THE IMPACT OF WORLD OIL PRICE FLUCTUATION AGAINST THE MONETARY STABILITY IN INDONESIA YEAR 1991- 2010

SKRIPSI

GITA PRIYANTI
0810514039

JURUSAN ILMU EKONOMI
FAKULTAS EKONOMI
UNIVERSITAS ANDALAS
PADANG 2012

LIST OF TABLE

LIST OF GRAPHS

PREFACE

All praise to be on Allah SWT, Lord of the world. The writer would like thank to God for its guidance and mercy therefore my thesis entitled " **The Impact Of World Oil Price Fluctuation Against The Monetary Stability In Indonesia Year 1991-2010"** has finally been accomplished on time without matter problem.

This thesis is submitted as a patial requirement to acquire Bachelor Degree at Economic Department of Economic Faculty of Andalas University. The reason lying behind the chosen of this title is recently, the increasing of the world oil prices have been highlighted in all countries of the world, particularly for oil importing countries, such as Indonesia.

The increasing of oil prices will impact on some economic aspects of a nation. For the company with the speed-up of the process of world industrialization, crude oil plays more important role in the national economy. From this background, the aim to this study is to examine the impact of world oil price fluctuation against the monetary stability in indonesia.

The writer realize that this thesis still far from perfection. It needs to be improved. For that reason, the writer would gladly welcome constructive critics and suggestions for perfection. Hopefully this thesis can be helpful and give benefit to anyone who read it, especially to academicians and students.

Padang, June 2012

Gita Priyanti

ACKNOWLEDGEMENTS

This little essay is the thesis submitted for the exams of bachelor degree in Economics Faculty of Andalas University. Preparation of this thesis is the first experience for me, so I apologize if in this thesis there are some mistakes, both the content and manner of making the thesis.

Finally, after going through a long period process and hard work, my thesis entitled " The Impact Of World Oil Price Fluctuation Against The Monetary Stability In Indonesia Year 1991-2010" has finally settled. In the process of completion, there are many people who have involved either directly or indirectly. I would like to express my gratitude to those people who made it possible for me to complete this thesis.

Wit all of the humility, my infinitely gratitude I express to :

1. Allah SWT. Thank you for answering my prayers. You has given me everything, so that I can finish this thesis well. Praise to be Allah, the Lord of the world. Hopefully I stay in your way and keep getting better.
2. Prof.Dr.H.Sjafrizal,S.E,MA. My thesis supervisor that very kind, patient, and understanding. Thank you for taking the time schedules in the middle of his teaching activities, seminars, until his family-time for guiding and advising my thesis. Gave me a lot of referrals starting from the thesis material substance and how to behave. Supporting me in moral aspect and advice me well. May you always be blessed by God, healthy and a lot of luck.

3. Prof.Dr.H.Firwan,S.E,M.Ec,DEA,Ing and Drs.H.Mazrizal,M.Soc.Sc who have been pleased as expert examiners on my thesis. Thank you for your opportunity and give some advices to my thesis.
4. Prof.Dr.H.Syafruddin Karimi,S.E.MA as my academic advisor. Thank for your guidance during my lecture here.
5. My beloved parents Drs. Yasri and Sevriza Yatmi, S.Pd. I really appreciate for your prayer and your guidence along my life. Not only in term of this thesis, but I thankful for everything in my life. Also for my sisters, Fujia Sari Olivia, SP and Resa Idha. I really love you.
6. My beloved partner Puja Hadi Purnama. Thanks dear for your support, patient and your spirit that makes me able to finish it as soon as possible. And most importantly for your infinite love that makes me feel as the only one the perfect woman. I love you deeply and I'm proud to be yours.
7. To my "BIE" D'Mentriez . Wish we can reach our awesome future as a real ministry. It could be so nice to spend the time with you guys. I love you "menkes" Mailanindra Putri, "menag" Fadhilla Wahyuni, "mendik" Mustika Mardhatillah, "menbud" Diana Safitri, "menpora" Melki Tiadora. I wait for the next A.G.E.N.D.A, VN, lampu kejujuran, and other freak hobbies. For all member of Economics Int'08. I am proud to have you guys, the lovely 'komting' Ranof, Hari boO,Yogi_rina, and SUYETI group. I'm gonna miss all of moments with you. Wish we can make the awesome journeys like M.S.T. for the next moment. Have a great luck for all of my best classmates.

8. To my senior especially kak Nadya Morena. Thank for your time, energy, inputs and learning about VAR analysis, structuring my thesis. And also for my entire junior in international economic department.
9. To all my friends in Economic reguler class 2008. It could be so nice to meet you guys. I found some unique characters on all of you. Thanks for the happiness that you give it to me. You are so awesome.
10. To the staff of Bureau of Economics Andalas University who has helped smooth the process of my studies at Economic Faculty during the yeras.

Padang, June 2012

Gita Priyanti

CHAPTER I

INTRODUCTION

1.1 Background

In the global economy, the economic interaction between countries is the important aspect for the improvement of a country in order to be more open and develop. The process of interaction is characterized by increasing trade in goods and services, movement of capital flows, technology transfer, as well as the mobilization of labor from one country to another country (IMF). It also can make easy for countries to trade each other, because there is no barrier to entry.

It looks like two sides of a coin, on the one hand globalization gives the advantages to enrich the people in the world. It is during the globalization can be managed properly and followed by improvement in welfare of a country. But, in the other hand it also gives the disadvantages or negative impact to the world economic shocks on monetary stability in those countries.

Indonesia has integrated its economy, it is characterized by a variety of recent government deregulation in the 1970s to 1980s. It will make Indonesia to be more open on a global scale, both in the field of investment, fiscal, monetary and trading or financial (Koesoema, 2002). It looks like the new economy and the transition with a high degree of dollarization, the Indonesian economy was affected by the economy of the United States.

We realize that the exchange rate (especially for the country use flexible/floating exchange rate, such as Indonesia) is one factor that can transmit the world economic shocks to the domestic economy directly. This is according to

Jimenez (2001) which told that the system of flexible exchange rates would cause the economic conditions become more vulnerable or riskier to face the shocks from the global economy. That is why, the exchange rate is an important factor which should be noted in transmitting monetary policy in order to maintain domestic economic stability.

As Norris and Floerkemeier (2006) said that monetary policy should be based on exchange rate stability, because it has a high impact on prices (price stability). By maintaining the stability of monetary activities, it will also promote financial stability in Indonesia.

For achieving financial stability, in 2005, Bank Indonesia introduced the BI Rate as an instrument of monetary policy in Indonesia. This instrument shows that the interest rate as operational target of monetary policy Indonesia. Suppose that financial markets are a global market, which has similar characteristics to other countries with money markets, the interest rate instrument can also become an instrument for controlling foreign exchange.

It reminded that the crisis in 1997, it is a result of the fragility of Indonesia's exchange rate system. Starting with the attack on the Thai Baht currency, but then spread everywhere, including Indonesia which eventually destroyed the Indonesian economy itself. Since Indonesia still has a high degree of dependence on the U.S. dollar, then of course any change in the Fed Funds Rate (as a monetary instrument of the United States) can also be a source of shocks to the monetary stability of Indonesia.

The changes of world interest rates (FFR) can be simply said to be a rebalancing of the global capital markets or it can also show changes potofolio tendency of foreign investors (Obstfeld and Rogoff, 2005). This change will be responded in the form of central bank monetary policy changes. It is such as changes in SBI, which will affect the exchange rate (rupiah against USD), the trade balance (exports-imports), inflation rate, as well as the price level in Indonesia.

Beside that, there is another problem that also should be faced in the period of globalization. It is related to the volatility of prices of capital goods, while on the other side of real output to be reduced (Rogoff, 2006). Volatility of price of capital goods is transitory, because it also would cause exchange rate volatility. Therefore, the investors or producers will react to the increasing trend of productivity that may increase the risk of macroeconomic investment.

Prices of capital goods, especially oil prices which in the recent period is always moving in the range of 100 USD/barrel. It has given rise to inflation in the countries of the world and will increase the price of goods and services internationally. Inflation is happening in the world is directly or indirectly will transmit to inflation and the domestic economy itself.

Recently, the increasing of the world oil prices have been highlighted in all countries of the world, particularly for oil importing countries, such as Indonesia. This is caused by rising global oil prices; there will be an impact on imports of oil price increases that would indirectly reduce the income of the importing country. Because the country should spend much money to buy the oil to fulfill the country needs.

The phenomenon of fluctuations in world oil prices is not only impact on oil importing countries, but also impact on the net exporter countries. The increasing of world oil prices cause the oil-exporting countries reduce crude oil production or hold it and prefer to meet the needs of crude oil in the country given the high world oil prices.

The increasing of oil prices will impact on some economic aspects of a nation. For the company with the speed-up of the process of world industrialization, crude oil plays more important role in the national economy. So, the impacts of world oil price has on fluctuation the development of national economy is definite valued by economists in all countries (Jian, Gao 2005).

The fluctuations in world oil prices, which on the spot price FOB recent months the price has always crept up, will accommodate the inflation that occurred in developed countries, which on the other hand may represent the level of world inflation.

Inflation control is expected to make the domestic real interest rates become more competitive, so that the pressure on the rupiah can be reduced and eventually will cause the domestic economy will also become more competitive in facing to global competition (Nasution, 2007). Besides controlling the inflation rate is also intended to maintain the stability of the rupiah, which will affect the domestic economy and further in order to achieve the welfare of the people.

Based on these phenomena are related to fluctuations in world economic problems and its impact on domestic monetary stability. So I'll try to do the research with the title of the study **"The Impact of World Oil Price Fluctuations Against the Monetary Stability in Indonesia, year 1991-2010".**

1.2 Problem Identification

Based on the background that explained above, the common issues to be discussed is the establishment of macroeconomic model that can explain the relationship between the fluctuations of world oil price on monetary stability in Indonesia. The variables used in this model are exchange rate (e), world crude oil price (WOP), gross domestic product (GDP), consumer price index (CPI), and domestic interest rate (i). This study estimates the relationship between variables by using data from year 1991 until 2010.

1.3 Research Questions

This research will address several questions, they are :

1. What is the cause of world oil price fluctuations and the transmission of monetary stability in Indonesia ?
2. What is the impact of world oil price fluctuations to monetary stability in Indonesia ?

1.4 Research Objectives

The objectives of the research are:

1. Analyze the causes and tendency of world oil price fluctuation to the monetary stability in Indonesia.
2. Analyze the impact of world oil price fluctuation to the monetary stability in Indonesia.
3. Formulate the policy implementation emerged from the analysis.

1.5 The Scope of Research

In this study, the writer limit the price of oil with the world crude oil price (WOP) is measured in dollars per barrel and its impact on economic growth is measured by gross domestic product (GDP) in billion US dollars, exchange rate (e) in rupiah/US dollars, consumer price index (CPI) as indicator of inflation, and domestic interest rate (i) in annual percentage with a period of 20 years, from 1991 until 2010.

1.6 Hypothesis

This study can be hypothesized as follows:

1. There is negative relationship between world oil price with economic growth and exchange rate (depreciation).
2. There is positive relationship between world oil price with inflation and interest rate

1.7 Writing Systematic

The systematic of writing in this research are :

Chapter I : Introduction

Chapter II : Theoretical Framework and Literature Reviews

Chapter III : Research Methodology

Chapter IV : General View of Research

Chapter V : Result and Analysis

Chapter VI : Conclusion and Suggestions

CHAPTER II

THEORETICAL FRAMEWORK AND LITERATURE REVIEWS

2.1 Theoretical Framework

The theoretical framework put forward the theory or argument has ever issued about the impact of global economic fluctuations on monetary stability in Indonesia. After that, the empirical research on the later will present the results of previous studies on the impact of fluctuations in the world economy to monetary stability in Indonesia that has been done previously.

2.1.1 Mundell Fleming Theory (Two Country Model)

Mundell-Fleming model starts from the assumption that a small open economy with perfect capital mobility that allows people to access fully in the world economy (Mankiw, 2003). In addition, there are other characteristics that can be used to describe a small open economy, including: economy with a very high level of dependence on the global economy, economy that is relatively unstable with high levels of vulnerability to shocks from abroad (Jimenez, 2001), and the high level of dependence on international price changes.

2.1.1.1 IS-LM Model

This model also explains about goods market and money market, as the IS-LM model, or may be written;

IS $\rightarrow$ $Y = C\,(Y-T) + I(i) + G + NX(e)$ .... (2.1)

LM $\rightarrow$ $M / P = L\,(i, y)$ .... (2.2)

Where:

Y is aggregate output (GDP);

C is the sum of consumption;

I is investment-related interest rate (i), which if interest rates rise, then investors will tend put their money in money markets compared to allocate on new capital goods.;

G is government spending is exogenous is made by the government, therefore it will be assumed fixed.

NX is net exports are negatively related to exchange rate (e), that is in case of exchange rate depreciation in the value of exports will increase while the value of imports will decrease.

M is the money supply;

P is the price level;

i is the domestic interest rate (SBI);

y is the level of domestic income;

M / P is the supply of real money balances;

L (i, y) is the demand for real money balances.

2.1.2 Inflation Theory

Inflation is often defined as the tendency of rising prices in general and continuously, within a certain time and place (Korteweg, 1973; Ackley, 1978; Nopirin, 1997; and Boediono, 2001). Its presence is often interpreted as one of the main problems in the economy of the country, in addition to unemployment and balance of payments imbalances. However, despite being one of the major problems in the economy, most experts agree that positive impact of inflation will be maximum by the inflation rate is rather low, ranging between 5% - 6% per year

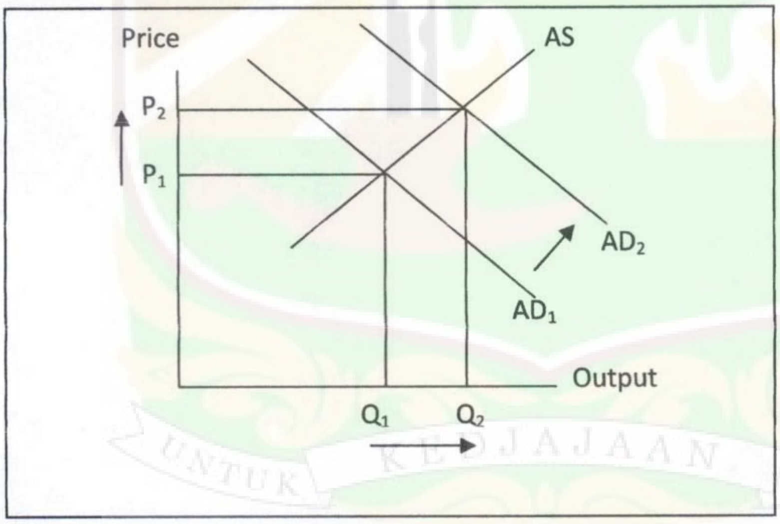
(Glassburner, Chandra, 1981: 106). In other words, inflation is less or more than that number, will have a tendency to give negative impact to the economy.

According to Keynesian economic theory proposes that changes in money supply do not directly affect prices, and that visible inflation is the result of pressures in the economy expressing themselves in prices. The supply of money is a major, but not the only, cause of inflation.

a. Demand-Pull Inflation

Inflation is caused by demand for some goods that are too strong. Therefore the price increases as a result of the rising demand to the level of production which has been in a state of full employment.

Graph 2.1 : Demand-Pull Inflation



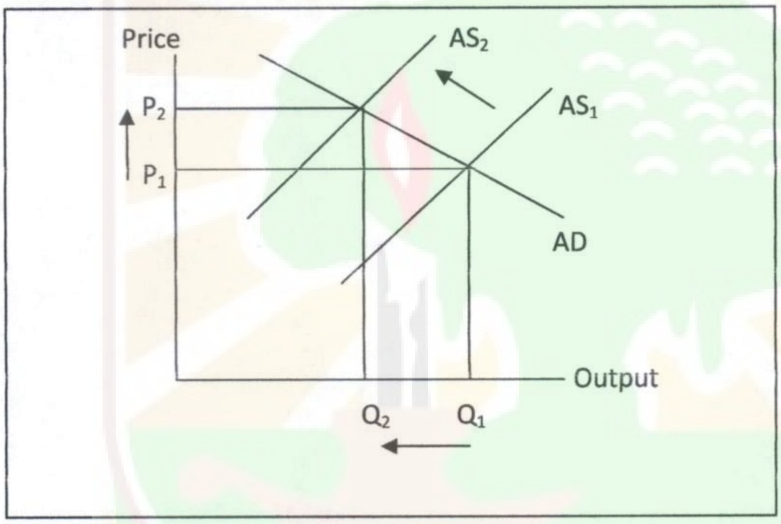
Source:Soediyono (2000)

Graph 2.1 illustrates the graph of demand-pull inflation. Initial equilibrium price level is P_1 and the quantity of goods demanded is for Q_1. Due to public demand for goods (aggregate demand) increases, for example because of increased government spending or an increase in foreign demand for goods exports, the aggregate demand curve shifts to the right of the AD_1 to AD_2. As a result of shifting the AD curve, the rate of price rises from P_1 to P_2 and causing inflation.

b. Cost Push Inflation

This inflation was caused by rising in production costs. The increase in production costs of goods and services will push the price increases.

Graph 2.2 Cost Push Inflation



In Graph 2.2 shows that when there is an increase in production costs, i.e. due to rising prices of raw materials for production, the supply curve will shift from AS_1 to AS_2. As a result, production levels declined and led to price rising, i.e. from P_1 to P_2.

2.2 Literature Review

Gunu Umar (2010), researching on oil price shocks to the oil exporting countries, particularly oil dependent countries like Nigeria. He examined that the impact of the fluctuations on macroeconomic of Nigeria, which the result that the GDP increases as crude oil prices rise. The implication is that the economic growth of the country is driven by the external forces, since crude oil prices are determine by exogenous factors and also Nigeria as a net exporter country.

Hamilton (1983) provide some evidence, over the period 1948-1972, that the correlation between oil price shocks and the US recessions were statistically significant. His analysis suggested that seven of eight American recessions occurring over his estimation period were preceded by dramatic increase in the price of crude oil, indicating that large economies such as The US could also be vulnerable to oil price shocks.

Desroches (2004) examines the sources of macroeconomic fluctuations in 22 developing countries, including Indonesia. In this study, Desroches distinguishes the source of macroeconomic fluctuations into two, namely fluctuations caused by real output shocks and world interest rates. The results of this study indicate that in each country, there were differences in the transmission mechanism of the two shocks. As a follow up to examine these differences, the sample is divided again into groups based on economic structure and system of exchange rates applied. Furthermore, the results of this study explain that the exchange rate system and capital flow restrictions are applied to each country are important factors that could explain the transmission mechanism of the influence of these two shocks to fluctuations in business cycles.

Woodford (2007) with a Two-Country Model, found that globalization is linked to the various possible economic mechanisms will be very difficult to influence important matters concerning the ability of central banks in controlling domestic inflation through monetary policy that was followed nation wide.

Other research is research that has been done is Agenor, McDermott, and Prasad (2000). This study aims to compare the macroeconomic fluctuations in emerging market (EM) and developed countries by using some macroeconomic variables, which include: fiscal variables, wage rates, inflation, money supply, the level of credit, trade, and exchange rates. The results of this study suggest that macroeconomic fluctuations in developing and developed countries almost the same.

Another study also conducted by Kydland and Zarazaga (1997) by examining fluctuations in Argentina as well as research by Rodriguez-Mata (1997) in Costa Rica. In addition to the vulnerability of small economies open to outside influences, economic openness will also have consequences on the planning and implementation of macroeconomic policies, including its monetary policy (Warjiyo, 2004).

Dungey (2001) conducted a study to look at the behavior of monetary policy in responding domestic shock and overseas economies. By using the Australian cash rate as a monetary policy variable, the results of studies say that changes in monetary policy targets both the gross national expenditure and inflation can reduce output growth. Furthermore, this study also mentioned the importance of domestic policies to change and respond to domestic and foreign shocks, in order to maximize the profits of the domestic economy.

Cushman and Zha (1997) examined the impact of monetary policy shocks caused in Canada. By using the VAR model, the results of this study indicate that the shock of the foreign economy (the U.S.) significantly affect Canada's economy, and consistent with the traditional theory of an open economy.

Furthermore, this study also emphasizes the importance of the exchange rate as the transmission mechanism.

Parrado (2001) examined the impact of foreign shocks (world oil price) and monetary policy on macroeconomic variables at Chile. By using SVAR approach with short-term restriction, the results of studies say that the contraction of monetary policy may lead to decreased output and monetary aggregates. Furthermore, the results of this study also mentioned that there is relationship between price and exchange rate.

Through the analysis by using impulse response function model SVAR, Arif and Tohari (2006), found that the shocks resulting from changes in world oil prices as a representation of the world inflation rate and the federal funds rate as a representation of world interest rates are significant implications for the domestic variables. It shows that Indonesia as a small open economy highly vulnerable to shocks world variables. Then using the variance decomposition analysis shows that the shock variable inflation and world interest rates have contributed to fluctuations in macroeconomic variables Indonesia. The results of the analysis also states that the transmission of international shocks to the domestic economy occurs through the exchange rate. However, Bank Indonesia's efforts to dampen the shock causes the shock variable contribution to the world of domestic interest rates higher.

CHAPTER III

RESEARCH METHODOLOGY

3.1 Descriptive Analysis

The analysis used here is the analysis of the relationship between fluctuations in world oil prices on exchange rate, economic growth, inflation, and interest rate in Indonesia by using VAR (Vector Autoregression) and time series data in the time frame 1991-2010.

3.2 Variable of Research

This study uses yearly data for world oil price for a time span of 2001 until 2010 with variables that be used for this research are:

1. Exchange rate is a value of the domestic currency, if changed with foreign currency. It uses the the exchange rate rupiah against US dollars (Rp/US dollars).
2. Oil Price is the world oil prices (crude oil) set by some states in units of US$ Dollar per barrel. The writer uses Europe Brent Spot Price FOB.
3. GDP or real Gross Domestic Product GDP constant 2000 is the value of all goods and services produced by a country for a year in billion US Dollars.
4. Consumer Price Index is choosen as indicator of inflation. A consumer price index measures a price change for a constant market basket of goods and services from one period to the next within the same area. CPI is chosen because can represent price level in real life.

5. Interest rate is choosen for making decision in business cycle. It is very important for the investors to run their business. In this study, the writer use SBI's discount rate (1 month) in annual percentage.

3.3 Source of Data

Data has an important role in this research, the writer can do research by using data related to research. This research uses secondary data, where the information that has been collected by researchers and recorded in journals, books, articles, and other publications, which taken from government agencies like the Central Bureau of Statistics, Bank Indonesia, and previous studies related to this research.

3.4 Methodology

One of the methods used to analyze time series data is the VAR method, this method is a form of macro-econometric models are often used to see problems macroeconomic fluctuations. VAR model, developed by Sims (1980) and based on Granger causality test, allows the analysis of the relationship of selected variables with each other.

Each variable in VAR model is written as a function of both their own values of other variables. Determination of the lag orders of variables entering into the model come first among important decision stages in VAR analysis. Lag order to be selected should be adequate to catch dynamic relationship between variables. In general, it is observed that estimations made with short lag orders are more successful than estimations made with long lag orders.

The advantage of VAR analysis (Gujarati, 1995, 2003) are :

1. This method is simple, we need not worry to discriminate between endogenous variables and exogenous variables
2. Simple Estimate
3. VAR is able to see more variables in analyzing economic phenomenon of short-term and long-term.
4. VAR is able to find a solution to the problem of variable time series is not stationary (non stationary) and spurious regression (spurious regression) or spurious correlations (spurious correlation) in the econometric analysis.
5. The estimates (forecast) obtained by using this method in many cases better than the results obtained using a complex simultaneous equation model though.
6. Impulse Response Function track the response of current and future of each variable due to changes or shock a certain variables
7. Variance Decomposition provide information about the contribution (percentage) of the variance of each variable to changes in a particular variable
8. In addition, the VAR analysis is also an analytical tool which is very useful, both in understanding the reciprocal relationship (interrelationship) between economic variables, and information economic model structured.

The weakness of VAR analysis (Gujarati, 1995, 2003) are :

1. VAR model is a model that atheoritic or not based on theory, this is not like the simultaneous equations. In the simultaneous equations, selection of variables to be included in the equation plays an important role in identifying the model.

2. In the VAR model the emphasis on forecasting so that this model is less suitable for use in analyzing the policy analysis.
3. Selection the number of lag used in the equation can also cause problems. For example we have three independent variables with eight lag for each variable. We have to estimate at least 24 parameters. For that purpose we must have more data or observation.
4. The entire variable in VAR model should be stationer. If it's not stationer, so we have to transform it first.
5. Difficult interpretation of coefficient.

Generally a VAR model is specified as :

$$y_t = m + A_1 y_{t-1} + A_2 y_{t-2} + \ldots + A_p y_{t-p} + \varepsilon_t \qquad \text{.....................(3.1)}$$

Equation (3.1) specifies VAR (p) process, where y_t is a K x K matrices of coefficients, A_i (i = 1,2,3,...,p), and m is K x 1 vector of constants and ε_t is a vector of *white noise* process.

The easiest way to appreciate the feature of VAR is to specify a simple VAR. Consider a simple VAR where K=2 and p=1. This gives:

$$\begin{pmatrix} y_1 \\ y_2 \end{pmatrix} = \begin{pmatrix} m_1 \\ m_2 \end{pmatrix} + \begin{pmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{pmatrix}$$

$$y_t = m + Ay_{t-1} + \varepsilon_t \qquad \text{.............................(3.2)}$$

more explicitly, this can be written as:

$$y_{1t} = m_1 + a_{11} y_{1,t-1} + a_{12} y_{2,t-1} + \varepsilon_{1t}$$

$$y_{2t} = m_2 + a_{21} y_{1,t-1} + a_{22} y_{2,t-1} + \varepsilon_{2t}$$

3.5 Model Specification

Based on Kim and Roubini's VAR model, the model specification can be written :

$$X_t = \beta_0 + \beta_1 Y_t + \varepsilon_t \qquad \text{..............................} (3.3)$$

Where

X_t = domestic variables (exchange rate, GDP, CPI, interest rate) in t period

Y_t = foreign variable (world oil price) in t period

β_0 = constanta

β_1 = coefficient of regression

ε_t = error term

By using VAR method, each variables can become dependent variable and also independent variable. So, we can see the relationship between each variable. The model application of VAR model for this study can be done as follows (Gunu Umar, 2010):

$$\Delta e_t = \sum_{t=1}^{L} \alpha^t_{11}\, \Delta e_{t-i} + \alpha^0_{12}\, \Delta WOP_t + \sum_{t=1}^{L} \alpha^t_{12}\, \Delta WOP_{t-i} + \alpha^0_{13}\, \Delta GDP_t + \sum_{t=1}^{L} \alpha^t_{13}\, \Delta GDP_{t-i}$$

$$+ \alpha^0_{14}\, \Delta CPI_t + \sum_{t=1}^{L} \alpha^t_{14}\, \Delta CPI_{t-i} + \alpha^0_{15}\, \Delta i_t +$$

$$\sum_{t=1}^{L} \alpha^t_{15}\, \Delta i_{t-i} + \varepsilon_{1t} \qquad (3.4)$$

$$\Delta WOP_t = \sum_{t=1}^{L} \alpha^t_{21}\, \Delta WOP_{t-i} + \alpha^0_{22}\, \Delta e_t + \sum_{t=1}^{L} \alpha^t_{22}\, \Delta e_{t-i} + \alpha^0_{23}\, \Delta GDP_t + \sum_{t=1}^{L} \alpha^t_{23}\, \Delta GDP_{t-i}$$

$$+ \alpha^0_{24}\, \Delta CPI_t + \sum_{t=1}^{L} \alpha^t_{24}\, \Delta CPI_{t-i} + \alpha^0_{25}\, \Delta i_t +$$

$$\sum_{t=1}^{L} \alpha^{l}_{25}\, \Delta i_{t-i} + \varepsilon_{2t} \tag{3.9}$$

$$\Delta GDP_t = \sum_{t=1}^{L} \alpha^{l}_{31}\, \Delta GDP_{t-i} + \alpha^{0}_{32}\, \Delta e_t + \sum_{t=1}^{L} \alpha^{l}_{32}\, \Delta e_{t-i} + \alpha^{0}_{33}\, \Delta WOP_t + \sum_{t=1}^{L} \alpha^{l}_{33}\, \Delta WOP_{t-i} +$$

$$\alpha^{0}_{34}\, \Delta CPI_t + \sum_{t=1}^{L} \alpha^{l}_{34}\, \Delta CPI_{t-i} + \alpha^{0}_{35}\, \Delta i_t + \sum_{t=1}^{L} \alpha^{l}_{35}\, \Delta i_{t-i} + \varepsilon_{3t} \tag{3.10}$$

$$\Delta CPI_t = \sum_{t=1}^{L} \alpha^{l}_{41}\, \Delta CPI_{t-i} + \alpha^{0}_{42}\, \Delta e_t + \sum_{t=1}^{L} \alpha^{l}_{42}\, \Delta e_{t-i} + \alpha^{0}_{43}\, \Delta WOP_t + \sum_{t=1}^{L} \alpha^{l}_{43}\, \Delta WOP_{t-i} +$$

$$\alpha^{0}_{44}\, \Delta GDP_t + \sum_{t=1}^{L} \alpha^{l}_{44}\, \Delta GDP_{t-i} + \alpha^{0}_{45}\, \Delta i_t + \sum_{t=1}^{L} \alpha^{l}_{45}\, \Delta i_{t-i} + \varepsilon_{4t} \tag{3.11}$$

$$\Delta i_t = \sum_{t=1}^{L} \alpha^{l}_{51}\, \Delta i_{t-i} + \alpha^{0}_{52}\, \Delta e_t + \sum_{t=1}^{L} \alpha^{l}_{52}\, \Delta e_{t-i} + \alpha^{0}_{53}\, \Delta WOP_t + \sum_{t=1}^{L} \alpha^{l}_{53}\, \Delta WOP_{t-i} + \alpha^{0}_{54}$$

$$\Delta GDP_t + \sum_{t=1}^{L} \alpha^{l}_{54}\, \Delta GDP_{t-i} + \alpha^{0}_{55}\, \Delta CPI_t + \sum_{t=1}^{L} \alpha^{l}_{55}\, \Delta CPI_{t-i} + \varepsilon_{5t} \tag{3.12}$$

Where e_t is exchange rate in t-period and e_{t-i} is exchange rate in previous period. WOP_t is world oil price in t-period, and WOP_{t-i} indicates the world oil price in previous period. GDP_t is Gross Domestic Product constant base year 2000 in t-period and GDP_{t-i} is GDP in previous period. CPI_t is inflation in t-period and CPI_{t-i} is inflation in previous period. i_t is interest rate in t-period and i_{t-i} is interest rate in previous period. The last, ε is disturbance term error which is called impulse or innovation or shock in vector autoregression (VAR).

3.6 Stages of VAR Model

According Arsana (2004), there are several analysis tools by Sims (1980) through VAR model. Stages of this research uses following steps :

3.6.1 Stationary Test

One of the requirements to be met in the VAR model is that the observed data must be stationary. There are several methods to test of presence of stationary. Augmented Dickey Fuller (ADF), Z (Phillips and Perron, 1988), stationary KPSS (Kwiatkoskski et al, 1992) and DP (Dickey and Pantula, 1987). The root of the unit is a way to test stationary and it is developed by Augmented Dickey-Fuller (ADF). In principle, the roots test unit is intended to observe whether a particular coefficient of the model have estimated the value one or not.

In this study will use the Augmented Dickey-Fuller (ADF) unit root test to determine the variable's stationary properties or integration order. Before estimating the VAR model, we use the most recommended Akaike Information Criterion (AIC) test to determine the lag length of the VAR system to make sure the model is well specified.

The test estimation procedure takes the following forms;

[ADF-test] : $\Delta y_t = \alpha_0 + \alpha_t t + \delta_1 y_{t-1} + \alpha_i \sum_{i-1}^{m} \Delta y_{t-1} + \varepsilon_t$ .... (3.13)

Where Δy_t denotes lag difference of the variable under consideration. m is the number of lag and ε_t is error term. The stationary of the variables can be tested using hypothesis;

For ADF: H_O: $\delta_1 = 0$ {presence of unit root, not stationer} [where $\delta_1 = \rho\text{-}1 = 0$]

H_a: $\delta_1 \neq 0$ {no unit root, data is stationer}

Based on critical values of respective statistics, if null hypothesis cannot be rejected, then the-time series are non-stationary at the level and need to go variables X and Y time-series are not stationary or stationer at first difference, then between X and Y is said cointegrated. Cointegration used to obtain a stable long-term equation.

There are three ways to test for cointegration; (1) cointegration test of Engle-Granger (EG), (2) Cointegrating Regression Durbin Watson test (CRDW), and (3) test of Johansen. In this study, the writer will use the Johansen Cointegration Test. In this analysis, cointegration test are used to see whether the method can VECM used or not. If there is more than zero cointegrated rank, then VECM method can be used.

3.6.3 Lag Length Selection

Problem of this method is lag length to reach model stability. Selecting of lag in this research by using Akaike Information Criterion (AIC). AIC was developed by Hirotsugu in 1971 and proposed in Akaike (1974), is a measure of the goodness of fit of an estimated statistical model. The AIC is not a test of the model in the sense of hypothesis testing rather it is a test between models, a tool for model selection. Given a data set, several competing models may be ranked according to their AIC, with the one having the lowest AIC being the best. From the AIC value one may infer that the top three models are in a tie and the rest are far worse, but it would be arbitrary to assign value above which a given model is 'rejected'.

In the general case, the AIC is :

$$AIC = 2k + 2ln(L) \qquad \text{.................................(3.10)}$$

far worse, but it would be arbitrary to assign value above which a given model is 'rejected'.

In the general case, the AIC is :

$$AIC = 2k + 2ln(L) \qquad \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \qquad (3.14)$$

Where k is the number of parameter in the statistical model, and L is the maximized value of the likelihood function for the estimate model. AIC chosen lag with minimum value of AIC.

3.6.4 Granger Causality Test

The Granger Causality is used to determine whether there is relationship interplay between exchange rate (e), world oil prices (wop), output (GDP), price level or inflation (CPI), and interest rate (i).

In this study, testing causality group should be done between variables with the vector model autoregressive (VAR). Causality test is done by formulating restrictions zero (zero restriction) on the lag coefficients with a variable against another Wald statistic χ^2. Although the data used integrated (integrated) or integrated together (cointegrated), then the Wald statistic can still be used for causality test. In this study, testing causality group should be done between variables with the vector model autoregressive (VAR).

A variable X is said to cause another variable Y, with respect to a given information set that includes X and Y, if current Y can be predicted better by using past values of X than by not doing so, given all other past information in the information set is used.

If F-statistics are large and the probability value close to zero, and the probability values are less than α value, so that's variables are significant related granger.

3.6.5 Test Result Analysis

3.6.5.1 Impulse Response Function

IRF sees the effect of turbulence (shock) a standard deviation of the variable innovation against the present value (current time values) and values to come (future values) of the endogenous variables are found in the model were observed.

A technical impulse response function is a VAR model test results or the conclusion of this VAR test. This function shows how the main shock (fundamental shock), affect the economy (Ellison, 2003).

Fundamental shock in this study is the fluctuation in world oil prices and its effect on exchange rate (e), output (GDP), price level or inflation (CPI), and interest rate (i).

3.6.5.2 Cholesky / Variance Decomposition

After IRF, Cholesky decomposition or variance decomposition in composed. Variance Decomposition or Forecast error variance decomposition indicates the amount of information each variable contributes to the other variables in a Vector Autoregression (VAR) models. Variance decomposition determines how much of the forecast error variance of each of the variable can be explained by exogenous shocks to the other variables.

CHAPTER IV

OVERVIEW OF WORLD OIL PRICE FLUCTUATION AND INDONESIAN ECONOMY

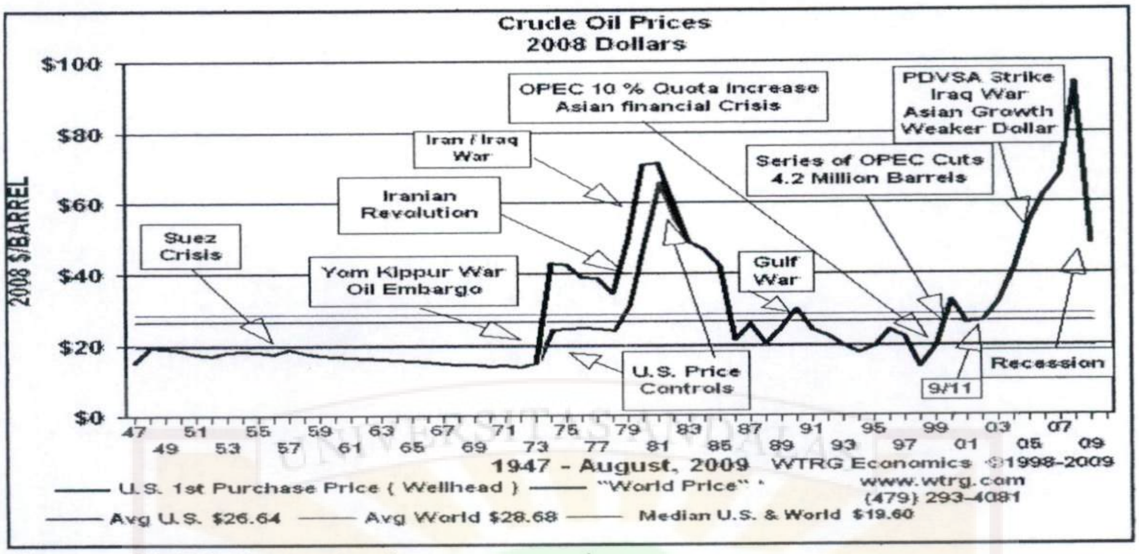
4.1 The Development of World Oil Price

World oil prices have fluctuated since 1940s. Fluctuations in oil prices were influenced by the amount of supply and demand of the net exporters and importers of crude oil. Moreover, geopolitical risk, speculative markets, the oscillating value of the US dollar and interest rates, domestic and foreign demand, and capacity changes have all contributed to the fluctuations. The results impact on inflation, investment decisions, gross domestic product, then supply and demand of crude oil itself.

World oil prices began to fluctuate since the 1940s. In 1946, the average cost of a barrel of oil is US$1.36 as compared to US$99.57 in 2008. Much has changed in sixty years, and many analysts documented the history, causes, and effects of the fluctuating price of oil.

From 1958 to 1970, prices were stable near US$3.00 per barrel, but in real terms the price of crude oil declined from above US$19 to US$14 per barrel. The decline in the price of crude oil when adjusted for inflation for the international producer suffered the additional effect in 1971 and 1972 of a weaker US dollar (graph 4.1)

Graph 4.1 : The Fluctuation of Crude Oil Price 1947-2010



Source : WTRG Economics (www.wtrg.com)

The crisis of oil was began on October 17, 1973, when member States Organization of Arab Petroleum Exporting Countries (OAPEC, consisting of the Arab members of OPEC, Egypt, and Syria) announced, as a result of the Yom Kippur war that is still ongoing, that such States will not going to send oil to the countries that supported Israel in its conflict with Syria and Egypt (the State in question is the United States and its allies, plus Japan).

At the same time, OPEC members agreed to use their influence in regulating the mechanism of world oil prices to boost the oil prices. Since the industrialization of the world's dependent on crude oil and OPEC's role as a global provider of powerful, this price increase dramatically affect the inflation target of the countries and at that time the country may worsen of the economic activities. (Wikipedia).

In the late of 1970s, the second oil crisis occurred due to the Iranian revolution and the Iraq-Irans' War that have been destroyed Iran's oil production sector, it lead surging in oil prices. Saudi Arabia and other OPEC countries to increase production to offset a decline and losses during production that losses to 4%. Then in 1980, which carried Iraq invasion of Iran resulted in Iran's oil production almost ceased and Iraq's oil production is also reduced.

The trends of oil embargo and political turmoil since the 1970s in the Middle East countries are aware to the industrial countries of their vulnerability for importing oil. In reaction, they began making strategic of oil reserves, increase exploration in non-OPEC regions, improving the efficiency of oil consumption, and substitutes fuel power with nuclear, gas, coal and other energy conversion. Due to this conversion and energy diversification, the world oil consumption began to fall and non-OPEC production continues to increase because of high prices stimulated. The world began to flood the oil, the dominance of OPEC production began gradually eroded and prices began fall.

Oil glut was happened in the 1980s caused by a decrease in demand. World oil prices in 1980 for US$37.38 per barrel down to US$15.04 per barrel in 1986. This oil flooding (glut) occurs as a result of increased crude oil production in anticipation of the crisis in 1979. After 1980, declining demand and excess production resulting in the collapse of oil prices over six years with a peak reduction in price by 60% in 1986.

In 1986, the price per barrel was lowered when OPEC decided to link their prices to the spot market and increase production from two million barrels per day to five million barrel per day. Throughout the late 1980s, prices remained low until the Gulf War broke out in 1990 and increased the price per barrel from US$19.59 in 1989 to US$24.49 in 1990. Improved technology in drilling and production techniques of the 1990s brought some stability and low prices to the industry. Between 1991 and 1995 the average price per barrel was a steady $18.72 (see graph 4.1)

In the period 2000-2003, OPEC was applied “price band”, the price range of US$22 until US$28 dollars per barrel to stabilize price. The Production was raised or lowered when the market price above or below that range. The amount of the price ranges are selected based on long-term interests of OPEC. Apparently the average price of OPEC basket is quite stable around US$25 dollars. The success of management supply is caused by the availability of sufficient oil production from OPEC and non-OPEC.

Since 2003, the increasing of free trade and globalization makes the world economy is getting better, spearheaded by the U.S. and China, thus increasing the return oil demand and increasing prices sharply, from an average of US$25.92 dollars per barrel in 2002 to US$26.13 dollars per barrel in 2003, until the end of 2010 reached US$79.43 dollars per barrel. OPEC price band has no effect anymore.

An increase indicates a more limited ability to supply crude oil and fuel giving rise to oil shocks for the umpteenth time in June 2008, world crude oil prices reached the highest point in its history, which is US$133.93 dollars per barrel.

The more advanced of the earth, the demand for oil will grow, but rather the availability of oil will decrease, because oil is a finite natural resource that will run out at any given time. Therefore, oil prices will be higher with the high demand and dwindling oil resources that are available on this earth.

The natural disaster (earthquake and tsunami) in Japan also impacts to the fluctuation of world oil price. There are many victims, damaged infrastructures, and nuclear reactor explosion. It will decrease the economy growth of Japan. As we know, as developed country, the economy of Japan give impact for world economy. It needs more energy (crude oil) to build its big industry. This condition can increase the world oil price.

4.2 The Fluctuation of Indonesian Exchange Rate

The exchange rate shows the price of the currency when exchanged for other currencies. The determination of the value of a country's currency rate with other currencies as well as goods which are determined by demand and supply of the currency concerned. This law also applies to the exchange rate, if the rupiah will demand more than supply the rupiah exchange rate will be appreciated, and vice versa. Appreciation or depreciation will occur if the country follows a policy of free floating exchange rate, so that the exchange rate will be determined by market mechanisms (Kuncoro, 2001).

The globalization of world markets is widespread consequences of liberalization of international markets. These conditions made it difficult to control the monetary pressures of the world economy. Under these conditions, the price formation process (the exchange rate, interest rates, stock index, commodity prices, etc.) are determined by the economy of other countries.

Monetary crisis in several Latin American countries, Eastern Europe and Asia, including Indonesia can not be separated from the process of globalization of the market. By the crisis of the rupiah against foreign exchange, especially the USD that have occurred since mid-1997, resulting in a crisis of public confidence in the banking system, and continues to the government's handling of the crisis.

Monetary policies in this period was directed to hold foreign currency speculation as well as securing foreign exchange reserves. Since July 1997 there has been a monetary crisis which shook the foundations of economic and national politics. For banks, the crisis has caused tremendous liquidity problem due to the collapse of inter-bank money market.

As a lender of last resort, Bank Indonesia should help maintain stability of the economy. The rupiah continued to fall sharply, the government tightening measures amount through higher interest rate and the transfer of state funds / foundations of the banks to BI (SBI) and the tightening of government budgets.

To save the foreign exchange reserves at the date of August 14, 1997 the band released and subsequent intervention Indonesia to implement a floating exchange rate policy until now. Then, the system is confirmed by regulation number 23 and 24 in 1999. In this regulation, the system of exchange rates in Indonesia are set by the government after hearing the recommendation from Bank Indonesia. This is done because the exchange rate system would have very broad, not only to the activities of monetary and financial sector, but also real economic activity.

In October 1997, the government invited the IMF to help the crisis recovery program in Indonesia. Government, among others, said it would guarantee repayment to the depositors. To reduce the amount of depreciation pressures, the monetary policies pursued by covering a variety of ways, including widening the intervention band, restrictions on foreign exchange transactions by banks, changes in exchange rates and tightening system liquidity.

Various measures are not fully managed to hold the rate of depreciation of the rupiah because of the crisis mentioned in a short time has grown from the original financial crisis into an economic crisis, social and cultural crisis and political crisis that becomes a multidimensional crisis.

Graph 4.2 : The Fluctuation of Exchange Rate 1991-2010

Source : www.tradingeconomics.com

From the graph above, we can see the fluctuation of the exchange rate. The Indonesian Rupiah exchange rate appreciated 1.28 percent against the US Dollar during the last month. During the last 12 months, the Indonesian Rupiah exchange rate appreciated 1.32 percent against the US Dollar. Historically, from 1991 until 2012 the USDIDR exchange averaged Rp. 7598.34 reaching an historical high of Rp. 16650 in June of 1998 and a record low of Rp. 1977 in November of 1991.

The rupiah depreciated during the year 2008 compared to 2007. Although until the month of September 2008 the movement of relatively stable exchange rate where it is mainly due to the performance of the current account surplus was recorded as well as macroeconomic policies to be careful.

As we know, most of the raw materials for companies in Indonesia still relies on imports from abroad. When the rupiah depreciates, this will lead to rising raw material costs. The increase in production costs will reduce firm's profit. This will encourage investors to sell their owned stock. If many investors are doing so, it will encourage the decline in stock price index.

For the investors themselves, the depreciation of the rupiah against the dollar indicates that the decreasing of economic outlook Indonesia. Because the depreciation of the rupiah could occur if the factor of Indonesia's economic fundamentals are not strong (Sunariyah, 2006). Of course, it can increase the risk for investor if the stock market are going to invest in Indonesia (Robert Ang, 1997).

Investors will certainly avoid the risk, so investors will be inclined to sell and wait until the economic situation is felt to improve. Actions taken by investors selling will drive the stock price index declines on the Stock Exchange (BEI).

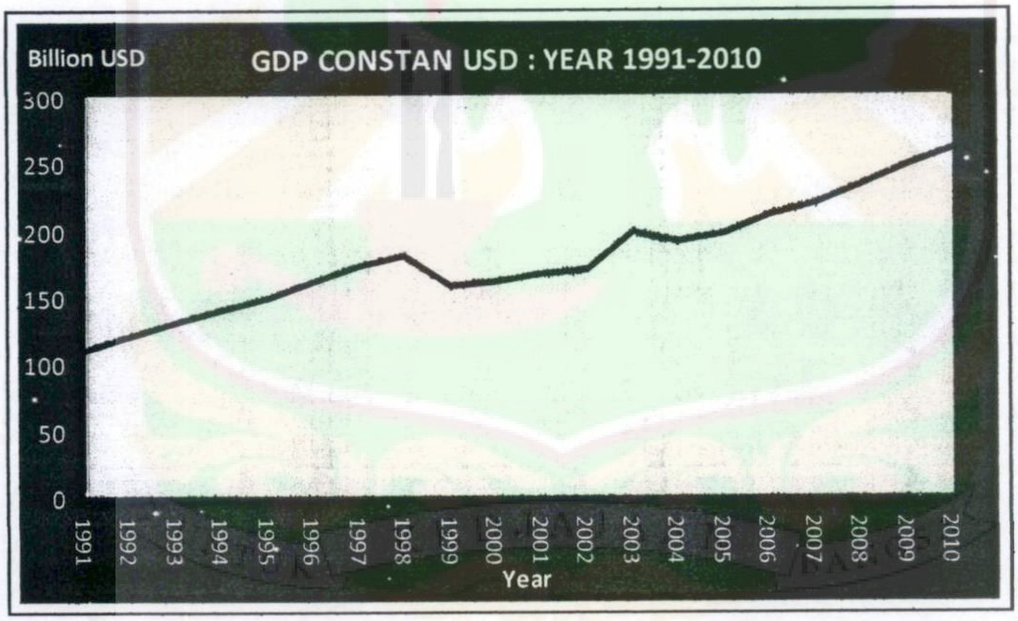
4.3 The Progress of Indonesian Economic Growth

The global economic growth forecasts increasing made by various institutions including the IMF to the range of 4.4 percent or up 0.2 percent compared to the previous projections.

Throughout the first quarter of 2011 shows the performance of the global economy improves. Beside the global economy is getting better, also the consumption of developed countries increased in line with improving the production sector. Meanwhile, domestic demand in Asia remains positive although in some countries began to slow and there are risks associated with the debt crisis in Europe and impaired production of natural disaster after an earthquake in Japan.

In the midst of the global economic recovery imbalances, the Indonesian economy's performance during last ten year has increased. This was reflected in increased GDP growth from US$160.4 billion in 2001 to US$195.6 billion and continue increase 2% from US$540.3 billion in 2009 to US$568.6 billion in 2010 (graph 4.3)

Graph 4.3 GDP Constant of Indonesia 1991-2010



Source :www.nationmaster.com

From the graph 4.3 we can see that how Indonesian economy fluctuate along 1991 until 2010. During 1991 until 1996, Indonesian GDP has increased 10% annually. At that time, Indonesia was reached higher economic growth than past ten years for about 8.22% in 1995 and 7.82% in 1996. This improvement mostly pushed by consumption and the impact of investment boom existed in 1995. By mid 1997, Indonesia was hit by economic crisis.

This crisis was becoming multidimensional crisis that brought terrible effect in economic growth. It proved by sharp degradation at 4.7% in 1997 and the worst was -13.12% in 1998. GDP experienced a deep contraction. The decreasing of GDP in 1998 was caused by investment activities and private consumption which decreased sharply. The decline in Indonesia's GDP at that time also in line with falling down of world oil prices at that time because of global crisis.

Apart from the economic crisis that hit Indonesia, Indonesia's economy gradually began to increase quite significantly. Based on the chart above, from year to year, Indonesia's GDP rose to 5.7% in 2005 followed by a growth of 6.3% in 2006. In 2008, Indonesian economy returned to the condition characterized by the development of a highly dynamic and challenging due to global economic turmoil that significantly changes.

In general, the increase in fuel prices will lower consumption and investment activities and further suppress economic growth. Based on the simulation model of SOFIE (Short Term Forecast Model for Indonesian Economy) fuel price hike will directly trigger a rise in inflation so that it will put pressure on people's purchasing power. The fuel price hike as much as 10% expected to reduce private consumption growth of 0.03% (Bank Indonesia, 2008).

But in fact, high oil prices will negatively affect economic growth. This is caused due to Indonesia is a developing country depends on oil. Indonesian oil production per year declined while oil consumption in Indonesia increased due to the addition of human population, industry, factories, and others. This inevitably makes the government issued fuel subsidies that taken from the state budget. The higher oil price so the higher subsidize that must be issued by government, and it will cause budget deficits.

When seen from the graph 4.3, Indonesia's GDP has increased every year (except in 1997 because of monetary crisis), although in line with the increase in world oil prices. In this case, the GDP of Indonesia was formed by several factors. Despite soaring oil prices which caused budget deficit, but revenues from other factors also helped shape the GDP of Indonesia. The point is that when Indonesia issued a subsidy from the state budget, then there are also revenues from non-oil exports which has dominated in the past few years and state revenues from taxes. In other words, the state budget deficit due to higher oil prices in the countries covered by the surplus of other higher revenues.

During 2008, Indonesia's economy faced with various problems. Impact of global financial crisis which resulted in instability in the domestic economy and the world also led to a slowdown of world economic growth. On the other hand commodity prices are still showing uncertainty despite pressure from energy prices / oil has begun to subside. These elements are directly or indirectly affect the domestic price index and economic growth in Indonesia.

During 2010, the performance of the domestic economy continued to improve despite the imbalance in the midst of global economic recovery. This is indicated by an increasing number of high GDP growth and balance of payments surplus is large enough. Economic growth reached 6.1%, higher than the 2009 growth of only 4.6%. Economic growth supported by strong investment and export performance improved in line with the strong growth in trading partner countries, particularly in Asia.

Economic growth in 2011 expected to reach 6.0 to 6.5 percent. Indonesia's economic growth expected to continue to improve, at least through 2015.[1] During this period, Indonesia's economy will enter a golden growth because of improved commodity prices and increased purchasing power. In addition, Indonesia's economy is expected to improve with the next to maintain macroeconomic stability, higher economic growth and trade surplus is still going great.

4.4 The Tendency of Indonesian Inflation

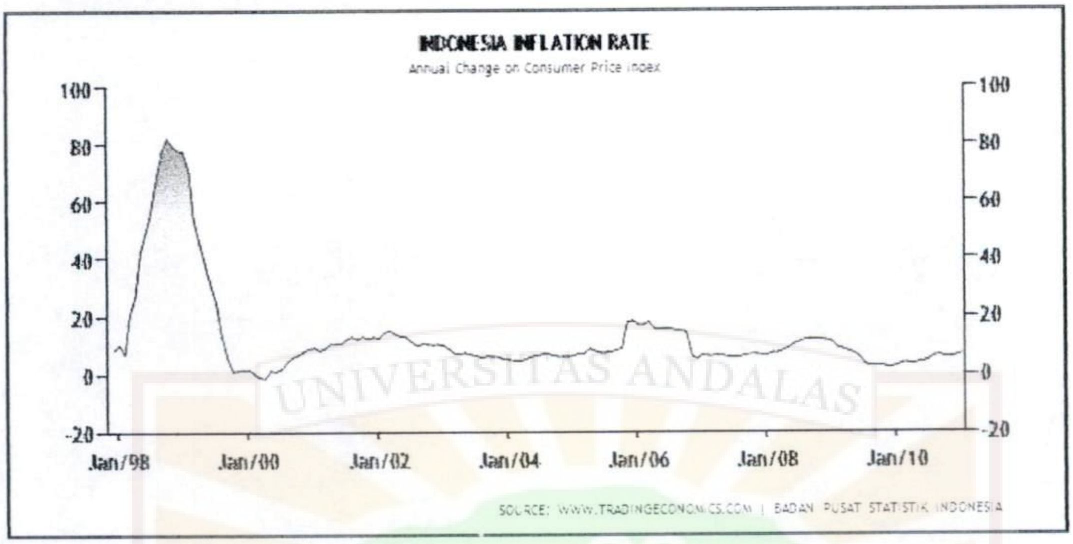
In economics, inflation is a rise in the general level of prices of goods and services in an economy over a period of time. When the general price level rises, each unit of currency buys fewer goods and services. Consequently, inflation also reflects erosion in the purchasing power of money – a loss of real value in the internal medium of exchange and unit of account in the economy. A chief measure of inflation is the consumer price index (CPI) over time.

From year to year, CPI in Indonesia has fluctuated. The trend rise in consumer price index from 1991 to 2010 is quite significant; the average annual CPI growth reached 2-3%. The highest increase occurred in 1997-1998 in the amount of 3% at which that time the monetary crisis in Indonesia led inflation soared by 58% and all prices rebounded.

---

[1] Bank Indonesia

Graph 4.4 : The Inflation Rate 1997-2010



Source : www.tradingeconomics.com

The fluctuation in world oil prices affects the level of inflation in various countries. In Indonesia, with the condition that oil prices raise more than 10% of macro assumptions, the potential for instability are not inevitable. Empirical test shows that the rise in oil prices that occurred on an ongoing basis would be responded in a positive and long-term effect especially on the inflation variable.

The increase in inflation driven by supply side that is rising oil prices will push up the price of goods in general through higher production costs. This in turn will encourage an increase in the supply of money circulating in the country. The condition increasing in money supply, the empirical and theoretical will push the weakened of rupiah (depreciation).

The increase in world oil prices will also cause inflation impact on other sectors in Indonesia. For example, the petrochemical industry that uses oil as its raw materials will raise the price of certain products, such as plastic and nylon. Increasing in world oil prices will also encourage the rising prices of some food in the country. Even for the next year there is a decline in oil price but the industry will not decrease their product's price for a while because they want to return the capital that was lost because the higher cost when there is higher price of oil at the past.

When there is scarcity of oil, the supply is limited, while demand is relatively stable or even tended to increase, according to 'law of demand (supply-demand)' will cause prices to rise. We know that the role of oil as an energy source holds a central role in all human activity. Especially in the economic field, the increase in oil prices would trigger an increase of other commodities, because the production costs (fuel, transportation) will goes up.

In 2005, the inflation is the high compared to subsequent years, it is equal to 17.11 percent. This is due to price increases shown by the increase in all groups of goods and services, such as foodstuffs, food, beverages, cigarettes and tobacco, housing, water, electricity, gas and fuel, clothing, health groups , education, recreation and sport and transport, communication and financial services.

Entering the year 2006 the inflation rate has decreased very significantly. Inflation for the year decreased to 10.51 percent. This is quite satisfactory, although the rate of inflation is relatively high at 6.60 percent. Inflation conditions were maintained until well into 2007, but at the end of 2007 has decreased even though only for 0.01 percent. Along with maintaining the stability of the exchange rate, inflation rate for 2009 is gradually decreased from the previous year.

The annual inflation rate at the end of 2008 reached approximately 11.06 per cent, falling to 2.78 percent in late 2009. The decline in inflation during the year 2009, greatly influenced by the low rate of inflation in food items and components of the price set by the government.

However, in 2010, inflation is likely to increase by 6.96 per cent in line with world economic growth leading to higher prices of goods and services in Indonesia. In addition, climate change has also resulted in decreased production of goods and services. Therefore, the government must continue to take measures necessary to anticipate the development of inflation in market operations, maintain adequate supply and availability of goods, secure the stock in the area, keeping the smooth distribution of goods, develop the national logistics system, and intensify agricultural extension to farmers better equipped to face climate change.

4.5 The Development of SBI's Discount Rate

SBI's discount rate is in recognition of securities short-term debt denominated in dollars issued by Bank Indonesia to the discount system. SBI issued without a script, and the entire ownership and transactions recorded in the means of Bank Indonesia.

The parties may have the SBI is a commercial bank and the community. SBI can be bought on the primary market while the community is only allowed to buy in the secondary market. Publishing SBI in the primary market auction conducted by the mechanism on every Wednesday or the next working day (in terms of days referred to is a holiday). SBI issued with a period 1 month up to 12 months with the smallest units of Rp1 million.

Since the beginning of July 2005, Bank Indonesia uses the mechanism of BI rate, the BI announced that SBI interest rate target. Bank Indonesia wants to auction during the period particular. BI rate is used as a reference for the actors market in the auction. BI rate is used as a reference in the implementation of the operation monetary control to ensure that the weighted average interest 1-month SBI interest rate auction results open market operations to be around BI rate.

BI rate set by the board of governors to consider the following matters [2] :

1. Recommendations generated by the BI rate policy reaction function in economic model for achieving the inflation target
2. A variety of other information such as macroeconomic indicators, surveys, expert opinion, the results of economic research, etc..

Bank Indonesia is currently using the SBI rate as one instrument to control inflation. If the inflation felt quite high, Bank Indonesia will raise SBI rates to curb rising inflation. Changes in interest rates SBI will give effect to the capital markets and financial markets. If interest rates go up then it will directly increase interest expense.

Companies with high leverage will get a very heavy impact against the increase in interest rates. The increase in interest rates could reduce the profitability of the company so as to give effect to the company's stock price concerned. In addition to the increase of interest expense, it will motivate

[2] www.bi.go.id

investors to transfer funds to the deposits. This occurs because of rising interest rates will followed by commercial banks to raise interest rates deposits. When deposit rates are higher than the level expected return of investors, the investor will move their funds to the deposit.

For the community itself, the high interest rates mean inflation rate in the country is quite high. Given the inflation high will cause a reduction in the level of real consumption society because the value of money held by the public is reduced. This will cause the consumption of goods produced by the company will decrease as well. This certainly will reduce the level of income company so as to affect the level of corporate profits, which in turn will affect the.

In the banking sector, the condition of the national banking performance in 2009 is relatively good and stable in response to global crisis, strengthened through the implementation of monetary easing through the BI rate. BI steps taken in 2009 is to lower the BI Rate by considering the overall economic outlook in the future. BI Rate by 6.5 percent will be retained because it is fairly consistent and this condition persisted until December 2010.

Along with the measures taken by government fiscal stimulus and the determination of the BI Rate, the rate of SBI was following the movements of the BI Rate. Interest rates of Interbank Money Market also continued to decline approaching BI Rate. Interbank rates in 2009 as a whole has been under from the BI Rate. This is in line with the strengthening of monetary policy and money market interest rates. However, the fact interest rates are not declining as fast as expected.

Movement of Bank Indonesia Certificates (SBI) 1 month and 3 months in early 2010 determined respectively 6.45 percent and 6.60 percent. One-month SBI rate and three months continued to decline until April 2010, but in the month of May 2010 one-month SBI rate and three months respectively had elevated to the position of 6.3 percent and 6.58 percent. As of June 2010 one-month SBI interest rate was lowered to 6.26 percent while three-month SBI increased again to 6.6 percent.

On June 16, 2010 BI issued a policy package to include:

1. Widening the corridor interbank rates
2. The application of minimum one month holding period SBI, this policy came into effect on July 7, 2010
3. With the June 16 package of the steps taken to remove SBI's rate, first started in June 2010 for one-month SBI and SBI three months since November 2010.

Thus investors who invest through SBI to hold the investment for 3 months before reselling. 3-month SBI outstanding until October 2010 and in November 2010, no longer SBI for a period of three months.

BI just issued a mid-term SBI is 6 months, 9 months and 12 months. In order to achieve the ultimate target of monetary policy, monetary policy framework is done through controlling interest rates and is reflected by setting BI rate.

CHAPTER V

EMPIRICAL RESULT AND ANALYSIS

5.1 Empirical Findings

Based on the methodology above, by using the VAR method we can get the result and analyze each variable of this research. All of the variable is changed into logarithm, after that it follows the stage of VAR that already discuss above :

5.1.1 Stationary Test

When discussing the statistical properties of an econometric model it is important to test the presence of unit roots in order to avoid the problem of spurious regression. In fact, if a variable contains a unit root (i.e it it *non-stationary*) and it does not combine with other non-stationary series to form a stationary cointegration relationship, then regression involving the series can falsely imply the existence of a meaningful economic relationship.

There are several ways of testing for the presence of a unit root. However we focus our attention on the Augmented Dickey Fuller (ADF) test. In the ADF test, the formulation of the null hypothesis that the observed variable has a unit root, which means these variables are not stationary.

The null hypothesis is rejected if the ADF test statistic value is greater than the critical value. Decision rejecting the null hypothesis in the ADF test shows that the observed variables do not have a unit root, which means it stationary.

Results of data processing for the variables are using Eviews statistical application programs such as those found in Table 5.1 below:

Table 5.1 Unit Root Results at First Difference (I(1))

Unit Root Test	**Variables**	**Intercept**		**Trend & Intercept**		**None**	
		t-stat	**prob**	**t-stat**	**Prob**	**t-stat**	**Prob**
1st difference	E	-3.52	0.02	-4.52	0.02	-3.20	0.00
	WOP	-5.16	0.00	-5.22	0.00	-6.39	0.00
	GDP	-4.20	0.00	-3.56	0.06	-3.85	0.00
	CPI	-4.67	0.00	-4.62	0.01	-4.81	0.00
	I	-6.30	0.00	-6.21	0.00	-6.58	0.00

Data is processed by using Eviews 6 (See Appendix 1)

The estimated results for the unit root test are presented in table 5.1 using Augmented Dickey Fuller (ADF) Test with critical value 1%, %5, and 10% at Level and First Differenced. In the unit root test level I(0) indicates that all variables are not stationary, except interest rate (i). In the unit root test level I(0) explains that the variable has relationship in the present period. In this case, the domestic interest rate has the unit root test level I(0).

For all in one unit root test none can satisfy Mc.Kinnon critical value to reach stationary condition variables in I(0) because critical value has smaller value in comparing with t-statistic Mc. Kinnon for all variables and probability values are greater than 0.05.

When viewed from the first differential, almost the probability value of all variable is less than 0.05, and t-test value is larger than its critical value

Mc.Kinnon. This indicates that the stationary variables are accepted by first differentiated.

In the table 5.1 the null hypothesis of the presence of unit root is rejected in I(1) at all for level of significant 5%. The result showed, the fluctuation of data obtained and has a unit root at the level I(0). In addition, all of variables in a model have a relationship.

Stationery test is necessary because the data are not stationary will lead to biased results because the regression results derived from non stationary data will cause a spurious regression. Spurious regression caused regression estimation results that have a high R square, but no significant relationship between variables (Gujarati, 2003).

This essence stationary test was intended to examine whether a particular coefficient of autoregressive models are estimated to have a value of one or not. In examining the behaviour of the data used augmented Dickey Fuller test (ADF). To compare the value of augmented Dickey Fuller (ADF) is used tables of critical values developed by Mac-Kinnon (Lilien, 1990).

It is clearly shown in table 5.1 that the null hypothesis of the presence of unit root is rejected in first difference I(1) to all the variable for level of significant 5% even with intercept, or trends and intercept, or without both.

From the result above, we can conclude that all the variables are stationer in First Difference (I(1)). It means that each variable has relationship in previous period and future period.

Table 5.2 Stationary Level Table

Variables	Stationary Level
E	I(1)
WOP	I(1)
GDP	I(1)
CPI	I(1)
I	I(0) , I(1)

Data is processed by using Eviews 6 (See Appendix 1)

5.1.2 Co-Integration Test

Two or more variables are not stationary before differentiated but stationary at first difference are likely to occur cointegration, which means there is a long-term relationship between them. After estimation by using ADF test, and got all variables satisfied to stationarity at first difference, next continue to co-integration test. Co-integration test is a form of testing in dynamic model that aims to explore the possibilities of long term relationship among the observed variables. Observed variables co-integrated if the residual of regression holds in stationary condition. From the result of unit root test carried out, all variables have the same degree of integration at first differentiated or I(1).

Table 5.3 Johansen Cointegration Test

Date: 02/02/12 Time: 15:41
Sample (adjusted): 1993 2010
Included observations: 18 after adjustments
Trend assumption: Linear deterministic trend
Series: E WOP GDP CPI I
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized		Trace	0.05

No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.930600	98.48318	69.81889	0.0001
At most 1 *	0.816756	50.46149	47.85613	0.0000
At most 2 *	0.527656	39.91667	29.79707	0.0022
At most 3 *	0.258719	36.41579	15.49471	0.0284
At most 4 *	0.255460	21.02704	3.841466	0.0121

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values
Data is processed by using Eviews 6(See Appendix 2)

As a matter of necessity, the study tested for cointegration using the Johansen approach which is suitable for VAR model. The result shows in table 5.3 that (at 5%) there is five cointegrating relation in each of the models, because the value of Trace Statistic is greater than the level significant 5%. It's mean that the entire variable are cointegrated each other. This naturally allowed us to proceed to the estimation of VAR. It is indicated there is long-run relationship among variables, test are composed combining all variables. In other words, in every short period, all variables tended adjust to each other, to achieve long-term equilibrium.

5.1.3 Lag Length Selection

Determination of optimum lag is one of the important requirements in the VAR model, because if the lag used incorrect or inaccurate (in this case the lag is not optimum), it will give ambiguous results. The optimum lag means how many time periods previously included in the VAR (up to a period of time before that affects the current period). The longer lag was included into the VAR, the more parameters are also included in the VAR formula, which in turn will provide results that are not significant. Based Cologni and Manera, the maximum lag does not exceed 5.

The first stage of this modeling sequence is to select the lag order of the underlying VAR in these variables, based on Akaike Information Criterion (AIC) in this table below.

Table 5.4 Lag Length Criteria

Criteria	Value	Lag Selection
LR Statistic	99.51	1
Final Prediction Error	4.28e-08	2
Akaike Information Criterion	-3.77	2
Schwarz Information Criterion	-1.05	2
Hannan-Quinn Information Criterion	-3.30	2

Data is processed by using Eviews 6(See Appendix 3)

Based on table 5.4, according to the Akaike Information Criterion (AIC) suggested the use of optimum lag is the lag-2 because the minimum value for Akaike Information Criterion lies in lag-2. This result is also supported by others criteria, such as SC (Schwarz Information Criterion), FPE (Final Prediction Error), and HQ or Hannan-Quin Information criterion shown that the lag suggestion for the VAR model used Lag-2. But on the sequential modified LR statistic (each test at 5% level).

5.1.4 Granger Causality Test

This section will discuss about the Granger Causality test that was first introduced by Sims (1972). Granger Causality test is intended to look at the relationship between the two variables. Granger causality test by using the optimum lag has been done before on a lag length selection, i.e. on the second lag (lag-2). If a value of probability less than 0.05 or 5% and F-statistics obtained greater than the value of its probability, thus both variables are statistically exists Granger causality relationship, as shown in the table below.

Table 5.5 Granger Causality Test

Pairwise Granger Causality Tests
Date: 02/02/12 Time: 13:00
Sample: 1991 2010
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
WOP does not Granger Cause E	18	4.13205	*0.0408
E does not Granger Cause WOP		0.17403	0.1222
GDP does not Granger Cause E	18	11.8840	*0.0015
E does not Granger Cause GDP		0.97302	0.4311
CPI does not Granger Cause E	18	4.71701	*0.0565
E does not Granger Cause CPI		0.64521	0.1307
I does not Granger Cause E	18	5.26807	*0.0140
E does not Granger Cause I		10.0819	*0.0023
GDP does not Granger Cause WOP	18	0.50332	0.6158
WOP does not Granger Cause GDP		4.41070	*0.0290
CPI does not Granger Cause WOP	18	1.38079	0.2859
WOP does not Granger Cause CPI		5.05719	*0.0074
I does not Granger Cause WOP	18	0.87003	0.4420
WOP does not Granger Cause I		4.59547	*0.0457
CPI does not Granger Cause GDP	18	3.67312	0.0166
GDP does not Granger Cause CPI		2.71682	0.1033
I does not Granger Cause GDP	18	0.13379	0.8760
GDP does not Granger Cause I		0.21758	0.8073
I does not Granger Cause CPI	18	1.21484	0.3283
CPI does not Granger Cause I		1.17002	0.3410

Data is processed by using Eviews 6(See Appendix 4)

Table 5.5 describes the interrelationship among variables (Granger causality). Star symbol (*) on the table indicates that the null hypothesis is rejected, or there is a relationship between these variables.

For example, from table 5.5 shows that there is relationship between variable world oil price with exchange rate. It shows that we reject the null hypothesis, in other words, oil prices affect the formation of exchange rate. It is called one-way relationship. Beside that, there are some one-way relationship between other variables, such as GDP granger caused exchange rate, CPI granger caused exchange rate, WOP granger caused GDP, WOP granger caused CPI, and WOP granger caused interest rate. It means only the first variable affects the formation of the second variables while the second variable has no effect on the first variable.

On interest rate (I) and exchange rate (E), the relationship that occurred here is two-way relationship or granger causality, because both of the variable influence each other. We can see from the value of probability that less that 0,05 or 5 %, they are 0,0140 and 0,0023.

For the other granger causality is not statistically significant, because the probability is greater than 0,05 or 5 %.

5.1.5 VAR Estimation

VAR estimation is done using the optimum lag that has been previously determined, that was lag-2. Through VAR estimates will be obtained the R-square value of each variable. If the R-square value was close to 1, then the stronger the relationship between variables.

Having found cointegration relationship among the five variables of the study, then the next step is to form a Vector Auto Regression (VAR) model. Summary of VAR estimation results can be seen in appendix 5. As explained in research methodology, all variables in VAR/VECM can be exogenous either endogenous. In findings, exchange rate is set as first variable as endogenous, thus followed by world oil price, GDP, CPI and interest rate .

Based on the results of testing to determine the VAR model where decisions are taken based on the significance level at a tolerable error $\alpha = 0.05$ is by comparing the calculated t-value (the value in row three) compared with the t-table at which $\alpha = 0.05$ with a value of t-table (0.025;15) = 2.131. If the t-test is greater than the t-table, so it means that there is significant influence between variable.

Tabel 5.6 VAR Estimation

Vector Autoregression Estimates
Date: 02/02/12 Time: 16:03
Sample (adjusted): 1993 2010
Included observations: 18 after adjustments
Standard errors in ( ) & t-statistics in [ ]

	E	WOP	GDP	CPI	I
E(-1)	1.436402	-1.083601	-1.237447	0.492050	175.4931
	(0.37754)	(0.56711)	(0.27087)	(0.52495)	(41.1209)
	[0.80459]	[-1.91074]	[-1.56838]	[1.93733]	[4.26774]
E(-2)	-0.670848	1.740062	1.237228	-0.386190	-177.3128
	(0.32848)	(0.49342)	(0.23567)	(0.45673)	(35.7774)
	[0.04225]	[1.52655]	[1.24975]	[-0.84555]	[-1.95600]
WOP(-1)	0.406989	-0.637326	-0.015269	-0.135485	14.21790
	(0.24266)	(0.36451)	(0.17410)	(0.33741)	(26.4301)
	[-2.67718]	[-1.74847]	[-3.08770]	[-0.40155]	[2.53794]
WOP(-2)	-0.341714	0.267110	0.358710	0.181334	-59.82524
	(0.27687)	(0.41589)	(0.19865)	(0.38497)	(30.1562)
	[-1.23419]	[0.64226]	[1.80578]	[3.47103]	[-1.98384]
GDP(-1)	0.298830	2.389109	0.585095	-1.471110	-24.90920
	(1.24814)	(1.87484)	(0.89549)	(1.73545)	(135.944)
	[2.23942]	[1.27430]	[0.65338]	[-2.84768]	[-0.18323]
GDP(-2)	-0.057629	-1.606493	0.037497	1.031188	72.65252
	(1.07631)	(1.61673)	(0.77221)	(1.49653)	(117.228)
	[-1.15354]	[-0.99367]	[0.04856]	[0.68905]	[0.61975]
CPI(-1)	-0.077835	-0.042804	0.143559	0.470729	-5.350023
	(0.25845)	(0.38822)	(0.18543)	(0.35936)	(28.1495)
	[-1.30116]	[-0.11026]	[0.77421]	[1.30992]	[-0.19006]
CPI(-2)	0.457823	-1.081348	-0.336804	-0.313219	36.26755
	(0.25262)	(0.37947)	(0.18125)	(0.35126)	(27.5150)
	[2.81227]	[-1.84964]	[-1.85825]	[-0.89171]	[1.31810]
I(-1)	0.012866	0.011432	0.003315	-0.011423	-0.750625

	(0.00753)	(0.01132)	(0.00541)	(0.01048)	(0.82062)
	[3.38042]	[1.01014]	[0.61332]	[-1.09037]	[-0.91471]
I(-2)	0.011208	-0.012361	0.000388	0.003423	0.043564
	(0.00345)	(0.00519)	(0.00248)	(0.00480)	(0.37604)
	[1.35002]	[-0.45525]	[0.15670]	[0.71303]	[0.11585]
C	-0.683988	0.043616	0.867041	2.566078	-88.52436
	(0.88152)	(1.32414)	(0.63245)	(1.22569)	(96.0124)
	[-0.77592]	[0.03294]	[1.37091]	[2.09358]	[-0.92201]
R-squared	0.958250	0.925223	0.972696	0.838992	0.938226
Adj. R-squared	0.898606	0.818398	0.933691	0.723265	0.807120
Sum sq. Resids	0.048310	0.109002	0.024867	0.093397	573.0929
S.E. equation	0.083075	0.124787	0.059603	0.115509	9.048227
F-statistic	16.06628	8.661134	24.93736	18.23901	8.627024
Log likelihood	-27.74351	-20.41992	-33.72026	-21.81053	-56.68698
Akaike AIC	1.860390	1.046658	2.524473	1.201170	7.520775
Schwarz SC	1.316274	0.502542	1.980357	3.657054	8.064891
Mean dependent	3.802222	1.469444	2.387222	2.192222	15.24556
S.D. dependent	0.260893	0.292825	0.231461	0.123362	14.43556

Determinant resid covariance (dof adj.)	3.94E-09
Determinant resid covariance	3.51E-11
Log likelihood	-88.95509
Akaike information criterion	3.772788
Schwarz criterion	1.052207

Data is processed by using Eviews 6(See Appendix 5)

The first equation vector autoregression (VAR) estimates for exchange rate (E) as dependent variable as follow :

$$E = 1.44E(-1) - 0.67E(-2) + 0.41WOP(-1) - 0.34WOP(-2) + 0.30GDP(-1)$$

$$(0.80) \quad (0.04) \quad (-2.68)^{*} \quad (-1.23) \quad (2.24)^{*}$$

$$- 0.06GDP(-2) - 0.08CPI(-1) + 0.46CPI(-2) + 0.01I(-1) + 0.01I(-2) - 0.68$$

$$(-1.15) \quad (-1.30) \quad (2.81)^{*} \quad (3.38)^{*} \quad (1.35) \quad (-0.78)$$

The sign of (*) denotes significant of 95% confidence level

Based on the results of VAR estimation exchange rate (E) as dependent variable, can be seen that the variables that affect exchange rate (E) is significantly present in the world oil price variable at t-1 (short term or at lag one previous periods) with t-statistics of -2.68, variable GDP t-1 with t-statistics 2.24, and CPI t-2 (short term or at lag two previous period) with t-statistics 2.81, and variable interest rate t-1 with t statistic 3.38, while exchange rate variable is not statistically significant effect.

The coefficient determination of R-squared is 0.958. It means 96% of exchange rate is determined by factors in model and the rest about 4% is influenced by other variables. For simply, all variables can put together with exchange rate in long term, even there is no variables effected, the dependent variable still has value about 0.68.

The second equation vector autoregression (VAR) estimates for world oil price (WOP) as dependent variable as follow :

$$
\begin{aligned}
WOP = & \underset{(-1.91)}{-1.08E(-1)} + \underset{(1.53)}{1.74E(-2)} - \underset{(-1.75)}{0.64WOP(-1)} + \underset{(0.64)}{0.27WOP(-2)} + \underset{(1.27)}{2.39GDP(-1)} \\
& \underset{(-0.99)}{-1.61GDP(-2)} - \underset{(-0.11)}{0.04CPI(-1)} - \underset{(-1.85)}{1.08CPI(-2)} + \underset{(1.01)}{0.01I(-1)} - \underset{(-0.46)}{0.01I(-2)} + \underset{(0.03)}{0.04}
\end{aligned}
$$

The sign of (*) denotes significant of 95% confidence level

For short term even long term with lag, there is no one of the variables are significant to variable of world oil price (WOP), because the t-statistic of each variable is less than 2.131 and not significant at 95% confidence level.

The coefficient determination of R-squared is 0.925 which means 93% of world oil price is determined by factors in model, and the rest, about 7% is formed by other variables exclude them. For simply, all variables can put together with world oil price in long term, even there is no variables effected, the variable dependent still has value about 0.04.

The third equation vector autoregression (VAR) estimates for gross domestic product (GDP) as dependent variable as follow :

$$GDP = -\ 1.24E(-1) + 1.24E(-2) - 0.02WOP(-1) + 0.36WOP(-2) + 0.59GDP(-1)$$

$$(1.57) \qquad (1.25) \qquad (-3.09)^{*} \qquad (1.81) \qquad (0.65)$$

$$+0.04GDP(-2) + 0.14CPI(-1) - 0.34CPI(-2) + 0.00I(-1) + 0.00I(-2)$$

$$(0.05) \qquad (0.78) \qquad (-1.86) \qquad (0.61) \qquad (0.16)$$

$$+\ 0.87$$

$$(1.37)$$

The sign of (*) denotes significant of 95% confidence level

Based on the results of VAR estimation gross domestic product (GDP) as dependent variable, can be seen that the variables that affect GDP is significantly present in the world oil price variable at t-1 (short term or at lag one previous periods) with t-statistics of -3.09 and significant at 95% confidence level.

The coefficient determination of R-squared is 0.973 which means 97% of GDP is determined by factors in model, and the rest, about 3% is formed by other variables exclude them. For simply, all variables can put together with GDP in long term, even there is no variables effected, the variable dependent still has value about 0.87.

The forth equation vector autoregression (VAR) estimates for consumer price index (CPI) as dependent variable as follow :

$$CPI = 0.49E(-1) - 0.39E(-2) - 0.14WOP(-1) + 0.18WOP(-2) - 1.47GDP(-1)$$

$$(1.94) \qquad (-0.85) \qquad (0.40) \qquad (3.47)^{*} \qquad (-2.85)$$

$$+1.03GDP(-2) + 0.47CPI(-1) - 0.31CPI(-2) - 0.01I(-1) + 0.00I(-2) + 2.57$$

$$(0.69) \qquad (1.31) \qquad (-0.89) \qquad (-1.09) \qquad (0.71) \quad (2.09)$$

The sign of (*) denotes significant of 95% confidence level

Based on the results of VAR estimation CPI as dependent variable, can be seen that the variables that affect CPI is significantly present in the world oil price variable at t-2 (at lag two previous periods) with t-statistics of 3.47 and significant at 95% confidence level. It shows positive relationship between CPI and world oil price. If WOP increase, it will make higher CPI (inflation).

The coefficient determination of R-squared is 0.839 which means 84% of CPI is determined by factors in model, and the rest, about 16% is formed by other variables exclude them. For simply, all variables can put together with CPI in long term, even there is no variables effected, the variable dependent still has value about 2.57.

The fifth equation vector autoregression (VAR) estimates for interest rate (I) as dependent variable as follow :

$$I = 175.49E(-1) - 177.31E(-2) + 14.22WOP(-1) - 59.83WOP(-2) - 24.91GDP(-1)$$

$$(4.27)^{*} \quad (-1.96) \quad (2.54)^{*} \quad (-1.98) \quad (-0.18)$$

$$72.65GDP(-2) - 5.35CPI(-1) + 36.27CPI(-2) - 0.75I(-1) + 0.044I(-2) - 88.52$$

$$(0.62) \quad (-0.19) \quad (1.32) \quad (-0.91) \quad (0.12) \quad (-0.92)$$

The sign of (*) denotes significant of 95% confidence level

Based on the results of VAR estimation interest rate as dependent variable, can be seen that the variables that affect domestic interest rate is significantly present in the exchange rate and world oil price variable at t-1 (short term or at lag one previous periods) with t-statistics 4.27 and 2.54.

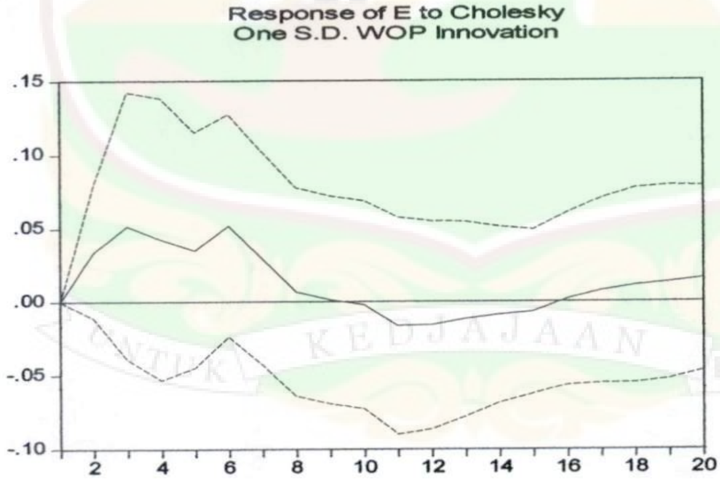
The coefficient determination of R-squared is 0.938 which means 94% of interest rate is determined by factors in model, and the rest, about 6% is formed by other variables exclude them. For simply, all variables can put together with interest rate in long term, even there is no variables effected, the variable dependent still has value about 88.52

5.1.6 Impulse Response Function

To verify the impact of world oil price fluctuation to the Indonesian economy, it is essential to identify shocks of oil price. Identifying shock by using impulse response function and variance decomposition. Impulse response function will show how the response variable to shocks, and Variance Decomposition will show the influence of each variable.

With the Impulse Response Function, we will see how the response of each variable to fundamental shocks that was happening. In this case, the reaction variables exchange rate, GDP, CPI, and interest rate to shocks in world oil prices. Through the impulse response function will be the conclusion of this study.

Graph 5.1 : Response of Exchange Rate to World Oil Price

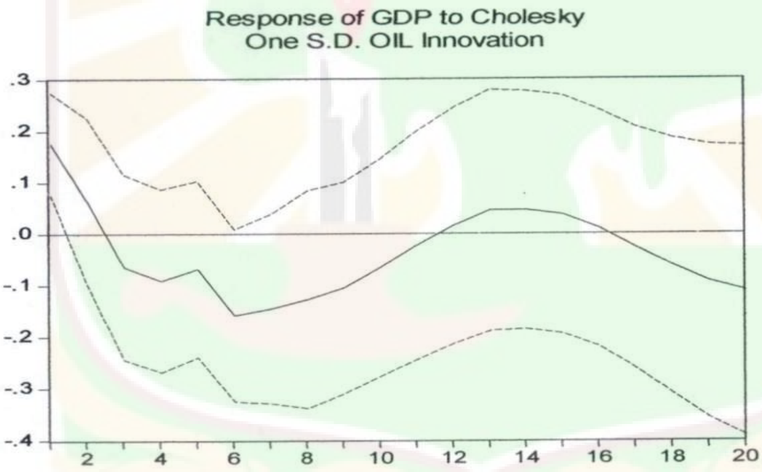


Data is processed by using Eviews 6 (See Appendix 6)

The vertical axis is the response of the variable domestics shocks while the horizontal axis is time period. The range of time period of observation is 20 period. The blue line is the impulse response function of the domestic variables to shocks in world oil prices, while the red line is the constraint error (error bands) which gives an overview of its significance response (Ellison, 2003).

The trend of exchange rate response to world oil price shocks is significant positive at the beginning period until third period. After the next period, the response of exchange rate decrease and finally increase step by step. From the description of the graph can be concluded that exchange rate response to world oil price shock is significant positive at beginning period. It makes the depreciation of rupiah, with higher nominal number but the value of money is lower.

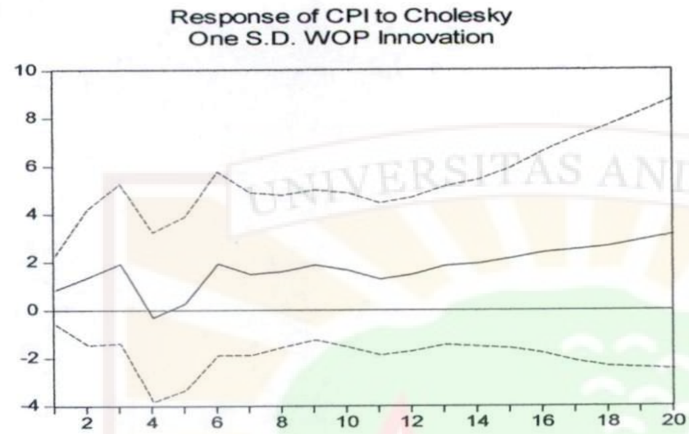
Graph 5.2 : Response of GDP to World Oil Price



Data is processed by using Eviews 6 (See Appendix 6)

The GDP response to world oil price shocks is significant negative at the beginning period. It began response positively from the twelfth period until the sixteenth period. Given the negative response of GDP at the beginning of this period due to oil price shocks cause the government should provide subsidies to the public and the subsidies was taken from the state budget. However, the government gradually began reduce subsidies to cover the budget deficit so that the output back to take off. Based on the overall results, impulse response of GDP to shocks in oil prices showed a negative relationship.

Graph 5.3 : Response of CPI to World Oil Price

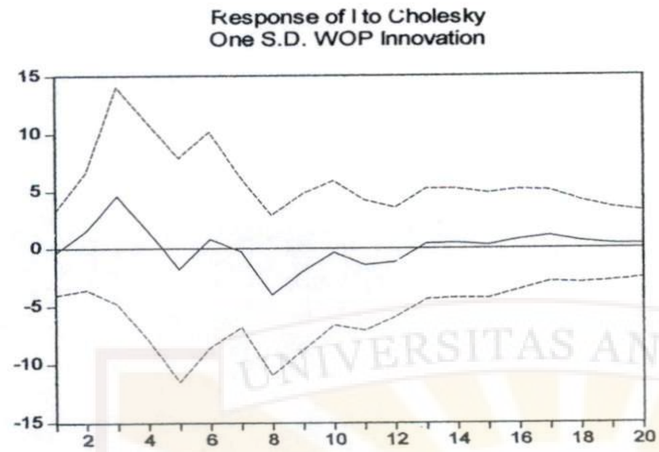


Data is processed by using Eviews 6 (See Appendix 6)

At the beginning the CPI response to world oil price shocks is significant positive until third period. In the next period, oil price shocks are negatively responsed by the CPI. After that, moving on from fourth period, the response of CPI has increased in the period of five and six and then continued to increase in response from period seven until the last period.

We can see from the overall response that was given of CPI to changes in world oil prices, it can be concluded that oil price shocks since the beginning gives a positive response of CPI. This is consistent with the reduction of subsidies provided by government and led to inflation in Indonesia increased along with rising world oil prices. Subsidy reduction is made to cover the budget deficit due to rising of oil prices.

Graph 5.4 : Response of Interest Rate to World Oil Price



Data is processed by using Eviews 6 (See Appendix 6)

At the beginning the interest rate response to world oil price shocks is significant positive until third period. In the next period, oil price shocks are negatively responsed by the interest rate. In the thirteenth period until the end period, it shows positive response to world oil price.

From the graph above, we can conclude that there is positive relationship between interest rate and world oil price. The increasing of world oil price imply as inflation, so the bank will increase the interest rate for avoiding bankruptcy.

5.1.7 Variance Decomposition

Variance decomposition aimed to measure the variance decomposition forecast error variance of a variable, that show big the difference before and after shocks, both derived from the variable itself to other variables. Variance decomposition is another tool to see the impact of each independent variable on the dependent variable. It describes strengths and weakness of the independent variable.

The result of variance decomposition tests toward oil price shocks can be seen in Appendix . In the first row respectively is a period, the standard error, and the next is the explanatory variable model, namely exchange rate, world oil price, gross domestic product, consumer price index, and interest rate . Interpretation of the results will be focused in looking at the variance decomposition of each variable to changes in world oil prices. Variance decomposition in Eviews obtained the following results.

1. Table 5.7 : Variance Decomposition of Exchange Rate

Period	S.E.	E	WOP	GDP	CPI	I
1	0.074140	100.0000	0.000000	0.000000	0.000000	0.000000
5	0.205488	78.93176	16.32280	1.636368	2.525489	0.583590
10	0.222479	71.61925	21.25819	2.888611	3.631011	0.602939
15	0.230668	69.55555	21.23692	3.877249	4.686022	0.644260
20	0.237667	69.47597	21.07045	4.281324	4.511597	0.660668

Data is processed by using Eviews 6 (See Appendix 7)

From the table 5.7 indicates that variable of exchange rate has the estimated error variance completely (100%). It is explained by itself in the first period while the other variables is 0%. Next, in the fifth period variable oil price has an influence of estimates of error variance as 16.32 %. The strong influence of world oil price always increase along the period. In the end of period the influence of world oil price to exchange rate decrease about 21.07%.

2. Table 5.8 : Variance Decomposition of Gross Domestic Product

Period	S.E.	E	WOP	GDP	CPI	I
1	0.051542	19.05066	5.338088	75.61125	0.000000	0.000000
5	0.158440	65.78480	12.35454	13.88114	6.586959	1.392565
10	0.177245	62.95788	14.75954	13.72980	7.289131	1.263653
15	0.193590	61.40767	17.90025	13.14350	6.359138	1.189436
20	0.197097	59.35359	17.72901	15.18598	6.452352	1.279061

Data is processed by using Eviews 6(See Appendix 7)

From the table above, at the first period the world oil price influence GDP about 5,33% and exchange rate about 19.05%, while the other variable is 0%.

Entering the fifth period, the influence of world oil price to GDP increase. The strong influence of variable world oil price always increase until the end of period, it is about 17.72%

3. Table 5.9 : Variance Decomposition of Consumer Price Index

Period	S.E.	E	WOP	GDP	CPI	I
1	0.110930	16.06780	56.01261	1.458485	26.46111	0.000000
5	0.164282	38.14301	29.52308	13.37262	16.31796	2.643327
10	0.171957	38.94122	29.85854	12.39809	16.29114	2.511018
15	0.176891	39.97938	30.04885	11.93207	15.64770	2.391999
20	0.177805	39.99414	29.90277	12.13249	15.58505	2.385550

Data is processed by using Eviews 6(See Appendix 7)

At the first period, the consumer price index variable is influenced by exchange rate, world oil price, gross domestic product, and itself. It is about 16.07%, 56.01%, 1.46%, and 26.46%, while the interest rate variable does not give effect. The world oil price shows the strong influence at the begining of period. After the next period, the influence of world oil price to consumer price index alway decrease until the end of period, it is only 29.90%.

4. Table 5.10 : Variance Decomposition of Interest Rate

Period	S.E.	E	WOP	GDP	CPI	I
1	7.997938	5.299853	0.232549	89.36508	0.244393	4.858128
5	18.85653	59.62012	8.266276	26.20517	2.674554	3.233876
10	20.84600	58.78827	11.57239	23.29623	3.354339	2.988772
15	21.13825	58.67891	12.13361	22.84172	3.413653	2.932108
20	21.28917	58.54484	12.48272	22.54333	3.535660	2.893446

Data is processed by using Eviews 6 (See Appendix 7)

From the table above, we can see that the interest rate variable is influenced by all variables at the first period, that is exchange rate as 5.30% , world oil price as 0.23%, gross domestic product as 89.37%, consumer price index as 0.24%, and itself as 4.86%. The estimates error variance of world oil price alway increase since the beginning of period until the end of period and it shows strong influence for interest rate.

CHAPTER VI

CONCLUSION AND RECOMMENDATION

6.1 Conclusion

This study uses a method of VAR (Vector Autoregression) to analyze the effect of world oil price fluctuations on Indonesian economy with indicators of exchange rate in Rp/U.S. dollar, Gross Domestic Product (GDP) in constant 2000 prices in units of billion U.S. dollar, inflation as measured by the consumer price index, and SBI's discount rate (one month), over the past 20 years, from 1991 to 2010. Indonesia assumes as small open economy, it is very vulnerable with the world economy shock.

Based on research results and discussion described in the previous chapter concludes as follows :

1. There are some factors affecting the fluctuation world oil price :
   a. Speculation motive.
      Speculation and investment-grade money entering the commodities market has attributed to the recent price increase. Speculation means that we have enough supply to support the demands of the market (Alaron, 2007). Some actors of the economy activity want to get the higher profit in this situation.
   b. The US dollar and interest rate (Fed Fun Rate)
      The changing status of the US dollar is another cause of the fluctuating price of oil in the US. Recently, interest rates have been low and the

value of the dollar has declined. Low rates encourage capital investment, and in turn growth will create a increase in supply. Barrels are priced in dollars all around the world, so when the dollar weakens, the price per barrel goes up due to the reducing revenues to OPEC producing countries. The combination of low rates and the decreasing dollar value have created high oil prices.

2. The impact of fluctuation world oil price to monetary stability in Indonesia :
   a. There is negative relationship between world oil price with exchange rate and gross domestic product. The inceasing of world oil price is indicated as world inflation, it will depreciate the rupiah. Beside that, the increase in oil price will reduce the GDP of Indonesia because increase in oil price will make increase in subsidy and the subsidy will reduce the APBN or budget state and also reduce the GDP in Indonesia.
   b. There is positive relationship between world oil price with consumer price index (inflation) and interest rate. By looking at impulse response functions of inflation and interest rate to oil price shocks, it shows positive relationhip between them. The higher of world oil price leads higher inflation and higher interest rate. When there is high inflation in a country, the central bank (Bank of Indonesia) should reduce the money supply. As we know, the relationship between money supply and interest rate is negative. The decreasing of money supply will lead the higher interest rate.

That's why the relationship between world oil price and interest rate is positive.

c. From the analysis explains that the transmission of international shock to domestic economy happen through the exchange rate. But, the effort of Bank Indonesia to reduce that shock cause the higher of interest rate. Beside that, the monetary policy has important rule in maintaining the stability of Indonesia economy. This policy shows the big action to improve economy growth and maintain price stability.

6.2 Recommendation

By looking at the significant influence of world oil price variable to domestic variables that makes unstable domestic economy. Bank Indonesia should anticipate on the fluctuation or changing of the variable in order it can stimulate the Indonesia economy.

The monetary policy is effective to improve the economic growth and maintain price stability. The expansionary monetary policy (increase money supply) can improve the economy activity when recession. In the other hand, the contractionary monetary policy (decrease money supply) can reduce the inflation when there is a boom in that country.

So, Bank Indonesia should be consistent with the policy that already performed. In other word, Bank Indonesia should focus with the planning framework and target that already operated. Beside that, the consistency in managing the policy will increase the public confidence to monetary policy in the future.

In addition, to anticipate the rising of world oil prices and maintain the state budget, the government should begin to reduce oil subsidies to avoid deficit. With the growing amount of fuel subsidies, the government's ability to finance various programs oriented to improving the welfare of the poor people such as education, health, infrastucture, and small medium enterprise (SME).

Besides the reduction of oil subsidies and oil price adjustments, a few steps that need to be done by government, among others, making energy savings firstly. Second, strictly supervise the flow of oil, both crude oil and refined oil. Third, monitor and resolve or suppress the smuggling of crude oil from oil fields to distribution channels. And the next step is conducting energy diversification, for example replacing petroleum use with natural gas, and so on. All of the decision has the consequences. It's expected to further strengthen and stimulate the national economy and improve social justice for all Indonesian people.

REFERENCE

Arif, M.Maula Al, and Tohari, Achmad, (2006), "*Peranan Kebijakan Moneter Dalam Menjaga Stabilitas Perekonomian Indonesia Sebagai Respon Terhadap Fluktuasi Perekonomian Dunia*", Buletin Ekonomi Moneter dan Perbankan Oktober 2006.

Agénor, P.-R., C.J. McDermott, and E.S. Prasad, (2000),"*Macroeconomic Fluctuations in Developing Countries: Some Stylized Facts*", World Bank Economic Review 14(2): 251-85.

Amano, A. Robert, and Van Norden, Simon (1993). *"Oil Prices and the Rise and Fall of the U.S. Real Exchange Rate"*. Working Paper : International Department , Bank of Canada, Ottawa, Ontario, Canada

Bank Indonesia (2001-2010). *"Laporan Tahunan BI" (Online).* HTTP: http://www.bi.go.id

Bernanke, Ben S., (2007), "*Globalization and Monetary Policy*", presented in Fourth Economic Summit, Stanford Institute for Economic Policy Research, Stanford, California, March 2, 2007.

Brown and Yucel. (1999). "*Globalization, Oil Price Shocks, and U.S Economic Activity*". Federal Reserve System. Southern Methodist University

Cologni, A, and Matteo Maner (2005). *"Oil Price, Inflation and Interest Rate in a Structural Cointegrated VAR Model for the G-7 Countries".* International Energy Market.

Cushman, D.O. and T.A. Zha .(1995), "*Identifying Monetary Policy in a Small Open Economy Under Flexible Exchange Rates*", Journal of Monetary Economics.

Desroches, Brigitte, (2004), *"The Transmission of World Shocks to Emerging-Market Countries: An Empirical Analysis"*, Bank of Canada Working Paper 2004-44.

Dungey, Mardi, (2001), "*International Shock and the Role of Domestic Policy in Australia*", Centre for Economic Policy Research Discussion Paper No. 443, Australian National University.

Energy Information Administration. www.eia.gov/petroleum

Ghosh, Neal, Varvares, Chris, and Morley, James (2004). *"The Effect of Oil Prices Shocks on Output".* Journal of Business Economics, Vol.44 No.4

Gujarati. (1995). *"Basic Econometric"*. McGraw-Hill. New York.

IMF , (2003), "*Global Financial Flows*", World Development Indicators.

Jimenez, J.F, (2001), "*Business Cycles in Small Open Economies : The Case of Costa Rica*", Working Paper No. 330.

Koesoema, Bambang Warih, (2002), "*Indonesia dalam proses Globalisasi berkaitan dengan kesiapan menghadapi AFTA, strategi pemberdayaan*

UKM (Usaha Kecil dan Menengah) dan Penegakan System Hukum (ekonomi)/ Law Enforcement"

Mankiw, Gregory, N. (2003), *Makroekonomi*, edisi kelima, Harvard University

Mishkin, Frederick S., (2007), "*Will Monetary Policy Become More Of A Science?*", NBER ; Working Paper 13566.

Morena, Nadya, (2011). *"World Oil Price Fluctuation Impact on Indonesia Economy"*. Thesis. International Economics, Andalas University

Norris, Era Dabla and Holger Floerkemeier , (2006), "*Transmission Mechanisms of Monetary Policy in Armenia: Evidence from VAR Analysis*", IMF Working Paper

Obstfeld, Maurice and Kenneth Rogoff, (2005), "*Global Current Account Imbalances and Exchange Rate Adjustments*", University of California & Harvard University.

Parrado, Eric, (2001), "*Effects of Foreign and Domestic Monetary Policy in Small Open Economi : The Case of Chile*", Central Bank of Chile, Working Papers No. 108.

Richard Clarida, Jordi Gali, and Mark Gertler, (2002), "*A Simple Framework for International Monetary Policy Analysis*", Journal of Monetary Economics 49: 879-904.

Rogoff, Kenneth, (2006), "Impact of Globalization On Monetary Policy", Harvard University.

Rose, Andrew K, (2006), "*A Stable International Monetary Sistem Emerges : Inflation Targeting Is Bretton Woods, Reversed*" , NBER; Working Paper 12711.

Razin, Assaf dan Prakash Loungani, (2005), "*Globalization and Inflation Output Tradeoffs*", NBER; Working Paper 1164.

Statistik Ekonomi Keuangan Indonesia. Bank Indonesia. (1991-2010)

Salvator, Dominick. (1997). *"International Economics"*. Wiley

Sims, Christopher.A, (1980), *"Comparison of Interwar and Postwar Cycles ; Monetarism Considered"*, NBER ; Working Paper 430.

Stiglitz, Joseph, (2002), "*Globalization and Its Discontents*", Penguin Books.

Smith, L. Lewis (2010). "*The Relation Between Oil Price and Economic Activity*". (Article)

Soediyono, Reksoprayitno. (2000). *"Pengantar Ekonomi Mikro"*.BPFE UI. Yogyakarta

Umar, Gunu, and Abdulhakeem, A Kilishi (2010). *"Oil Price Shocks and the Nigeria Economy : A Variance Autoregressive (VAR) Model"*. International Journal of Business and Management, Vol 5, No.8.

Woodford, Michael, (2007), "*Globalization and Monetary Control*", NBER; Working Paper 13329.

Wikipedia. *"Vector Autoregression (VAR)"*. www.wikipedia.com

APPENDIX

APPENDIX 1 : STATIONARY TEST

Exchange Rate (E)

I(0) - Intercept

Null Hypothesis: E has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic based on SIC, MAXLAG=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.893831	0.3278
Test critical values:	1% level	-3.831511	
	5% level	-3.029970	
	10% level	-2.655194	

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

I(0) – Trend and Intercept

Null Hypothesis: E has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic based on SIC, MAXLAG=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.984943	0.9223
Test critical values:	1% level	-4.532598	
	5% level	-3.673616	
	10% level	-3.277364	

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

I(0) – None

Null Hypothesis: E has a unit root
Exogenous: None
Lag Length: 0 (Automatic based on SIC, MAXLAG=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		1.619503	0.9692
Test critical values:	1% level	-2.692358	
	5% level	-1.960171	
	10% level	-1.607051	

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

I(1) – Intercept

Null Hypothesis: D(E) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic based on SIC, MAXLAG=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.515282	0.0199
Test critical values:	1% level	-3.857386	
	5% level	-3.040391	
	10% level	-2.660551	

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

I(1) – Trend and Intercept

Null Hypothesis: D(E) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 4 (Automatic based on SIC, MAXLAG=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.522586	0.0156
Test critical values:	1% level	-4.800080	
	5% level	-3.791172	
	10% level	-3.342253	

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

I(1) – None

Null Hypothesis: D(E) has a unit root
Exogenous: None
Lag Length: 0 (Automatic based on SIC, MAXLAG=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.299170	0.0025
Test critical values:	1% level	-2.699769	
	5% level	-1.961409	
	10% level	-1.606610	

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

I(2) – Intercept

Null Hypothesis: D(E,2) has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic based on SIC, MAXLAG=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.778507	0.0020
Test critical values:	1% level	-3.920350	
	5% level	-3.065585	
	10% level	-2.673459	

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

I(2) – Trend and Intercept

Null Hypothesis: D(E,2) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic based on SIC, MAXLAG=4)

		t-Statistic	Prob.*

Augmented Dickey-Fuller test statistic		-4.643426	0.0104
Test critical values:	1% level	-4.667883	
	5% level	-3.733200	
	10% level	-3.310349	

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

I(2) – None

Null Hypothesis: D(E,2) has a unit root
Exogenous: None
Lag Length: 1 (Automatic based on SIC, MAXLAG=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.945094	0.0001
Test critical values:	1% level	-2.717511	
	5% level	-1.964418	
	10% level	-1.605603	

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

World Oil Price (WOP)

I(0) - Intercept

Null Hypothesis: WOP has a unit root
Exogenous: Constant
Lag Length: 2 (Automatic based on SIC, MAXLAG=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		0.116520	0.9572
Test critical values:	1% level	-3.886751	
	5% level	-3.052169	
	10% level	-2.666593	

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

I(0) – Trend and Intercept

Null Hypothesis: WOP has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic based on SIC, MAXLAG=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.775902	0.0415
Test critical values:	1% level	-4.532598	
	5% level	-3.673616	
	10% level	-3.277364	

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

I(0) – None

Null Hypothesis: WOP has a unit root
Exogenous: None
Lag Length: 2 (Automatic based on SIC, MAXLAG=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		1.769554	0.9762
Test critical values:	1% level	-2.708094	
	5% level	-1.962813	
	10% level	-1.606129	

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

I(1) – Intercept

Null Hypothesis: D(WOP) has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic based on SIC, MAXLAG=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.156650	0.0008
Test critical values:	1% level	-3.886751	
	5% level	-3.052169	
	10% level	-2.666593	

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

I(1) – Trend and Intercept

Null Hypothesis: D(WOP) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic based on SIC, MAXLAG=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.216277	0.0034
Test critical values:	1% level	-4.616209	
	5% level	-3.710482	
	10% level	-3.297799	

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

I(1) – None

Null Hypothesis: D(WOP) has a unit root
Exogenous: None
Lag Length: 0 (Automatic based on SIC, MAXLAG=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.385017	0.0000
Test critical values:	1% level	-2.699769	
	5% level	-1.961409	
	10% level	-1.606610	

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

I(2) – Intercept

Null Hypothesis: D(WOP,2) has a unit root
Exogenous: Constant
Lag Length: 3 (Automatic based on SIC, MAXLAG=4)

	t-Statistic	Prob.*

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.456338	0.0045
Test critical values:	1% level	-4.004425	
	5% level	-3.098896	
	10% level	-2.690439	

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

I(2) – Trend and Intercept

Null Hypothesis: D(WOP,2) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 3 (Automatic based on SIC, MAXLAG=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.170353	0.0274
Test critical values:	1% level	-4.800080	
	5% level	-3.791172	
	10% level	-3.342253	

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

I(2) – None

Null Hypothesis: D(WOP,2) has a unit root
Exogenous: None
Lag Length: 3 (Automatic based on SIC, MAXLAG=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.698608	0.0002
Test critical values:	1% level	-2.740613	
	5% level	-1.968430	
	10% level	-1.604392	

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

Gross Domestic Product (GDP)

I(0) – Intercept

Null Hypothesis: GDP has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic based on SIC, MAXLAG=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.064022	0.9404
Test critical values:	1% level	-3.831511	
	5% level	-3.029970	
	10% level	-2.655194	

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

I(0) – Trend and Intercept

Null Hypothesis: GDP has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic based on SIC, MAXLAG=4)

		t-Statistic	Prob.*

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-1.411042	0.8235
Test critical values: 1% level	-4.532598	
5% level	-3.673616	
10% level	-3.277364	

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

I(0) – None

Null Hypothesis: GDP has a unit root
Exogenous: None
Lag Length: 0 (Automatic based on SIC, MAXLAG=4)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	1.648283	0.9708
Test critical values: 1% level	-2.692358	
5% level	-1.960171	
10% level	-1.607051	

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

I(1) – Intercept

Null Hypothesis: D(GDP) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic based on SIC, MAXLAG=4)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.296580	0.0041
Test critical values: 1% level	-3.857386	
5% level	-3.040391	
10% level	-2.660551	

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

I(1) – Trend and Intercept

Null Hypothesis: D(GDP) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic based on SIC, MAXLAG=4)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-3.561548	0.0645
Test critical values: 1% level	-4.616209	
5% level	-3.710482	
10% level	-3.297799	

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

I(1) – None

Null Hypothesis: D(GDP) has a unit root
Exogenous: None
Lag Length: 0 (Automatic based on SIC, MAXLAG=4)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-3.846991	0.0007
Test critical values: 1% level	-2.699769	

	5% level	-1.961409	
	10% level	-1.606610	

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

I(2) – Intercept

Null Hypothesis: D(GDP,2) has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic based on SIC, MAXLAG=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.256905	0.0008
Test critical values:	1% level	-3.920350	
	5% level	-3.065585	
	10% level	-2.673459	

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

I(2) – Trend and Intercept

Null Hypothesis: D(GDP,2) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic based on SIC, MAXLAG=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.086023	0.0049
Test critical values:	1% level	-4.667883	
	5% level	-3.733200	
	10% level	-3.310349	

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

I(2) – None

Null Hypothesis: D(GDP,2) has a unit root
Exogenous: None
Lag Length: 1 (Automatic based on SIC, MAXLAG=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.452492	0.0000
Test critical values:	1% level	-2.717511	
	5% level	-1.964418	
	10% level	-1.605603	

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

Consumer Price Index (CPI)

I(0) – Intercept

Null Hypothesis: CPI has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic based on SIC, MAXLAG=4)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-2.492546	0.1326

Test critical values:	1% level	-3.831511	
	5% level	-3.029970	
	10% level	-2.655194	

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

I(0) – Trend and Intercept

Null Hypothesis: CPI has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic based on SIC, MAXLAG=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.650172	0.2648
Test critical values:	1% level	-4.532598	
	5% level	-3.673616	
	10% level	-3.277364	

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

I(0) – None

Null Hypothesis: CPI has a unit root
Exogenous: None
Lag Length: 0 (Automatic based on SIC, MAXLAG=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.153364	0.6176
Test critical values:	1% level	-2.692358	
	5% level	-1.960171	
	10% level	-1.607051	

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

I(1) – Intercept

Null Hypothesis: D(CPI) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic based on SIC, MAXLAG=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.667162	0.0019
Test critical values:	1% level	-3.857386	
	5% level	-3.040391	
	10% level	-2.660551	

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

I(1) – Trend and Intercept

Null Hypothesis: D(CPI) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic based on SIC, MAXLAG=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.615577	0.0092
Test critical values:	1% level	-4.571559	
	5% level	-3.690814	

	10% level	-3.286909	

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

I(1) – None

Null Hypothesis: D(CPI) has a unit root
Exogenous: None
Lag Length: 0 (Automatic based on SIC, MAXLAG=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.808933	0.0001
Test critical values:	1% level	-2.699769	
	5% level	-1.961409	
	10% level	-1.606610	

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

I(2) – Intercept

Null Hypothesis: D(CPI,2) has a unit root
Exogenous: Constant
Lag Length: 4 (Automatic based on SIC, MAXLAG=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.950956	0.0120
Test critical values:	1% level	-4.057910	
	5% level	-3.119910	
	10% level	-2.701103	

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

I(2) – Trend and Intercept

Null Hypothesis: D(CPI,2) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 4 (Automatic based on SIC, MAXLAG=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.603245	0.0703
Test critical values:	1% level	-4.886426	
	5% level	-3.828975	
	10% level	-3.362984	

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

I(2) – None

Null Hypothesis: D(CPI,2) has a unit root
Exogenous: None
Lag Length: 4 (Automatic based on SIC, MAXLAG=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.248424	0.0004
Test critical values:	1% level	-2.754993	
	5% level	-1.970978	
	10% level	-1.603693	

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

Domestic Interest Rate (I)

I(0) – Intercept

Null Hypothesis: I has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic based on SIC, MAXLAG=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.551136	0.0178
Test critical values:	1% level	-3.831511	
	5% level	-3.029970	
	10% level	-2.655194	

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

I(0) – Trend and Intercept

Null Hypothesis: I has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic based on SIC, MAXLAG=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.837518	0.0371
Test critical values:	1% level	-4.532598	
	5% level	-3.673616	
	10% level	-3.277364	

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

I(0) – None

Null Hypothesis: I has a unit root
Exogenous: None
Lag Length: 0 (Automatic based on SIC, MAXLAG=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.144508	0.0340
Test critical values:	1% level	-2.692358	
	5% level	-1.960171	
	10% level	-1.607051	

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

I(1) – Intercept

Null Hypothesis: D(I) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic based on SIC, MAXLAG=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.395450	0.0001
Test critical values:	1% level	-3.857386	
	5% level	-3.040391	
	10% level	-2.660551	

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

I(1) – Trend and Intercept

Null Hypothesis: D(I) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic based on SIC, MAXLAG=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.205149	0.0005
Test critical values:	1% level	-4.571559	
	5% level	-3.690814	
	10% level	-3.286909	

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

I(1) – None

Null Hypothesis: D(I) has a unit root
Exogenous: None
Lag Length: 0 (Automatic based on SIC, MAXLAG=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.575812	0.0000
Test critical values:	1% level	-2.699769	
	5% level	-1.961409	
	10% level	-1.606610	

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

I(2) – Intercept

Null Hypothesis: D(I,2) has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic based on SIC, MAXLAG=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.914726	0.0002
Test critical values:	1% level	-3.920350	
	5% level	-3.065585	
	10% level	-2.673459	

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

I(2) – Trend and Intercept

Null Hypothesis: D(I,2) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic based on SIC, MAXLAG=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.687716	0.0018
Test critical values:	1% level	-4.667883	
	5% level	-3.733200	
	10% level	-3.310349	

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

I(2) – None

Null Hypothesis: D(I,2) has a unit root
Exogenous: None
Lag Length: 1 (Automatic based on SIC, MAXLAG=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.137592	0.0000
Test critical values:	1% level	-2.717511	
	5% level	-1.964418	
	10% level	-1.605603	

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

APPENDIX 2 : JOHANSEN COINTEGRATION TEST

Date: 02/02/12 Time: 15:41
Sample (adjusted): 1993 2010
Included observations: 18 after adjustments
Trend assumption: Linear deterministic trend
Series: E WOP GDP CPI I
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.930600	98.48318	69.81889	0.0001
At most 1 *	0.816756	50.46149	47.85613	0.0000
At most 2 *	0.527656	39.91667	29.79707	0.0022
At most 3 *	0.258719	36.41579	15.49471	0.0284
At most 4 *	0.255460	21.02704	3.841466	0.0121

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values
Data is processed by using Eviews 6

APPENDIX 3 : LAG LENGTH SELECTION

VAR Lag Order Selection Criteria
Endogenous variables: E WOP GDP CPI I
Exogenous variables: C
Date: 02/02/12 Time: 15:48
Sample: 1991 2010
Included observations: 18

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-32.91771	NA	4.65e-05	4.213078	4.460404	4.247181
1	41.71565	99.51114*	2.14e-07	-1.301739	0.182214	-1.097122
2	88.95509	36.74179	4.28e-08*	-3.772788*	-1.052207*	-3.397656*

* 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 4 : GRANGER CAUSALITY

Pairwise Granger Causality Tests
Date: 02/02/12 Time: 13:00
Sample: 1991 2010
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
WOP does not Granger Cause E	18	4.13205	0.0408
E does not Granger Cause WOP		0.17403	0.1222
GDP does not Granger Cause E	18	11.8840	0.0015
E does not Granger Cause GDP		0.97302	0.4311
CPI does not Granger Cause E	18	4.71701	0.0565
E does not Granger Cause CPI		0.64521	0.1307
I does not Granger Cause E	18	5.26807	0.0140
E does not Granger Cause I		10.0819	0.0023
GDP does not Granger Cause WOP	18	0.50332	0.6158
WOP does not Granger Cause GDP		4.41070	0.0290
CPI does not Granger Cause WOP	18	1.38079	0.2859
WOP does not Granger Cause CPI		5.05719	0.0074
I does not Granger Cause WOP	18	0.87003	0.4420
WOP does not Granger Cause I		4.59547	0.0457
CPI does not Granger Cause GDP	18	3.67312	0.0166
GDP does not Granger Cause CPI		2.71682	0.1033
I does not Granger Cause GDP	18	0.13379	0.8760
GDP does not Granger Cause I		0.21758	0.8073
I does not Granger Cause CPI	18	1.21484	0.3283
CPI does not Granger Cause I		1.17002	0.3410

APPENDIX 5 : VAR ESTIMATION

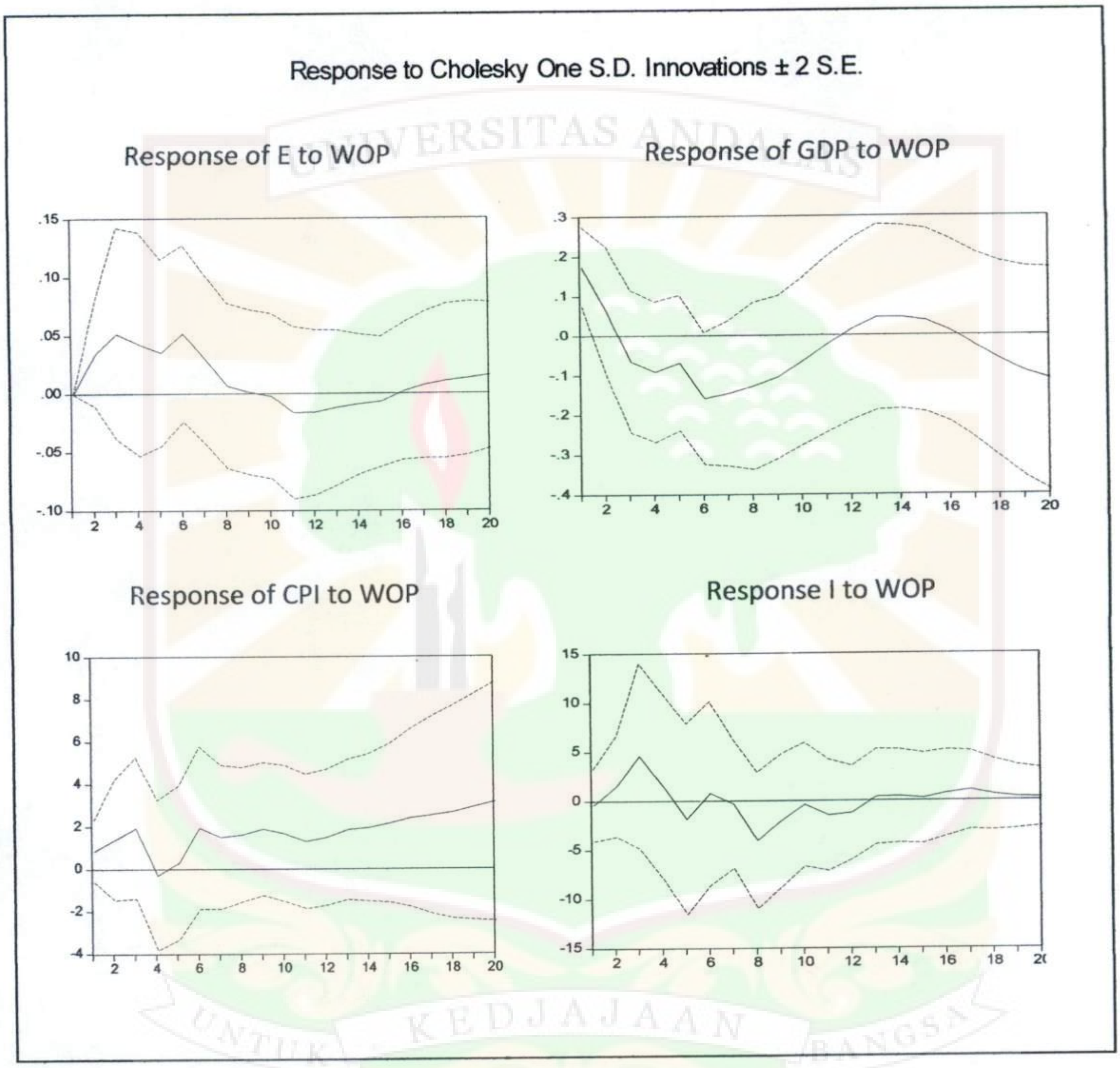
Vector Autoregression Estimates
Date: 02/02/12 Time: 16:03
Sample (adjusted): 1993 2010
Included observations: 18 after adjustments
Standard errors in ( ) & t-statistics in [ ]

	E	WOP	GDP	CPI	I
E(-1)	1.436402	-1.083601	-1.237447	0.492050	175.4931
	(0.37754)	(0.56711)	(0.27087)	(0.52495)	(41.1209)
	[0.80459]	[-1.91074]	[-1.56838]	[1.93733]	[4.26774]
E(-2)	-0.670848	1.740062	1.237228	-0.386190	-177.3128
	(0.32848)	(0.49342)	(0.23567)	(0.45673)	(35.7774)
	[0.04225]	[1.52655]	[1.24975]	[-0.84555]	[-1.95600]
WOP(-1)	0.406989	-0.637326	-0.015269	-0.135485	14.21790
	(0.24266)	(0.36451)	(0.17410)	(0.33741)	(26.4301)
	[-2.67718]	[-1.74847]	[-3.08770]	[-0.40155]	[2.53794]
WOP(-2)	-0.341714	0.267110	0.358710	0.181334	-59.82524
	(0.27687)	(0.41589)	(0.19865)	(0.38497)	(30.1562)
	[-1.23419]	[0.64226]	[1.80578]	[3.47103]	[-1.98384]
GDP(-1)	0.298830	2.389109	0.585095	-1.471110	-24.90920
	(1.24814)	(1.87484)	(0.89549)	(1.73545)	(135.944)
	[2.23942]	[1.27430]	[0.65338]	[-2.84768]	[-0.18323]
GDP(-2)	-0.057629	-1.606493	0.037497	1.031188	72.65252
	(1.07631)	(1.61673)	(0.77221)	(1.49653)	(117.228)
	[-1.15354]	[-0.99367]	[0.04856]	[0.68905]	[0.61975]
CPI(-1)	-0.077835	-0.042804	0.143559	0.470729	-5.350023
	(0.25845)	(0.38822)	(0.18543)	(0.35936)	(28.1495)
	[-1.30116]	[-0.11026]	[0.77421]	[1.30992]	[-0.19006]
CPI(-2)	0.457823	-1.081348	-0.336804	-0.313219	36.26755
	(0.25262)	(0.37947)	(0.18125)	(0.35126)	(27.5150)
	[2.81227]	[-1.84964]	[-1.85825]	[-0.89171]	[1.31810]
I(-1)	0.012866	0.011432	0.003315	-0.011423	-0.750625
	(0.00753)	(0.01132)	(0.00541)	(0.01048)	(0.82062)
	[3.38042]	[1.01014]	[0.61332]	[-1.09037]	[-0.91471]
I(-2)	0.011208	-0.012361	0.000388	0.003423	0.043564
	(0.00345)	(0.00519)	(0.00248)	(0.00480)	(0.37604)
	[1.35002]	[-0.45525]	[0.15670]	[0.71303]	[0.11585]
C	-0.683988	0.043616	0.867041	2.566078	-88.52436
	(0.88152)	(1.32414)	(0.63245)	(1.22569)	(96.0124)
	[-0.77592]	[0.03294]	[1.37091]	[2.09358]	[-0.92201]
R-squared	0.958250	0.925223	0.972696	0.838992	0.938226
Adj. R-squared	0.898606	0.818398	0.933691	0.723265	0.807120
Sum sq. Resids	0.048310	0.109002	0.024867	0.093397	573.0929
S.E. equation	0.083075	0.124787	0.059603	0.115509	9.048227
F-statistic	16.06628	8.661134	24.93736	18.23901	8.627024
Log likelihood	-27.74351	-20.41992	-33.72026	-21.81053	-56.68698
Akaike AIC	1.860390	1.046658	2.524473	1.201170	7.520775
Schwarz SC	1.316274	0.502542	1.980357	3.657054	8.064891
Mean dependent	3.802222	1.469444	2.387222	2.192222	15.24556
S.D. dependent	0.260893	0.292825	0.231461	0.123362	14.43556

Determinant resid covariance (dof adj.)	3.94E-09
Determinant resid covariance	3.51E-11

Log likelihood	-88.95509
Akaike information criterion	3.772788
Schwarz criterion	1.052207

APPENDIX 6 : IMPULSE RESPONSE FUNCTION



APPENDIX 7 : VARIANCE DECOMPOSITION

1. Variance Decomposition of Exchange Rate

Period	S.E.	E	WOP	GDP	CPI	I
1	0.074140	100.0000	0.000000	0.000000	0.000000	0.000000
2	0.152349	94.86436	4.985950	0.034920	0.009568	0.105202
3	0.175394	85.55295	12.42341	0.971465	0.295612	0.756558

4	0.192985	81.02727	15.15317	1.235896	1.941355	0.642314
5	0.205488	78.93176	16.32280	1.636368	2.525489	0.583590
6	0.214038	73.78122	20.93082	1.511203	3.223519	0.553239
7	0.217279	71.71019	22.17687	1.921841	3.633074	0.558029
8	0.218356	71.19616	22.05578	2.544778	3.640524	0.562765
9	0.219831	71.32619	21.76453	2.668419	3.645603	0.595256
10	0.222479	71.61925	21.25819	2.888611	3.631011	0.602939
11	0.226039	71.26611	21.11208	3.263598	3.758672	0.599532
12	0.228073	70.69472	21.22091	3.457537	4.032561	0.594264
13	0.229342	70.22280	21.24781	3.573070	4.333526	0.622797
14	0.230012	69.82781	21.27211	3.736026	4.531668	0.632388
15	0.230668	69.55555	21.23692	3.877249	4.686022	0.644260
16	0.231575	69.59684	21.07778	3.953138	4.722283	0.649957
17	0.232754	69.65390	20.96701	4.024709	4.691881	0.662492
18	0.234363	69.69979	20.89922	4.113054	4.627703	0.660231
19	0.236058	69.66849	20.91228	4.194973	4.563289	0.660968
20	0.237667	69.47597	21.07045	4.281324	4.511597	0.660668

2. Variance Decomposition of Gross Domestic Product

Period	S.E.	E	WOP	GDP	CPI	I
1	0.051542	19.05066	5.338088	75.61125	0.000000	0.000000
2	0.117337	82.58379	2.161325	14.71461	0.189776	0.350498
3	0.142154	75.14634	8.436176	15.58171	0.590355	0.245415
4	0.149768	68.02021	12.57670	15.29090	3.791426	0.320762
5	0.158440	65.78480	12.35454	13.88114	6.586959	1.392565
6	0.162004	63.28889	13.70314	14.49296	7.178945	1.336063
7	0.166537	60.84766	15.25207	14.59675	8.030767	1.272749
8	0.169195	61.50159	15.08546	14.14718	7.986553	1.279216
9	0.171944	61.68047	15.20837	14.03533	7.735819	1.340017
10	0.177245	62.95788	14.75954	13.72980	7.289131	1.263653
11	0.182481	63.83172	14.96145	13.08793	6.879499	1.239394
12	0.187545	63.24654	16.33463	12.59725	6.626712	1.194870
13	0.190227	62.59323	16.96230	12.73076	6.524340	1.189377
14	0.192366	62.04041	17.44821	12.91264	6.432970	1.165770
15	0.193590	61.40767	17.90025	13.14350	6.359138	1.189436
16	0.194481	60.84760	18.12949	13.52426	6.302032	1.196623
17	0.195176	60.44557	18.05070	14.00386	6.283691	1.216168
18	0.195784	60.09063	17.96343	14.40903	6.309003	1.227901
19	0.196453	59.73607	17.84522	14.77751	6.377950	1.263257
20	0.197097	59.35359	17.72901	15.18598	6.452352	1.279061

3. Variance Decomposition of Consumer Price Index

Period	S.E.	E	WOP	GDP	CPI	I
1	0.110930	16.06780	56.01261	1.458485	26.46111	0.000000
2	0.131204	22.14511	40.58063	10.09525	24.58086	2.598154
3	0.152041	38.58904	30.48330	10.44074	18.47215	2.014762
4	0.162286	37.65734	29.95049	13.50491	16.22559	2.661663
5	0.164282	38.14301	29.52308	13.37262	16.31796	2.643327
6	0.164605	38.07517	29.40851	13.33337	16.51351	2.669442
7	0.167036	37.09848	30.47101	13.04557	16.77352	2.611420

8	0.169177	38.00247	30.02511	12.73476	16.69177	2.545886
9	0.170475	38.63890	29.81950	12.54426	16.44382	2.553526
10	0.171957	38.94122	29.85854	12.39809	16.29114	2.511018
11	0.173386	39.56429	29.61411	12.25876	16.09276	2.470077
12	0.175375	40.15428	29.64354	11.98604	15.80156	2.414592
13	0.176279	40.10673	29.91939	11.87283	15.69443	2.406620
14	0.176730	40.03695	30.01629	11.88460	15.66778	2.394376
15	0.176891	39.97938	30.04885	11.93207	15.64770	2.391999
16	0.177056	39.92192	30.10749	11.95767	15.62372	2.389210
17	0.177281	39.97693	30.03850	12.01102	15.58465	2.388903
18	0.177469	39.99505	29.98222	12.07417	15.56436	2.384196
19	0.177662	40.00308	29.93794	12.10099	15.57259	2.385386
20	0.177805	39.99414	29.90277	12.13249	15.58505	2.385550

4. Variance Decomposition of Interest Rate

Period	S.E.	E	WOP	GDP	CPI	I
1	7.997938	5.299853	0.232549	89.36508	0.244393	4.858128
2	15.64681	67.06526	1.027241	29.59291	0.093397	2.221191
3	16.93491	60.66513	8.302466	27.97962	0.362700	2.690089
4	18.32172	63.01180	7.798349	24.20354	2.683887	2.302424
5	18.85653	59.62012	8.266276	26.20517	2.674554	3.233876
6	19.30018	59.67423	8.067083	26.23377	2.751158	3.273757
7	19.91635	62.02574	7.596782	24.63996	2.590509	3.147013
8	20.53621	59.40041	10.94666	23.80537	2.818451	3.029119
9	20.74105	58.57412	11.66102	23.48468	3.307733	2.972446
10	20.84600	58.78827	11.57239	23.29623	3.354339	2.988772
11	20.92011	58.47617	11.96342	23.21968	3.360699	2.980040
12	20.98550	58.31586	12.20874	23.08299	3.427636	2.964769
13	21.04572	58.41970	12.17641	23.03774	3.415120	2.951037
14	21.08000	58.49161	12.18464	22.96811	3.412765	2.942873
15	21.13825	58.67891	12.13361	22.84172	3.413653	2.932108
16	21.20931	58.78079	12.18513	22.70287	3.418519	2.912680
17	21.26061	58.65082	12.38264	22.60191	3.465953	2.898673
18	21.27731	58.58512	12.44295	22.56693	3.510341	2.894658
19	21.28397	58.55830	12.46467	22.55285	3.529393	2.894789
20	21.28917	58.54484	12.48272	22.54333	3.535660	2.893446

APPENDIX 8 : OBSERVED DATA

Year	E (Rp/USD)	WOP (Dollar/Barrel)	GDP (Billion USD)	CPI	I (%)
1991	1992	18,41	128,17	128,6	20,5
1992	2062	18,14	139,12	135,08	18,00
1993	2110	13,73	158,01	148,83	13,49
1994	2200	15,93	176,89	163,17	12,44

1995	2308	17,93	202,13	177,83	14,74
1996	2383	23,78	227,37	189,62	13,99
1997	4650	17,18	215,75	111,79	22,00
1998	8025	9,82	95,45	198,47	70,81
1999	7100	25,47	140,00	202,45	11,93
2000	9595	25,66	165,02	221,37	14,53
2001	10400	18,71	160,45	249,15	17,62
2002	8940	28,33	195,66	274,13	12,93
2003	8465	29,81	234,77	109,83	8,31
2004	9290	39,6	256,84	116,86	7,43
2005	9830	56,86	285,87	136,86	12,75
2006	9020	62,47	364,57	145,89	9,75
2007	9419	90,93	431,93	155,5	8,00
2008	10950	39,95	514,39	113,86	10,98
2009	9400	74,46	539,35	117,03	6,46
2010	8991	91,45	706,558	125,17	6,26

APPENDIX 9: OBSERVED DATA (IN LOGARITHM)

Year	E (Rp/USD)	WOP (Dollar/Barrel)	GDP (Billion USD)	CPI	I (%)
1991	3,299289	1,265054	2,107786	2,109241	20,5
1992	3,314289	1,258637	2,14339	2,130591	18,00
1993	3,324282	1,137671	2,198685	2,17269	13,49
1994	3,342423	1,202216	2,247703	2,21264	12,44
1995	3,363236	1,25358	2,305631	2,250005	14,74
1996	3,377124	1,376212	2,356733	2,277884	13,99
1997	3,667453	1,235023	2,333951	2,048403	22,00
1998	3,904445	0,992111	1,979776	2,297695	70,81
1999	3,851258	1,406029	2,146128	2,306318	11,93
2000	3,982045	1,409257	2,217537	2,345119	14,53
2001	4,017033	1,272074	2,20534	2,396461	17,62
2002	3,951338	1,452247	2,291502	2,437957	12,93
2003	3,927627	1,474362	2,370643	2,040721	8,31
2004	3,968016	1,597695	2,409663	2,067666	7,43
2005	3,992554	1,754807	2,456169	2,136277	12,75
2006	3,955207	1,795672	2,561781	2,164026	9,75

2007	3,974005	1,958707	2,635413	2,19173	8,00
2008	4,039414	1,601517	2,711293	2,056371	10,98
2009	3,973128	1,871923	2,731871	2,068297	6,46
2010	3,953808	1,961184	2,849148	2,0975	6,26

Sources :

Exchange rate (E) : SEKI, Bank Indonesia

World Oil Price (WOP) : www.eia.doe.gov

(Europe Brent Spot Price FOB)

Gross Domestic Product (GDP) : www.indexmundi.com

(GDP constant 2000)

Consumer Price Index (CPI) : SEKI, Bank Indonesia

SBI rate – 1 month (I) : SEKI, Bank Indonesia