.684298	4.832999	4.741481
1	87.94944	376.9057	9.07e-07*	-2.564130	-1.820624*	-2.278213*
2	100.3983	20.66972	1.05e-06	-2.430123	-1.091811	-1.915473
3	108.0156	11.49790	1.48e-06	-2.113797	-0.180680	-1.370413
4	128.1005	27.28513	1.34e-06	-2.267943	0.259978	-1.295827
5	151.9918	28.84983*	1.09e-06	-2.565727*	0.557000	-1.364877

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

APPENDIX 5

VAR Stability Test

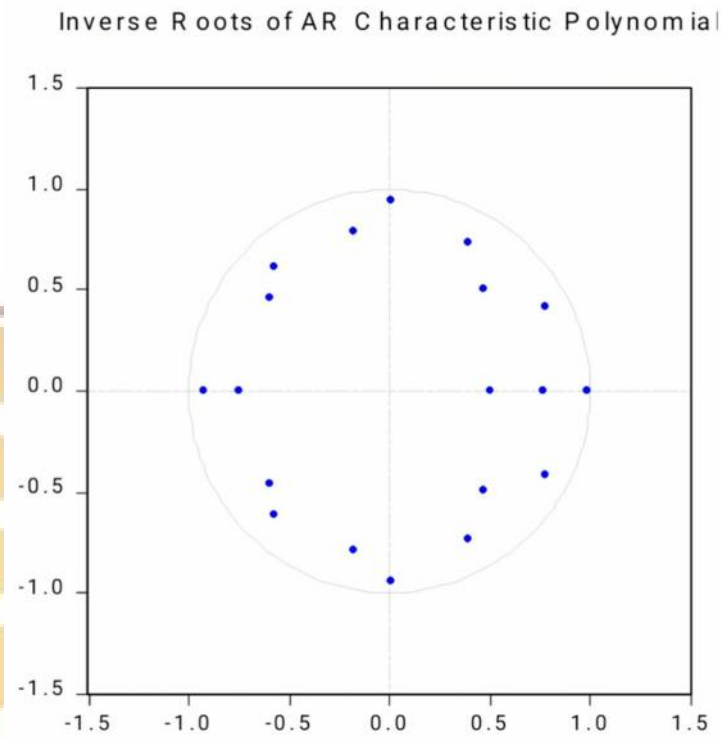
1. AR Root Table

Roots of Characteristic Polynomial
Endogenous variables: LNGDP LNTO LNCF LNFDI
Exogenous variables: C
Lag specification: 1 5
Date: 11/25/16 Time: 18:04

Root	Modulus
0.991828	0.991828
0.984123	0.984123
0.013636 + 0.942428i	0.942527
0.013636 - 0.942428i	0.942527
-0.924579	0.924579
0.780308 - 0.415318i	0.883951
0.780308 + 0.415318i	0.883951
-0.566658 - 0.613961i	0.835494
-0.566658 + 0.613961i	0.835494
0.390726 - 0.734799i	0.832224
0.390726 + 0.734799i	0.832224
-0.171326 - 0.793530i	0.811814
-0.171326 + 0.793530i	0.811814
0.772291	0.772291
-0.596670 - 0.466337i	0.757288
-0.596670 + 0.466337i	0.757288
-0.749233	0.749233
0.469591 - 0.499569i	0.685627
0.469591 + 0.499569i	0.685627
0.503232	0.503232

No root lies outside the unit circle.
VAR satisfies the stability condition.

2. AR Root Graph



APPENDIX 6
Johansen Co-integration Test

Date: 11/25/16 Time: 18:07
Sample (adjusted): 1994Q3 2014Q4
Included observations: 51 after adjustments
Trend assumption: Linear deterministic trend
Series: LNGDP LNTO LNCF LNFDI
Lags interval (in first differences): 1 to 5

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.432263	50.48534	47.85613	0.0277
At most 1	0.304797	21.61443	29.79707	0.3204
At most 2	0.058128	3.073294	15.49471	0.9635
At most 3	0.000375	0.019103	3.841466	0.8900

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.432263	28.87091	27.58434	0.0340
At most 1	0.304797	18.54114	21.13162	0.1109
At most 2	0.058128	3.054191	14.26460	0.9431
At most 3	0.000375	0.019103	3.841466	0.8900

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

LNGDP	LNTO	LNCF	LNFDI
-9.382895	-12.88616	10.92939	0.369185
-7.039392	-8.012837	8.318509	-2.828054
0.353056	-4.090085	2.278782	-1.638787
-5.661525	-0.771569	5.818873	-1.681795

Unrestricted Adjustment Coefficients (alpha):

D(LNGDP)	-0.030685	-0.026162	-0.062932	-0.001320
D(LNTO)	0.040425	0.039439	0.068340	8.84E-05
D(LNCF)	-0.013616	0.001156	0.002517	-0.000122
D(LNFDI)	-0.021753	0.152749	-0.002533	0.001106

1 Cointegrating Equation(s): Log likelihood 181.4655

Normalized cointegrating coefficients (standard error in parentheses)

LNGDP	LNTO	LNCF	LNFDI
1.000000	1.373367	-1.164820	-0.039347
	(0.17007)	(0.06307)	(0.07119)

Adjustment coefficients (standard error in parentheses)

D(LNGDP)	0.287913
	(0.48117)
D(LNTO)	-0.379301
	(0.51574)
D(LNCF)	0.127753
	(0.03471)
D(LNFDI)	0.204104
	(0.49451)

2 Cointegrating Equation(s): Log likelihood 190.7361

Normalized cointegrating coefficients (standard error in parentheses)

LNGDP	LNTO	LNCF	LNFDI
1.000000	0.000000	-1.263482	2.537557
		(0.45313)	(0.80699)
0.000000	1.000000	0.071839	-1.876340
		(0.34336)	(0.61149)

Adjustment coefficients (standard error in parentheses)

D(LNGDP)	0.472075	0.605039
	(0.59882)	(0.77466)
D(LNTO)	-0.656931	-0.836942
	(0.63900)	(0.82663)
D(LNCF)	0.119618	0.166192
	(0.04332)	(0.05604)
D(LNFDI)	-0.871155	-0.943641
	(0.52103)	(0.67402)

3 Cointegrating Equation(s): Log likelihood 192.2632

Normalized cointegrating coefficients (standard error in parentheses)

LNGDP	LNTO	LNCF	LNFDI

1.000000	0.000000	0.000000	-1.735484
			(0.62862)
0.000000	1.000000	0.000000	-1.633383
			(0.32914)
0.000000	0.000000	1.000000	-3.381956
			(0.72422)

Adjustment coefficients (standard error in parentheses)

D(LNGDP)	0.449857	0.862435	-0.696401
	(0.58319)	(0.78100)	(0.69189)
D(LNTO)	-0.632803	-1.116458	0.925627
	(0.62170)	(0.83258)	(0.73758)
D(LNCF)	0.120507	0.155896	-0.133460
	(0.04299)	(0.05758)	(0.05101)
D(LNFDI)	-0.872049	-0.933280	1.027125
	(0.52124)	(0.69804)	(0.61840)

APPENDIX 7
Granger Causality Test

Pairwise Granger Causality Tests
Date: 11/25/16 Time: 18:08
Sample: 1993Q1 2014Q4
Lags: 5

Null Hypothesis:	Obs	F-Statistic	Prob.
LNTO does not Granger Cause LNGDP	83	2.54356	0.0355
LNGDP does not Granger Cause LNTO		2.14651	0.0695
LNCF does not Granger Cause LNGDP	83	3.41232	0.0080
LNGDP does not Granger Cause LNCF		1.37394	0.2442
LNFDI does not Granger Cause LNGDP	53	1.14417	0.3525
LNGDP does not Granger Cause LNFDI		1.14517	0.3520
LNCF does not Granger Cause LNTO	83	4.09295	0.0025
LNTO does not Granger Cause LNCF		3.26382	0.0103
LNFDI does not Granger Cause LNTO	53	0.52453	0.7563
LNTO does not Granger Cause LNFDI		0.99438	0.4328
LNFDI does not Granger Cause LNCF	53	1.34214	0.2655
LNCF does not Granger Cause LNFDI		2.25536	0.0663

APPENDIX 8
VECM Stability Test

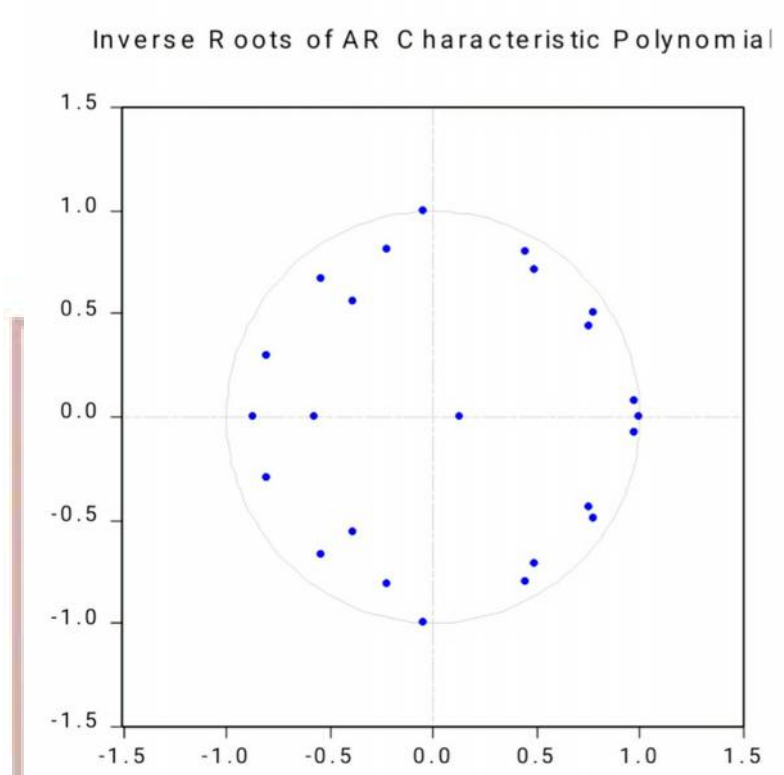
1. AR Root Table

Roots of Characteristic Polynomial
Endogenous variables: DLNGDP DLNTO DLNCF DLNFDI
Exogenous variables:
Lag specification: 1 5
Date: 11/25/16 Time: 18:10

Root	Modulus
1.000000	1.000000
-0.041574 + 0.997327i	0.998193
-0.041574 - 0.997327i	0.998193
0.973658 - 0.078220i	0.976795
0.973658 + 0.078220i	0.976795
0.779804 - 0.499744i	0.926196
0.779804 + 0.499744i	0.926196
0.453014 + 0.802161i	0.921241
0.453014 - 0.802161i	0.921241
0.759296 - 0.437455i	0.876297
0.759296 + 0.437455i	0.876297
-0.873209	0.873209
0.491820 - 0.715820i	0.868496
0.491820 + 0.715820i	0.868496
-0.534383 - 0.673916i	0.860075
-0.534383 + 0.673916i	0.860075
-0.798797 - 0.298703i	0.852819
-0.798797 + 0.298703i	0.852819
-0.221340 - 0.810012i	0.839709
-0.221340 + 0.810012i	0.839709
-0.384324 + 0.561625i	0.680535
-0.384324 - 0.561625i	0.680535
-0.571338	0.571338
0.127817	0.127817

VEC specification imposes 1 unit root(s).

2. AR Root Graph



Appendix 9
Classical Assumption Test

1. Multicollinearity Test

1.000000	-0.669274	-0.309727	-0.144585
-0.669274	1.000000	0.375535	0.140548
-0.309727	0.375535	1.000000	0.064695
-0.144585	0.140548	0.064695	1.000000

2. Heteroskedastisity Test

VEC Residual Heteroskedasticity Tests: No Cross Terms (only levels and squares)
Date: 11/25/16 Time: 18:14
Sample: 1993Q1 2014Q4
Included observations: 50

Joint test:

Chi-sq	df	Prob.
459.1414	460	0.5025

Individual components:

Dependent	R-squared	F(46,3)	Prob.	Chi-sq(46)	Prob.
res1*res1	0.913639	0.689956	0.7592	45.68196	0.4855
res2*res2	0.889791	0.526545	0.8570	44.48957	0.5356
res3*res3	0.969099	2.045308	0.3083	48.45495	0.3742
res4*res4	0.904816	0.619955	0.8007	45.24081	0.5040
res2*res1	0.903683	0.611895	0.8056	45.18415	0.5063
res3*res1	0.954594	1.371109	0.4602	47.72972	0.4023
res3*res2	0.962887	1.692063	0.3760	48.14437	0.3861
res4*res1	0.959044	1.527160	0.4160	47.95220	0.3936
res4*res2	0.927408	0.833194	0.6797	46.37041	0.4570
res4*res3	0.993841	10.52345	0.0376	49.69204	0.3284

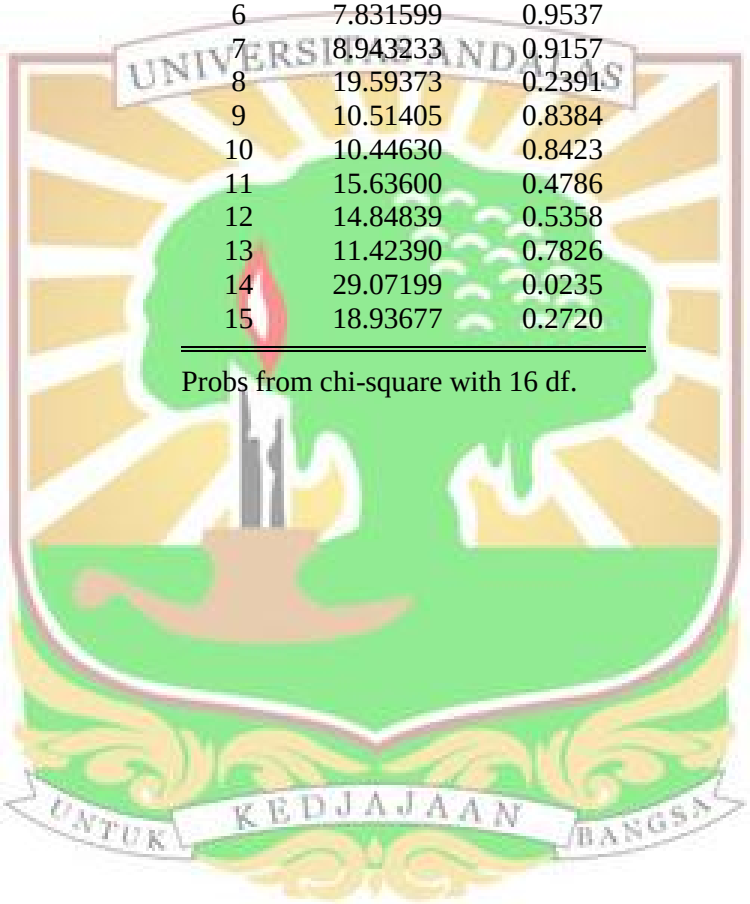
3. Autocorrelation Test

VEC Residual Serial Correlation LM Tests
Null Hypothesis: no serial correlation at lag order h

Date: 11/25/16 Time: 18:15
Sample: 1993Q1 2014Q4
Included observations: 50

Lags	LM-Stat	Prob
1	20.10371	0.2156
2	13.51768	0.6346
3	10.41989	0.8438
4	13.12838	0.6633
5	6.436978	0.9827
6	7.831599	0.9537
7	8.943233	0.9157
8	19.59373	0.2391
9	10.51405	0.8384
10	10.44630	0.8423
11	15.63600	0.4786
12	14.84839	0.5358
13	11.42390	0.7826
14	29.07199	0.0235
15	18.93677	0.2720

Probs from chi-square with 16 df.



APPENDIX 10
VECM Estimation Result

Vector Error Correction Estimates
Date: 11/25/16 Time: 18:17
Sample (adjusted): 1994Q4 2014Q4
Included observations: 50 after adjustments
Standard errors in ( ) & t-statistics in [ ]

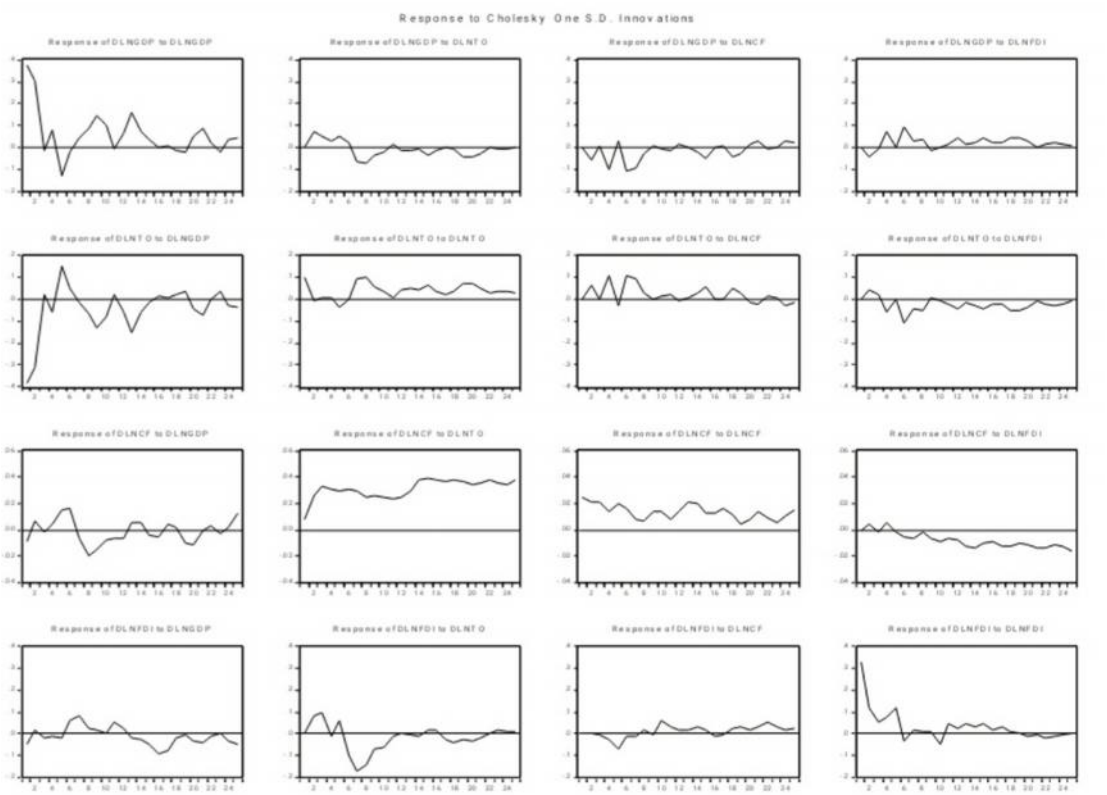
Cointegrating Eq:	CointEq1	CointEq2	CointEq3	
DLNGDP(-1)	1.000000	0.000000	0.000000	
DLNTO(-1)	0.000000	1.000000	0.000000	
DLNCF(-1)	0.000000	0.000000	1.000000	
DLNFDI(-1)	1.899923	1.667498	-3.565852	
	(0.60245)	(0.37127)	(0.75936)	
	[3.15367]	[4.49133]	[-4.69585]	
C	27.99981	36.87960	70.93033	
Error Correction:	**D(DLNGDP)**	**D(DLNTO)**	**D(DLNCF)**	**D(DLNFDI)**
CointEq1	0.476221	-0.680512	0.118033	-0.896861
	(0.62150)	(0.66029)	(0.04585)	(0.55590)
	[0.76624]	[-1.03062]	[2.57434]	[-1.61335]
CointEq2	0.957565	-1.262616	0.149672	-1.007634
	(0.85565)	(0.90905)	(0.06312)	(0.76533)
	[1.11911]	[-1.38894]	[2.37109]	[-1.31660]
CointEq3	-0.747477	1.011432	-0.129356	1.071258
	(0.74365)	(0.79006)	(0.05486)	(0.66515)
	[-1.00515]	[1.28020]	[-2.35789]	[1.61055]
D(DLNGDP(-1))	0.257164	-0.383014	0.118434	1.893641
	(0.94665)	(1.00573)	(0.06984)	(0.84672)
	[0.27166]	[-0.38083]	[1.69587]	[2.23644]
D(DLNGDP(-2))	-0.577265	0.480114	-0.017398	1.786093
	(1.05960)	(1.12573)	(0.07817)	(0.94775)
	[-0.54480]	[0.42649]	[-0.22257]	[1.88456]
D(DLNGDP(-3))	0.159122	-0.329416	0.022539	1.057629
	(0.90975)	(0.96653)	(0.06711)	(0.81372)
	[0.17491]	[-0.34082]	[0.33583]	[1.29974]

D(DLNGDP(-4))	-0.131566	-0.153889	0.016202	2.146841
	(0.94911)	(1.00835)	(0.07002)	(0.84893)
	[-0.13862]	[-0.15261]	[0.23139]	[2.52888]
D(DLNGDP(-5))	0.337210	-0.421895	-0.034753	0.944942
	(0.95460)	(1.01417)	(0.07042)	(0.85383)
	[0.35325]	[-0.41600]	[-0.49349]	[1.10670]
D(DLNTO(-1))	-0.001924	-0.030008	0.040418	1.877733
	(1.08528)	(1.15302)	(0.08006)	(0.97073)
	[-0.00177]	[-0.02603]	[0.50482]	[1.93436]
D(DLNTO(-2))	-0.328159	0.318249	-0.039697	0.404351
	(1.15240)	(1.22433)	(0.08502)	(0.97172)
	[-0.28476]	[0.25994]	[-0.46694]	[0.41612]
D(DLNTO(-3))	0.013930	-0.142465	-0.045655	1.122237
	(1.00772)	(1.07061)	(0.07434)	(0.90135)
	[0.01382]	[-0.13307]	[-0.61413]	[1.24507]
D(DLNTO(-4))	0.210791	-0.451451	-0.050665	2.318208
	(0.96778)	(1.02818)	(0.07140)	(0.86562)
	[0.21781]	[-0.43908]	[-0.70963]	[2.67807]
D(DLNTO(-5))	1.918269	-0.442959	-0.091940	0.879766
	(1.03076)	(1.03236)	(0.07169)	(0.86915)
	[1.86102]	[-0.42907]	[-1.28253]	[1.01222]
D(DLNCF(-1))	-1.649045	1.664113	-0.025967	-1.048690
	(1.98214)	(2.10584)	(0.14623)	(1.77291)
	[-0.83195]	[0.79024]	[-0.17758]	[-0.59151]
D(DLNCF(-2))	2.320595	-2.492466	0.181007	-1.108212
	(1.67061)	(1.77488)	(0.12325)	(1.49427)
	[1.38907]	[-1.40430]	[1.46868]	[-0.74164]
D(DLNCF(-3))	4.781691	4.439815	-0.318960	-2.854603
	(1.52501)	(1.62019)	(0.11250)	(1.36404)
	[3.13551]	[2.74031]	[-2.83510]	[-2.09276]
D(DLNCF(-4))	4.615590	-4.478305	0.612443	-2.850438
	(1.73618)	(1.84454)	(0.12808)	(1.55292)
	[2.65847]	[-2.42788]	[4.78163]	[-1.83554]
D(DLNCF(-5))	6.843435	6.692031	-0.220316	-2.219849
	(2.34516)	(2.49153)	(0.17301)	(2.09762)
	[2.91810]	[2.68591]	[-1.27344]	[-1.05827]

D(DLNFDI(-1))	0.300835	0.345514	0.026096	-0.212066
	(0.16319)	(0.17337)	(0.01204)	(0.14596)
	[1.84351]	[1.99292]	[2.16769]	[-1.45290]
D(DLNFDI(-2))	0.145350	0.226338	0.011739	-0.163722
	(0.16107)	(0.17113)	(0.01188)	(0.14407)
	[0.90238]	[1.32264]	[0.98789]	[-1.13640]
D(DLNFDI(-3))	-0.115362	0.204822	0.018755	-0.059560
	(0.16059)	(0.17061)	(0.01185)	(0.14364)
	[-0.71837]	[1.20052]	[1.58313]	[-0.41465]
D(DLNFDI(-4))	-0.116379	0.169462	-0.006111	0.140217
	(0.16385)	(0.17408)	(0.01209)	(0.14655)
	[-0.71028]	[0.97349]	[-0.50556]	[0.95675]
D(DLNFDI(-5))	0.000213	0.014802	-0.012323	-0.146488
	(0.14746)	(0.15666)	(0.01088)	(0.13189)
	[0.00144]	[0.09448]	[-1.13282]	[-1.11066]
C	0.357522	-0.292144	0.026916	0.248153
	(0.19052)	(0.20241)	(0.01406)	(0.17041)
	[1.87655]	[-1.44332]	[1.91500]	[1.45621]
R-squared	0.783122	0.761993	0.849937	0.704911
Adj. R-squared	0.591268	0.551447	0.717188	0.443870
Sum sq. resids	3.629781	4.096993	0.019755	2.903935
S.E. equation	0.373640	0.396959	0.027564	0.334200
F-statistic	4.081869	3.619142	6.402614	2.700389
Log likelihood	-5.375662	-8.402686	124.9628	0.201980
Akaike AIC	1.175026	1.296107	-4.038510	0.951921
Schwarz SC	2.092798	2.213878	-3.120739	1.869692
Mean dependent	0.043258	-0.007923	0.041562	0.038035
S.D. dependent	0.584432	0.592706	0.051832	0.448145

Determinant resid covariance (dof adj.)	8.96E-08
Determinant resid covariance	6.55E-09
Log likelihood	187.3095
Akaike information criterion	-3.172380
Schwarz criterion	0.957590

APPENDIX 11
Impulse Response Function (IRF)



APPENDIX 12
Variance Decomposition

Variance Decomposition of DLNGDP

Period	S.E.	DLNGDP	DLNTO	DLNCF	DLNFDI
1	0.373640	100.0000	0.000000	0.000000	0.000000
2	0.494893	95.49434	2.176460	1.492039	0.837165
3	0.497790	94.49162	3.134578	1.502758	0.871049
4	0.519328	88.99035	3.126047	5.286143	2.597458
5	0.538087	88.48769	3.811504	5.281067	2.419742
6	0.557917	82.46638	3.680612	8.601552	5.251453
7	0.572147	79.03192	4.735587	10.98977	5.242717
8	0.584761	77.91458	5.956252	10.75918	5.369983
9	0.603641	78.91232	5.880309	10.10504	5.102325
10	0.612830	79.37080	5.848034	9.830316	4.950846
11	0.613542	79.20885	5.917943	9.865020	5.008184
12	0.618845	79.03613	5.856234	9.745769	5.361869
13	0.639569	80.30761	5.517883	9.124620	5.049889
14	0.644350	80.30678	5.446154	9.120323	5.126739
15	0.649853	79.27815	5.605332	9.626943	5.489572
16	0.650312	79.16763	5.629332	9.615133	5.587905
17	0.650753	79.06861	5.624977	9.606500	5.699910
18	0.653822	78.36168	5.594270	9.958593	6.085456
19	0.657734	77.55675	5.934619	10.00655	6.502076
20	0.662209	77.16032	6.317497	9.939658	6.582530
21	0.669391	77.29963	6.361401	9.895982	6.442987
22	0.669911	77.26535	6.353948	9.895985	6.484713
23	0.670658	77.17102	6.356619	9.874352	6.598011
24	0.672729	77.00705	6.336181	10.05097	6.605797
25	0.674763	77.02052	6.298555	10.10376	6.577161

Variance Decomposition of DLNTO

Period	S.E.	DLNGDP	DLNTO	DLNCF	DLNFDI
1	0.396959	93.94915	6.050850	0.000000	0.000000
2	0.512804	93.85189	3.639119	1.726262	0.782730
3	0.513659	93.65730	3.631409	1.723194	0.988098
4	0.530009	89.06696	3.423737	5.482403	2.026897
5	0.553819	89.29358	3.587272	5.262472	1.856673
6	0.577235	82.84256	3.303404	8.474041	5.379994
7	0.594289	78.23453	5.416953	10.63916	5.709355
8	0.609133	75.67690	7.858163	10.32244	6.142498
9	0.625273	76.11840	8.249217	9.798064	5.834316
10	0.631544	76.18362	8.446337	9.643675	5.726368
11	0.632563	76.03102	8.422289	9.737584	5.809103
12	0.638224	75.55192	8.709396	9.589703	6.148985
13	0.657704	76.37694	8.744475	9.032284	5.846303
14	0.662945	75.91600	9.080262	9.071631	5.932111
15	0.670341	74.32271	9.887561	9.533153	6.256574
16	0.672022	73.99344	10.17625	9.485614	6.344697
17	0.672891	73.80947	10.25553	9.461199	6.473803
18	0.677709	72.88850	10.39375	9.825107	6.892640
19	0.684927	71.62309	11.23216	9.802896	7.341846
20	0.690965	70.72841	12.14697	9.679435	7.445191
21	0.697064	70.52918	12.51727	9.626223	7.327329
22	0.698145	70.31099	12.64928	9.639704	7.400020
23	0.700500	70.06586	12.82868	9.578792	7.526665
24	0.702909	69.73344	13.04284	9.673650	7.550070
25	0.704778	69.63035	13.15163	9.680541	7.537478

Variance Decomposition of DLNCF:

Period	S.E.	DLNGDP	DLNTO	DLNCF	DLNFDI
1	0.027564	9.593106	9.376757	81.03014	0.000000
2	0.044018	6.549146	37.76160	54.65692	1.032326
3	0.059016	3.721322	52.11974	43.52198	0.636952
4	0.068661	3.046182	59.35860	36.47535	1.119868
5	0.079049	5.757275	59.21544	34.13919	0.888096
6	0.087879	8.146058	59.81684	31.01095	1.026155
7	0.093528	7.720645	62.73178	28.14158	1.405998
8	0.099002	11.05148	61.98715	25.66475	1.296615
9	0.104363	11.98090	61.69811	24.72180	1.599188
10	0.108858	11.54057	62.06304	24.32786	2.068533
11	0.112052	11.24182	62.96141	23.43726	2.359515
12	0.116004	10.82589	63.16874	23.33519	2.670176
13	0.122483	9.890962	62.56651	24.09137	3.451164
14	0.130530	8.905427	63.33866	23.54673	4.209176
15	0.137381	8.142716	65.45990	22.04176	4.355621
16	0.143367	7.621770	66.99325	20.99470	4.390279
17	0.149415	7.083010	67.62352	20.56060	4.732868
18	0.155123	6.594892	68.73910	19.58213	5.083876
19	0.160079	6.590907	69.71199	18.47592	5.221184
20	0.164744	6.688553	70.25850	17.68588	5.367070
21	0.169843	6.295523	70.61998	17.31559	5.768905
22	0.174851	5.964775	71.30640	16.63282	6.096006
23	0.179056	5.705819	72.08212	15.94703	6.265030
24	0.183187	5.470560	72.49740	15.55659	6.475457
25	0.188882	5.607675	72.30680	15.24324	6.842288

Variance Decomposition of DLNFDI

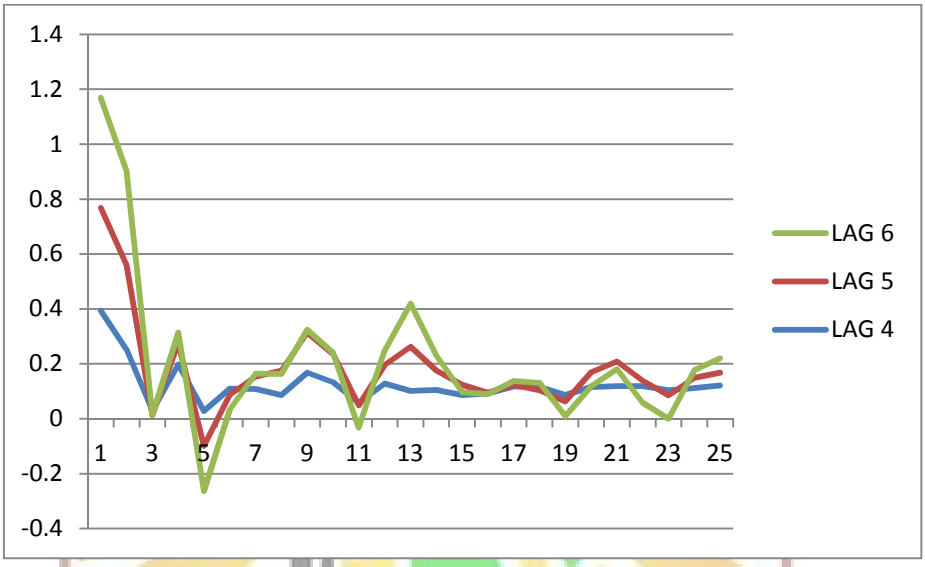
Period	S.E.	DLNGDP	DLNTO	DLNCF	DLNFDI
1	0.334200	2.090488	0.000272	0.046483	97.86276
2	0.364635	2.070485	5.478635	0.046264	92.40462
3	0.382450	2.094361	12.05810	0.043030	85.80451
4	0.390888	2.049445	11.59811	0.568924	85.78352
5	0.418962	2.017274	12.05536	3.142517	82.78484
6	0.436125	3.979754	15.99687	3.010811	77.01257
7	0.476512	6.246336	26.50316	2.575181	64.67532
8	0.497928	6.006601	32.27342	2.444285	59.27570
9	0.502910	6.074349	33.39016	2.403853	58.13163
10	0.512280	5.863853	33.54343	3.766584	56.82613
11	0.518350	6.866479	32.81996	4.061080	56.25248
12	0.520196	7.106513	32.60698	4.198336	56.08817
13	0.522993	7.186508	32.27006	4.250899	56.29253
14	0.526049	7.381842	31.96293	4.665260	55.98997
15	0.530730	8.009305	31.54438	4.691813	55.75450
16	0.538714	10.46621	30.72161	4.572907	54.23927
17	0.545125	12.05969	30.17282	4.471685	53.29581
18	0.547497	12.03503	30.44372	4.662847	52.85841
19	0.549066	11.97522	30.53147	4.936593	52.55672
20	0.551238	12.18575	30.60650	5.027752	52.18000
21	0.554337	12.66148	30.34231	5.395977	51.60023
22	0.557449	12.54409	30.01891	6.335718	51.10129
23	0.559149	12.46801	29.98282	6.710752	50.83842
24	0.560638	12.79638	29.87178	6.759268	50.57257
25	0.563102	13.35785	29.63830	6.864609	50.13924

Cholesky Ordering: DLNGDP DLNTO DLNCF DLNFDI

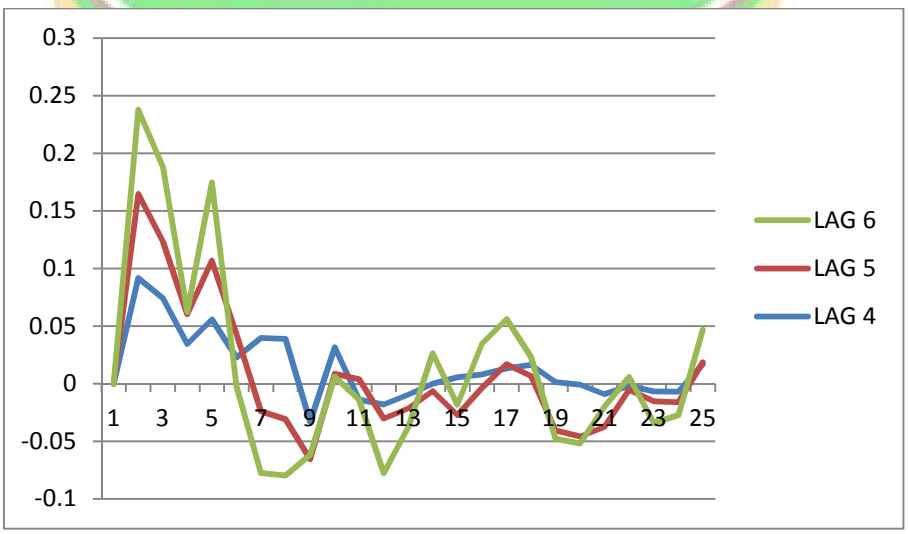
APPENDIX 13

Robustness Test

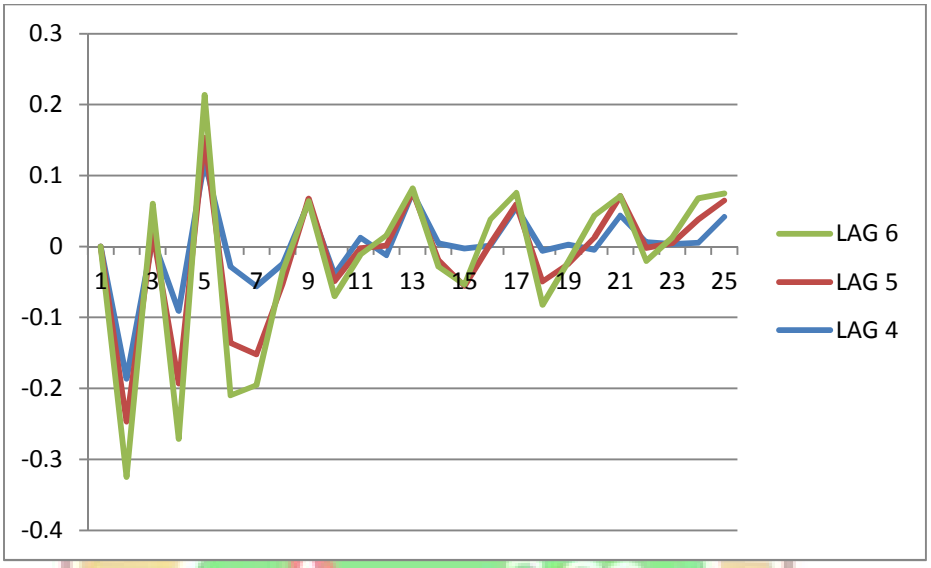
Robustness Test of GDP



Robustness Test of TO



Robustness Test of CF



Robustness Test of FDI