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WORLD OIL PRICE FLUCTUATION IMPACT ON INDONESIAN ECONOMY

THESIS

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بسم الله الرحمن الرحيم

Allah will answer your prayers. Maybe not always with a Yes, but always with the Best!

"This thesis is dedicated to
my grandparents who passed away,
and to my beloved parents"

It's really hard to put into words what I feel, since I've been through a very long road to graduate...

My biggest thank is for My Lord, Allah SWT,

for Your amazing bless, Your curing love, and

for Your answers to all of my prayer and my complain.

Praise be to Allah, the Lord of the Worlds.

And I thank myself,

After all of those ups and downs,

After all of those laughs and cries,

Thanks for not being buried in despair.

Last, the Show still goes on, Nadya! ♥♥♥

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World Oil Price Fluctuation Impact on Indonesian Economy

Thesis by: Nadya Morena

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ABSTRACT

Oil price has been highly volatile since the end of World War II. The volatily becomes even more serious in recent time. This has implication for the economies of Indonesia as oil importing country. This thesis analyzes the world oil price fluctuation impact on Indonesian economy using Vector Autoregression (VAR), in range year of 1991-2010. Variable used are world oil price, Gross Domestic Product constant 2000, Consumer Price Index (CPI) as inflation, the value of oil's export and import. The results show that oil price have significant impact on Indonesian economy. The negative relationship between oil price with GDP, and the positive relationship appear among oil price with inflation, and the value of oil's export and import. The finding signifies the presence of asymmetric relationship between oil price changes and the economy.

Keywords : World Oil price fluctuation, macroeconomic variables, vector-autoregression

This thesis has been presented before the examiners in the Thesis Examination and succesfully passed the Thesis Examination on August, 11th 2011. The abstract has been approved by the advisor and the examiners :

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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 "**World Oil Price Fluctuation Impact on Indonesia Economy**" has finally been accomplished on time and without matter problem. Everything happens gives a very meaningful lesson.

This thesis is submitted as a partial requirement to acquire Bachelor Degree at Economic Department of Economic Faculty of Andalas University. The reasons lying behind the chosen of this title are; firstly, Crude Oil plays more important role in the national economy, and it's regarded as "the blood" industry. Secondly, Despite the fact that Indonesia is exporting country, the country also imports oil from other countries. Last, The Surplus of importing value over the exporting value makes Indonesia as "a net importing country". From these background, the aim to this study is to examine the impact of world oil price fluctuation on Indonesian Economy.

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 benefits to anyone who read it, especially to academicians and students.

Padang, August 2011

Nadya Morena

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

Finally, after going through a long period process and hard work, my thesis entitled "World Oil Price Fluctuation Impact on Indonesian Economy" 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.

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Padang, August 2011

Nadya Morena

CHAPTER I

INTRODUCTION

1. 1 Background

Increasing in the world oil prices recently been highlighted in all countries of the world, particularly for oil importing countries. 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.

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 increase in world oil prices are caused 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 increase in oil prices will impact on some economic aspects of a nation. In company with the speed-up of the process of world industrialization, crude oil plays more important role in the national economy, and it's regarded as "the blood" industry and "black gold". So the impacts of oil price have on fluctuation the development of national economy is inevitably valued by economists in all countries (Jian, Gao 2005).

The influences oil price fluctuation has on national economy are in many aspects, and as there are different time lagged lagging effects when oil price fluctuation influences different aspects of national economy (GDP); the direct and indirect influences crude oil price fluctuation has on national economy should be

considered synthetically, generally speaking to most countries the indirect influence caused by oil price would reflect in one year and a half to two years.

Most countries are concerned about the effects of changes in crude oil prices on macroeconomic their performances. Their concerns are accentuated by the fact that crude oil prices fluctuated vehemently in recent year. The period since mid-2004 is a dramatic increase witnessed in crude oil prices substantially in the world market. For example, the crude oil prices increased from US$19 per barrel in 1993 to US$27 per barrel in 2003. In October 2004, it reached US$43 and in 2005 it went up to US$ 59 per barrel, and continues Increasing exceeding US$68 in July 2006, culminating in 2008's meteoric rise of crude oil prices to near US$133 per barrel as of mid-year (West Texas Intermediate).

Besides the increase in crude oil prices, in 2009 a decline in crude oil prices reached the lowest point in early January for US$40 per barrel and then rising gradually from month to month till the year of 2010 that crude oil prices near US$88 per barrel on December 2010. The increasing in crude oil prices are predicted continue to increase over upheaval that occurred in the Middle Eastern countries such as Libya, Egypt, and Algeria.

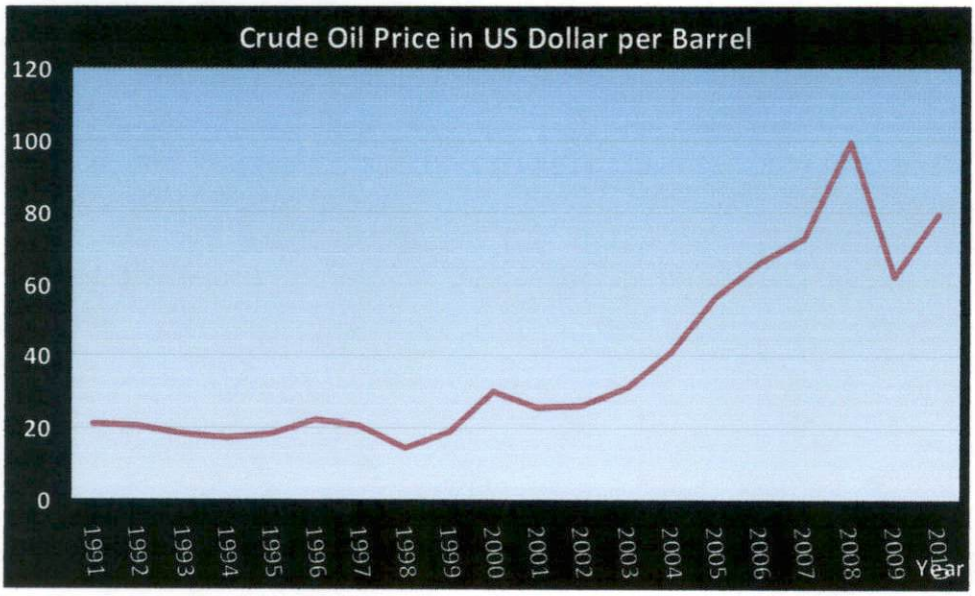
Crude oil price have been very volatile since 1991. Spikes from January 1991 there is fluctuation up and down towards crude oil price are because of the following factors: (i) OPEC restricted crude oil production and there is greater cooperation among its members; (ii) Asian growing oil demand signifying recovery from crisis; (iii) shrinking non-OPEC production (Gunu Umar, 2010); (iv) the price of oil, gold, and other commodities are determined by exchange rate,

in this case in US Dollar. The inflation of US Dollar causes the increasing in world oil prices (Harun, M, Vice President of Pertamina).

As an oil exporting country's organization or known as OPEC (1965) plays a role on the world oil price fluctuations that occur at this time. OPEC gave a huge influence on world oil pricing, because this organization consists of several countries at once world oil producers largest and the oil exporter to various countries.

Surge in world oil prices (Oil Price Shock) have occurred several times, first in the year 1973/1974 as a result of the boycott action of OPEC countries (Middle East) which is the conflict with Israel that led to the world economic recession. Meanwhile, the second oil shock occurred in the year 1979/1980 due to the high demand for oil in many countries. And the third spike occurred in 2008 which reached the highest point in world oil prices to US$133 per barrel (www.eia.org).

Graph 1.1 : Crude Oil Price 1991-2010



Source : *West Texas Intermediate (www.wti.gov/petroleum)*

Growth in world oil prices since 1991 shows an upward trend, even a fairly sharp surge occurred in recent years (graph 1.1). Development of a fluctuating oil prices are highly influential in national economy of Indonesia. Rising oil prices could provide additional revenue for the government (windfall profits), but at the same time will cause swelling of the burden of government subsidies. Furthermore, rising oil prices (in this case is the price of fuel), would raise the cost of production inputs in turn will affect the domestic price level.

By the net, the impact of higher oil prices will cause budget deficit by the central government. Therefore, persistent increases in oil prices will be potentially on the elimination of subsidies and will cause a direct impact on fuel prices in the CPI (Bank of Indonesia, 2005).

Increasing crude oil price was also followed by increase in the prices of many other energy commodities. In general increased 4.9 percent in May, the highest since November, the price of diesel oil rose 11.2 percent, 3.9 percent of gas and kerosene increased by 8 percent, and it will lead the value of export and import of those commodities.

But when viewed from year to year, Indonesian crude oil production decreased significantly. This is due to the limited resources of oil and oil refineries in Indonesia. Decreased in oil production and increased in oil consumption in Indonesia make the government reduce exports and increase imports of crude oil from abroad. This means the government should spend more budgets for the cost of oil imports.

Declining in production and export volume of Indonesian crude oil affects to other macroeconomic indicators. This also affects Indonesian economic

growth. The increase in world oil prices caused the high price of domestic crude oil. This increase was also accompanied by inflation or rising prices of basic commodities, and various other energy commodities, which generally increased 4.9 percent in May. Food prices are also a major driver of rising inflation also increased by 0.8 percent. Increased energy and food prices are harming to the consumers and business people. (Aversa, Yahoonews 2000).

The phenomenon of rising oil and food prices that triggered the increase in inflation as though not enough to complicate the current global economy. While inflation rises, growth actually stagnated and did not experience a satisfactory process. Fears of stagflation as it did in the 1970's began to appear, but remains a frightening specter to be expressed openly (Kennedy, Simon, 2008).

Viewed from the side of the oil decline that there are no significant impact. The decline in world oil price here cause changes in the value of Indonesian crude oil exports, but not too significant. Besides, the long decline in inflation during the 1980s and 1990s associated with a reduction in oil prices (LeBlanc and Chinn, 2004).

Based on these phenomena of fluctuations in world oil prices exposed, the writer interested to do research the impact of fluctuations in world oil prices to the Indonesian economy, with the title of the study "**World Oil Price Fluctuation Impact On Indonesian Economy, 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 Indonesian economy. The variables used to forming this model are world crude oil price, Gross Domestic Product (GDP), inflation, the value of export and import of Indonesian oil. This study estimates the relationship between variables by using data from year 1991 until 2010.

1. 3 Research Questions

1. What is the impact of world oil price fluctuation to the economic growth?
2. What is the relationship between world oil price fluctuations to the inflation?
3. Is the World Oil Price fluctuation affects the value of export and import of Indonesian oil?

1. 4 Research Objectives

The purpose of this study are :

1. To analyze the impact of world oil price fluctuation to the economic growth (Gross Domestic Product)
2. To investigate the relationship between world oil price fluctuation to the inflation
3. To examines the effect of World Oil Price Fluctuation to the value of export and import of Indonesian crude oil

1. 5 Research Advantages

The results of this study is expected to be useful for:

Academics

1. To fulfill requirements of the Bachelor of Economics in Economic Faculty, Andalas University.
2. This research is expected to contribute to science, especially concerning the impact of world oil price fluctuation
3. For myself, to improve my ability in writing reports and doing research
4. As additional information for further research

Government

For the Government of Indonesia, this research is expected to be used as additional information in making policy in order to maintain the export and keep the Indonesian Macroeconomics' Indicator stable even there is fluctuation in World Oil Price.

1. 6 The Scope of Research

In this study, the writer limit the price of oil with the world crude oil price measured in dollars per barrel and its impact economic growth measured by Gross Domestic Product (GDP) in US Dollars, inflation in the size of the annual percentage and the value of total Export and Import Indonesia's crude oil price in billion barrels with a period of 20 years, from 1991 until 2010.

1. 7 Writing Systematic

Overall assessment of this study consists of six chapters, with discussion topics in each chapter are as follows:

Chapter I : *Introduction*

An introductory chapter that provides background on issues concerning the selection of research title, problem identification, research objectives, research advantages, the scope of research and writing systematic.

Chapter II : *Theoretical Framework and Literature Review*

The literature review chapter describes basic theory, concepts related to study and the factors that influence of it. The theories obtained will be the basis for discussion and writing to make conclusions about the title that the writer chosen.

Chapter III : *Research methodology*

Chapter III is a chapter describing the research methods and operational definitions of research variables, types and sources of data, data collection methods and data analysis methods.

Chapter IV: *Trends of World Oil Price Fluctuation and An Overview of Indonesian Economy*

In this chapter described several stages in the development of world oil prices and the development of Indonesian Economy

Chapter V: *Empirical Result and Analysis*

It is a chapter outlining the empirical results and analysis of the study.

Chapter VI: *Conclusions and Implications*

It is a closing chapter that describes the conclusions of the analysis carried out and the implications that arise from the conclusion as an answer to the question of the problem.

CHAPTER II

THEORITICAL FRAMEWORK AND LITERATURE REVIEW

2.1 Theoretical Framework

2.1.1 Predictions from Theory

Although there is no obvious economic literature that states an agreement on a theoretical framework to explain how changes in oil prices affect economic activity, but James Hamilton (2008) tried to find the predictions of economic theory for the dynamic behavior of crude oil prices, there are three separate conditions that all should hold in equilibrium:

2.1.1.1 Returns to Storage

We consider the following investment strategy. Assumed that we borrow money today (denoted date *t)* in order to purchase a quantity Q barrels of oil at a price P_t dollars per barrel. Suppose we pay a fee to the owner of the storage tank of C_t dollars for each barrel we store for a year. Then we will need to borrow $(P_t + C_t)$Q total dollars, and next year we'll have to pay this back with interest, owing $(1 + i_t)(P + C_t)$Q dollars for i_t the interest rate. But we will have the Q barrels of oil that we can sell for next year's price, P_{t+1}. If,

$$P_{t+1} Q > (1 + i_t) (P + C_t) Q \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (1)$$

then we'll make a profit from putting more oil into storage today.

Of course, we don't know today what next year's price of oil will be, but you have some expectation based on information currently available, denoted $EtPt_{+1}$. From the equation (1), we'd expect to make a profit from oil storage whenever

$$EtPt_{+1} > P_t + C_t^* \quad \text{.....(2)}$$

where C_t^* reflects our combined interest and physical storage expenses :

$$C_t^* = i_t P_t + (1 + i_t) C_t$$

Suppose people did expect P_{t+1} to be greater than $P_t + C_t^*$. Then anyone could expect to make a profit buy buying the oil today, storing it, and selling it next year. If there are enough potential risk neutral investors, the result of their purchases today would be to drive today's price P_t up. Knowledge of all the oil going into inventory today for sale next year should reduce a rational expectation of next year's price $E_t P_{t+1}$. As long as inequality (2) held, speculation would continue, leading us to conclude that (2) could than hold in the equilibrium. What about the reserve inequality,

$$E_t P_{t+1} < P_t + C_t^* \ ?$$

Then anyone putting oil into storage is expecting to lose money, and it would not pay to do so for purposes of pure speculation. That doesn't mean that every storage tank will be empty, because inventories of oil are essential for the business of transporting and refining oil and delivering it to the market. We could think of such factors as equivalent to a "negative" storage cost for oil in the form of a benefit to our business of having some oil in inventory, which is referred to as a "convenience yield". We might then refine the above specification, subtracting any convenience yield from physical and interest storage costs C_t^* to get a magnitude $C_t^{\#}$, the net cost of carry. If people expect of oil prices to fall so much that

$$E_t P_{t+1} < P_t + C_t^{\#}$$

then there is an incentive to sell oil out of inventories today, driving P_t down and $C_t^{\#}$ up. We're then led to the conclusion that the following condition should hold in equilibrium

$$E_t P_{t+1} = P_t + C_t^{\#} \quad \text{.....(3)}$$

It is sometimes argued that if economist really understanding something, they should be able to predict what will happen next. But oil prices are an interesting example (stock price are another) of an economic variable which, if the theory is correct, we should be completely unable to predict (Hamilton, 2008).

2.1.1.2 Futures Market

If we thought oil prices were headed higher, there is an alternative investment strategy to buying oil today and physically storing it. We could instead enter into a futures contract, which would be an agreement we reach today to buy oil one year from now at some price, F_t, to which price we and counterparty agree today. Abstracting from margin requirements and broker's cost, if we've agreed to buy oil at price F_t, we will make money whenever $F_t < P_{t+1}$, because we could in this event sell the oil for which we pay F_t to someone else on next year's spot market at the price P_{t+1}, pocketing the different as pure profit. If our expectations were such that $F_t < E_t P_{t+1}$, everybody would want to be on the buy side of such contracts, bidding the terms of the contract F_t up. Equilibrium requires

$$F_t = E_t P_{t+1} + H_t^{\#} \quad \text{.....(4)}$$

where $H_t^{\#}$ is a term incorporating any risk premium or complications induced by margin requirements.

Note that (4) is not an alternative theory to (3)- both conditions have to hold in equilibrium. For example, if there were an increase in F_t without a

corresponding change in P_t, that would create an opportunity for someone else to buy spot oil at time t for price P_t, store if for a year, and sell it through a future contract.

If we choose to ignore cost of carry and risk premier, conditions (4) and (3) together would imply that the futures price simply follows the current spot price

$$F_t = P_t \quad \text{.....(5)}$$

To the extent that F_t and P_t differ, studies by Bopp and Lady (1991), Abosedraa and Baghestani (2004), Chinn, LeBlanc and Coibion (2005), and Alquist and Killian (2008) found that P_t provides as good or even a better forecast of P_{t+a} than does the futures price F_t.

Interestingly, the first three studies nevertheless also failed to reject the hypothesis that F_t embodies a rational expectation of the future spot price. The overall conclusion we might draw is that P_t offers about as good a forecast of the future spot as one can achieve.

2.1.1.3 Scarcity Rent

Oil is a finite resource. It is mined rather than produced, and once burned, cannot be reused. Harold Hotteling (1895-1973) pointed out back in 1931 that in the case of an exhaustible resource, price should exceed marginal cost even if the oil market were perfectly competitive.

To understand Hotteling's principle, suppose we take it as given that as a result of unavoidable geological limits, global production, of crude oil next year could only be 90% of the amount being produced this year. If we assumed say a short-run demand elasticity of -0.10 that would imply a price of oil next year that

is twice it current value. As we noted above, under such a hypothetical scenario it would pay anyone to buy oil today in order to store it in a tank for a year, waiting to sell into next year's more favorable market.

It would be more efficient, however, for the owner for any oil reservoir to "store" the oil directly by just leaving it in the ground, waiting to produce it until the price has risen. In a competitive equilibrium, the owners of the reservoir will receive a compensation for surrendering use of the nonreproducible resource that leaves them just indifferent between producing today and producing in the future. We can think of that scarcity rent at time t, denoted λ_t, as the difference between price P_t and marginal production cost M_t :

$$\lambda_t = P_t - M_t$$

Hotteling's principle holds that scarcity rent should rise at the rate of interest:

$$P_{t+1} - M_{t+1} = (1 + i_t)(P_t - M_t) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (6)$$

The initial price of P_0 is then determined by the transversally condition that if the price P_t follows the dynamic path given by (6) from that starting point, the resources is just exhausted at $t = \infty$. Nordhaus, Houthakker, and Solow (1973) discussed the possibility of a "backstop technology" which would allow an alternative energy source to be infinitely supplied at a fixed price $\overline{P}$, in which case the initial price P_0 is determined by the conditions that if the subsequent price path follows (6), the resource is just exhausted when P_t reaches $\overline{P}$, but as the price exceeded $133 per barrel in 2008, it was still unclear what such a backstop resource might be.

For example, the in-ground resource represented by oil sands is quite enormous, and is currently quite profitable at production levels of 1.3 mb/d.

however, water, natural gas, pipeline, labor, and capital constraints make it difficult to scale this up quickly, and the Canadian Association of Petroleum Producers is only predicting oil sands to contribute 4 mb/d by 2020.

Although the sharp run-up in through June of 2008 might be consistent with a newly calculated scarcity rent, the dramatic price collapse in the fall is more difficult to reconcile with a Hotelling-type story.

2.1.1.4 Role of Speculation

Michael Masters, in testimony before U.S. Senate in May 2008, estimated that asset allocated to commodity index trading strategies had risen from $13 billion at the end of 2003 to $260 billion as of March 2008. these funds hold a portfolio of near-term futures contracts (of which about 70% represent energy prices), following a strategy of selling the expiring contract the second week of the month and using the proceeds to buy the subsequent month's contract.

Suppose we believed that speculation as a force in and of itself could succeed in driving the futures price up. The buyer of spot crude oil would be a refiner, whose primary decision given gasoline demand is an intertemporal one. It can meet that demand with crude oil that it purchases at the current spot price, or produce out of inventory buying its crude forward at the futures price.

If the futures price were to increase with the spot price fixed, there would be a big increase in the demand for spot oil. If we thought of gasoline demand as completely price-inelastic in the short-run, the demand curve for spot crude would shift up by $1 per barrel when the futures price increased by $1. As a result, the speculators who are selling the expiring near-term contracts would find that they

have indeed made a profit in an environment in which an ever-increasing volume of futures purchases drives ever-increasing futures and spot prices.

Although it might appear that we have described a self-fulfilling speculative price bubble here, in reality it is not, because the demand for gasoline is in fact not completely price inelastic. Ultimately there are physical producers of crude oil and physical consumers of gasoline, and insofar as the activities of either have any response at all to the price, incentives for consumption would be reduced and incentives for production increased whenever the price of crude oil is driven up.

2.1.2 Theory of International Trade

International trade theory starts from the theory of mercantilism which assumes economic growth of a country growing as a result of the expenditure of other countries. Analysts mercantilism which was pioneered by Mun (1571-1641) with his England's Treasury by Foreign Trade agreed that, the only way for a country to become rich and powerful is to do as much as possible export and import as little as possible.

International trade is a trade done by a resident of a country with a population of other countries on the basis of mutual agreement. Residents are referred to in the form of inter-individual (individual to individual), between individuals and the government of a country or a country's government with other governments. In many countries, international trade became one of the main factors to increase the GDP. Although international trade has been occur for thousands years, its impact on economic interests, new social and political felt the last few centuries. International trade also helped encourage industrialization,

transportation advances, globalization and the presence of multinational companies.

In addition, trade can produce benefits for each country involved because it would encourage trade specialization in the production of certain commodities which contain comparative advantage that countries concerned can concentrate its resources on the sector and exporting some of its output to take advantage of other commodities that its comparative advantage he did not understand.

According to the *Hecksher-Ohlin* theory in Salvator (1997), a country will export the commodity they produce more of absorbing the factors of production are relatively abundant and cheap in the country, and in the same time it will import the commodity whose production requires a relatively scarce resource and expensive in the country. In short, a country rich or relatively more labor abundant will export commodities are relatively labor intensive and will import commodities are relatively capital intensive. In principle, trade between the two countries arise because of differences in demand and supply, and also because the desire to expand the marketing of export commodities for foreign exchange earnings in an effort to increase the provision and development of the country concerned.

In an open economic system, international trade is inseparable from the development of world economy as a whole. The development of world economy is essential to consider particularly the impact on the demand side, particularly the demand for export commodities. So for Indonesia with its economy which is open, trade is vital for efforts to promote sustainable economic growth.

International trade has several benefits, among others:

1. Getting things can not be produced in own affairs

   Many factors influence the difference in production in each country. Factors such as geography, climate and level of mastery of science and technology. With the international trade, each country is able to meet their own needs that are not produced.

2. Obtain benefits of specialization

   The primary reason for foreign trade activities is to obtain profits realized by specialization. While a country can produce a product the same kind as those produced by other countries, but they can sometimes be better if the country is importing goods from abroad.

3. Expanding markets and adds benefits

   Sometimes, employers do not run the machines (production tools) with the maximum because they are afraid over-production will happen, resulting in falling prices of their products. With the international trade, the entrepreneur can run the most of the machines and sell the excess product to overseas.

4. Modern technology transfer

   Foreign trade allows a country to learn a more efficient production techniques and ways to more modern management.

2.1.3 Economic Growth Theory

The modern conception of economic growth began with the critique of Mercantilism, especially by the physiocrats and with the Scottish Enlightenment

thinkers such as David Hume and Adam Smith, and the foundation of the discipline of modern political economy. The theory of the physiocrats was that productive capacity, itself, allowed for growth, and the improving and increasing capital to allow that capacity was "the wealth of nations". Whereas they stressed the importance of agriculture and saw urban industry as "sterile", Smith extended the notion that manufacturing was central to the entire economy.

David Ricardo argued that trade was a benefit to a country, because if one could buy a good more cheaply from abroad, it meant that there was more profitable work to be done here. This theory of "comparative advantage" would be the central basis for arguments in favor of free trade as an essential component of growth.

Relationship among Economic Growth and Export and Import

In general, economic growth expresses as the increase of per capita gross domestic product (GDP) or other measures of aggregate income, typically reported as the annual rate of change in real GDP. Economic growth is primarily driven by improvements in productivity, which involves producing more goods and services with the same inputs of labour, capital, energy and materials. Economists draw a distinction between short-term economic stabilization and long-term economic growth. The topic of economic growth is primarily concerned with the long run. The short-run variation of economic growth is termed the business cycle.

According to Lipsey (1995), Gross Domestic Product (GDP) is the national income as measured from the expenditure side is the amount of consumption expenditure, investment, government spending and import-

export. GDP is categorized into two, namely the nominal and real terms. It said nominal GDP, if the total GDP valued at current prices. While GDP is valued at the price of basic period is called real GDP, often referred to as the real national income.

Economists consider gross domestic product the main measure of how well the economy is doing. For example, most economists would define it as a recession if the GDP value of an economy declines for two or three consecutive quarters.

By the theory of Keynes, the aggregate output can measured by formula :

$$Y = C + I + G + NX \quad \text{.....(1)}$$

where Y is the output, C is consumption, I measured as investment, and NX means the difference between the value of exports (X) and imports (M) in a nation.

$$NX = X - M$$

from the basic, the output of a country is determined by several factors; consumption, investment, government expenditure, and net export (export minus import).

If viewed from the relationship between economic growth (aggregate output) with exports and imports, it can be concluded as follows:

1. The output and export value are positively relationship.

   $$Y = X$$

   Because the value of X here is positive, the greater the export of a State, the greater the total output that it receives.

2. The output and import value are negatively relationship

   $$Y = -M$$

Because the M-value is negative, the greater a country's import of goods, the lower the total output receipt because we have to pay more to foreign country.

2.1.4 Inflation Theory

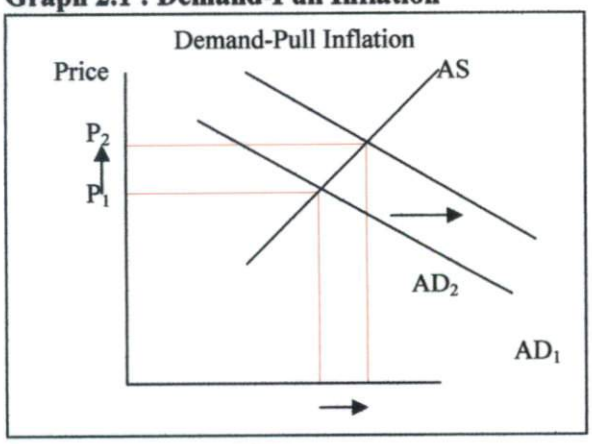
Inflation is often defined as the tendency of rising prices in general and continuously, within a certain time and place (Korteweg, 1973; Ackley, 1978; Nopirin, 1997; and Boediono, 2001). Its presence is often interpreted as one of the main problems in the economy of the country, in addition to unemployment 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.

Theoritically, the rise in inflation can be caused by several things. According Soediyono (2000: 179), from the cause of inflation can arise due to an increased in demand (demand pull inflation), because the pressure rise in production costs (cost push inflation), as well as both (mixed 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 illustrates the graph of demand-pull inflation. Initial equilibrium price level is P1 and the quantity of goods demanded is for Q1.

Graph 2.1 : Demand-Pull Inflation

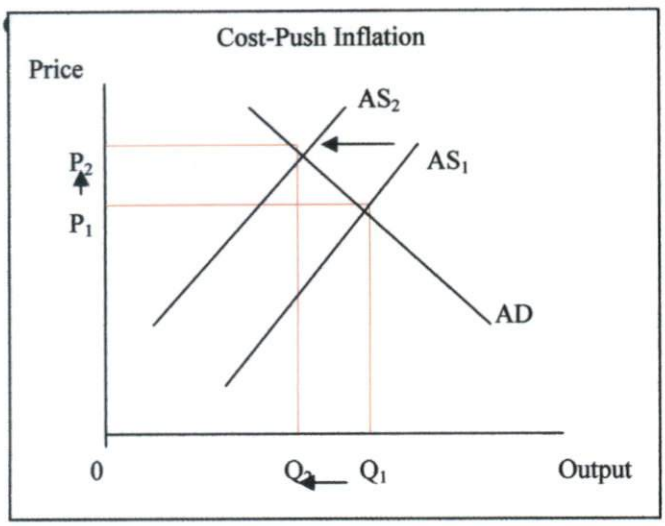


Source : Soediyono (2000)

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. 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

A large number of studies and growing literature have reported a correlation between increases in oil prices and subsequent economic downturns. Examples 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.

Following Hamilton (1983), Burbidge and Harrison (1982) examined for the period 1961-1982 whether or not general price levels in industrialized countries of US, Japan, Germany, Italy, UK, and Canada were affected by oil price shocks. Their result show while oil price were seen to significantly affect the US and Canadian price levels, the price effects in Japan, Germany, and the UK were found to be relative smaller.

Hooker (1996), in a more recent analysis, found that oil prices did not exert statistical impact on the US economy after 1973. He employed the VAR model using crude oil prices, three-month Treasury bill rates, import prices, and GDP deflator as the independent variables whilst real GDP and Unemployment as the dependent macroeconomic indicators.

Then, research by Mork (1989) focuses on the asymmetric effects. Mork hypothesized that, unlike oil price increases, price declines had little effect on the economy. His regressions confirmed his hypothesis – when the distinction between price increases and the decreases was made, the effect of price increases

on GNP growth doubled, whereas price declines had a small and statistically insignificant effect.

Lee, Ni and Ratti (1995) look into oil price shocks and real U.S GNP growth from 1949 to 1992 in a framework similar to that of Hamilton (1983) and Mork (1989). Other than asymmetric relationships, they also investigate the impact of oil price volatility to the macroeconomy by means of Generalized Autoregressive Conditional Heteroskedasticity (GARCH) model. The results obtained showed that, oil price volatility significantly affect the GNP and they also find asymmetric effects between positive and negative normalized shocks.

In addition, Weiqi Tang and Libo Wu (2009, Rasche and Tatom (1977, 1981), Barro (1984) and Brown and Yücel (1999), have same argument that Rising oil prices can be indicative of a classic supply-side shock that reduces potential output. Rising oil prices signal the increased scarcity of energy which is a basic input to production. Consequently, the growth of output and productivity are slowed. The decline in productivity growth lessens real wage growth and increases the unemployment rate at which inflation accelerates.

If consumer expect the rise in oil prices to be temporary, or if their expect the near term effects of output to be greater than the long-term effects, they will attempt to smooth out their consumption by saving less or borrowing more which boosts the equilibrium real interest rate. With slowing output growth and an increase in the real interest rate, the demand for real cash balances falls, and for a given rate of growth in the monetary aggregate, the rate of inflation increases. Therefore, rising oil prices reduce GDP growth and investment and boost real interest rate and the measured rate of inflation.

In contrary, there are several researchers who disagree with studies that have been mentioned above that oil prices have asymmetric effects on GDP. They assume instead that the world oil price has positive influence on economic growth. As research from Berument and Ceylan (2006), Tilak Abeysinghe (2005), the International Monetary Fund (2000), Bank of Indonesia (2005), Norasibah (2008), Gunu Umar (2010), and many others.

Berument and Ceylan (2006) study about the impact of oil price shocks on the economic growth of the MENA (Middle East and North Africa) countries. He explored two indicators namely NOI/GDP (net oil imports over GDP) and OE/OP (crude oil exports over crude oil production) year of 2000. The results observed by using VAR are one standard deviation shock oil prices have a significant, contemporaneous and positive effect on the growth of the Algerian economy.

The effects of positive oil price increase on the output growth of individual countries are ether positive or the evidence is not statistically significant. However they do not find negative and statistically significant effect of oil price shocks on the output growth for any country. There might be various reasons for this; oil price shocks could not affect the output growth unless it exceeds a certain threshold level, or the existing relationship could be non-linear.

The influence oil price fluctuation has on national economy are in many aspects, and as there are different time lagged lagging effects when oil price fluctuation influences different aspects of national economy; the direct and indirect influences crude oil price fluctuation has on national economy should be considered synthetically, generally speaking, to most countries the indirect

influence caused by oil price would reflect in one year and a half to two years (Gao Jian, 2006).

In Norasibah's research (2008), there are positive correlation between oil price and GDP, where increase in oil prices implies an increase in country's oil revenue and income. This finding also appear to be consistent with Roger (2001) who claimed that, the event of oil price shocks had aversely affected the growth rates and trade balances of the Asian economies, except oil exporting countries; Indonesia, Malaysia, and Brunei.

Viewed from the side of macroeconomic such as inflation, some literature states collectively that rising world oil prices led to rising inflation. Based on historical patterns, the increase in world oil prices led to increase in fuel prices in Indonesia, because of fuel prices in Indonesia referring to world oil prices. The increase in fuel prices would result increased inflation of 3.74%.

A relatively high increase was caused by the increase of different composition (kerosene, the increase is quite high) and weight of the fuel component in CPI survey was increased. With these calculations, first-round effects on inflation to rise 10% (premium, diesel, and kerosene) is 0.37%, while the impact of the second round for each increase of 10% is 12.41%, bringing the total impact for each 10% increase in fuel is 0.78% (Bank Indonesia, 2005).

Important to recorded, rising fuel prices will increase inflation, but the increase is only a temporary shock. In the future, if the shock does not occur again, then the impact of inflation in the medium term is expected to move down.

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.

2.3 Hypothesis

From the description of the theory and literature review that have been described, it can be hypothesized as follows:

1. There is an inverse relationship between oil price and economic growth
2. Oil price shocks have a positive effect on inflation rate
3. There is impact of oil price shock on the foreign trade especially export and import of crude oil.

CHAPTER III

RESEARCH METHODOLOGY

Descriptive Analysis

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

Research Variables

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. 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.
2. Oil Price is the world oil prices (crude oil) set by some states in units of US$ Dollar per barrel.
3. Inflation chosen is consumer price index (CPI). 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.
4. Export represented by Indonesian foreign trading of crude oil to abroad in billion US Dollars.
5. Import represented by Indonesian foreign trading of crude oil to abroad in billion US Dollars.

3.3 Data Source

Generally, there are two kinds of data; primary and secondary data. In the fields of epidemiology and public health, the distinction between primary and secondary data depends on the relationship between the person or research team who collected a data set and the person who is analyzing it. This is an important concept because the same data set could be primary data in one analysis and secondary data in another (Sarah Boslaugh, *Secondary Data Source*, Cambridge University Press)

If the data set in question was collected by the researcher (or a team of which the researcher is a part) for the specific purpose or analysis under consideration, it is primary data. If it was collected by someone else for some other purpose, it is secondary data.

This research used quantitative data and secondary data as based on estimation. Secondary data was chosen because those data are internationally and available in several online sources (Table 3.1)

Table 3.1 : Source of Data

Data	Source
World Oil Price	*West Texas Intermediate www.wti.org/gov/petroleum/*
GDP	*Trading Economics (www.tradingeconomics.com)*
Export	*Statistik Ekonomi Keuangan Indonesia (SEKI – Bank of Indonesia)*
Import	*Statistik Ekonomi Keuangan Indonesia (SEKI - Bank of Indonesia)*
CPI	*Statistik Ekonomi Keuangan Indonesia (SEKI - Bank of Indonesia)*

3.4 Time-Series Data

In statistics, signal processing, econometrics and mathematical finance, a time series is a sequence of data points, measured typically at successive times spaced at uniform time intervals. Examples of time series are the daily closing value of the Dow Jones index or the annual flow volume of the Nile River at Aswan.

There are several benefits from using time-series data (Bloomed Field, P, 1976). These include as following:

1. Time-Series data have natural temporal ordering. These make time-series analysis distinct from other common data analysis problems, in which no natural ordering of the observations (e.g. explaining people's wages by reference to their education level, where the individuals' data could be entered in any order).
2. Time series analysis is also distinct from spatial data analysis where the observations typically relate to geographical locations (e.g. accounting for house prices by the location as well as the intrinsic characteristics of the houses).
3. A time series model will generally reflect the fact that observations close together in time will be more closely related than observations further apart.
4. Time series models will often make use of the natural one-way ordering of time so that values for a given period will be expressed as deriving in some way from past values, rather than from future values.

Time-Series has the form:

$$X = \{X_1, X_2, ...\}.$$

Where X is indexed by the natural number. Another common notation is:

$$Y = \{Y_t : t \in T\},$$

where T is the index set.

.5 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 are 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 :

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

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:

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

$$y_t = m + A y_{t-1} + \varepsilon_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.2)$$

more explicitly, this can be written as:

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

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

3.6 Model Specification

The model specification of the current study by Gunu Umar (2010) is denoted as;

$$GDP_t = f(Oil, INF, Export, Import) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.3)$$

where GDP is Gross Domestic Product in billion US Dollar, *Oil is* world oil prices in US Dollar per barrel, Export represent Indonesian export of crude oil in billion US Dollars, Import is Indonesian import of crude oil in billion US Dollars, and *INF* denoted as inflation rate which measure by Consumer Price Index of Indonesia.

The model application of VAR model for this study can be done as follows (Gunu Umar, 2010):

$$\Delta GDP_t = \sum_{t-1}^{L} \alpha^t_{11} \Delta GDP_{t-i} + \alpha^0_{12} \Delta O_t + \sum_{t-1}^{L} \alpha^t_{12} \Delta O_{t-i} + \alpha^0_{13} \Delta CPI_t + \sum_{t-1}^{L} \alpha^t_{13} \Delta CPI_{t-i} + \alpha^0_{14} \Delta Export_t + \sum_{t-1}^{L} \alpha^t_{14} \Delta Export_{t-i} + \alpha^0_{15} \Delta Import_t + \sum_{t-1}^{L} \alpha^t_{15} \Delta Import_{t-i} + \varepsilon_{1t} \quad (3.4)$$

$$\Delta Oil_t = \sum_{t-1}^{L} \alpha^t_{21} \Delta O_{t-i} + \alpha^0_{22} \Delta GDP_t + \sum_{t-1}^{L} \alpha^t_{22} \Delta GDP_{t-i} + \alpha^0_{23} \Delta CPI_t + \sum_{t-1}^{L} \alpha^t_{23} \Delta CPI_{t-i} + \alpha^0_{24} \Delta Export_t + \sum_{t-1}^{L} \alpha^t_{24} \Delta Export_{t-i} + \alpha^0_{25} \Delta Import_t + \sum_{t-1}^{L} \alpha^t_{25} \Delta Import_{t-i} + \varepsilon_{2t} \quad (3.5)$$

$$\Delta CPI_t = \sum_{t-1}^{L} \alpha^t_{31} \Delta CPI_{t-1} + \alpha^0_{32} \Delta GDP_t + \sum_{t-1}^{L} \alpha^t_{32} \Delta GDP_{t-i} + \alpha^0_{33} \Delta O_t + \sum_{t-1}^{L} \alpha^t_{33} \Delta O_{t-i} + \alpha^0_{34} \Delta X_t + \sum_{t-1}^{L} \alpha^t_{34} \Delta X_{t-i} + \alpha^0_{35} \Delta M_t + \sum_{t-1}^{L} \alpha^t_{35} \Delta M_{t-i} + \varepsilon_{3t} \quad (3.6)$$

$$\Delta Export_t = \sum_{t-1}^{L} \alpha^t_{41} \Delta Export_{t-1} + \alpha^0_{42} \Delta GDP_t + \sum_{t-1}^{L} \alpha^t_{42} \Delta GDP_{t-i} + \alpha^0_{43} \Delta O_t +$$

$$\sum_{t-1}^{L} \alpha^t_{43} \Delta O_{t-i} + \alpha^0_{44} \Delta CPI_t + \sum_{t-1}^{L} \alpha^t_{44} \Delta CPI_{t-i} + \alpha^0_{45} \Delta Import_t +$$

$$\sum_{t-1}^{L} \alpha^t_{45} \Delta Import_{t-i} + \varepsilon_{4t} \qquad (3.7)$$

$$\Delta Import_t = \sum_{t-1}^{L} \alpha^t_{51} \Delta Import_{t-i} + \alpha^0_{52} \Delta GDP_t + \sum_{t-1}^{L} \alpha^t_{52} \Delta GDP_{t-i} + \alpha^0_{53} \Delta O_t +$$

$$\sum_{t-1}^{L} \alpha^t_{53} \Delta O_{t-i} + \alpha^0_{54} \Delta X_t + \sum_{t-1}^{L} \alpha^t_{54} \Delta X_{t-i} + \alpha^0_{55} \Delta \pi_t + \sum_{t-1}^{L} \alpha^t_{55} \Delta \pi_{t-i}$$

$$+ \varepsilon_{5t} \qquad (3.8)$$

Where *GDP* is of Gross Domestic Product constantbase year 2000 in t-period and GDP_{t-1} is GDP in previous period. Oil_t is world oil price in t-period, and O_{t-1} indicates the world oil price in previous period. X_t is Indonesian Export of crude oil; M_t is Indonesian Import of crude oil and X_{t-1} and M_{t-1} are the value of oil's export and import in the previous value; and inflation in t-period is represent by π_t and the previous period is π_{t-1}. The last, ε is disturbance term error which is called impulse or innovation or shock in vector autoregression (VAR).

3.7 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 :

3.7.1 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 (Kwiatkosksi 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;

$$[\text{ADF-test}] \quad : \quad \Delta y_t = \alpha_0 + \alpha_t t + \delta_1 y_{t-1} + \alpha_i \sum_{i-1}^{m} \Delta y_{t-1} + \varepsilon_t \qquad \text{.....(3.9)}$$

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 through first or higher order differencing process to achieve stationary and to find the order of integration. The test is applied to each variable used in the model.

3.7.2 Cointegration Test

If there is a linear combination of non-stationary variables integrated at the same time lag, then condition is called cointegration (Enders, 2004). If two

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.

3.7.3 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 :

$$AIC = 2k + 2ln(L) \qquad \text{.....(3.11)}$$

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.

3.7.4 Granger Causality Test

The Granger Causality is used to determine whether there is relationship interplay between world oil price and gross domestic product, world oil price and export, world oil price and import, and world oil price and inflation. 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. This procedure is already widely used, one by Algvacil et.al (2002) who conducted a study of foreign investment, export and other domestic variable in Mexico.

The Granger Causality is used to determine whether there is relationship interplay between world oil price and gross domestic product, world oil price and export, world oil price and import, and world oil price and inflation. 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.

While statistics for testing the null hypothesis of causality by Granger approach is:

$H_0 : X =/=> Y$ (X doesn't *Granger* cause Y)

$H_a : X \rightarrow Y$ (X *Granger* cause Y)

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.

3.7.5 Test Result Analysis

- **Impulse Response Function**

To see 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 oil prices and its effect on the economy measured by gross domestic product, exports, imports, and inflation. IRF is to see the shock effects of standard deviation of innovation variables on the present value (current time values) and the value of the future (future values) of endogenous variables included in the model were observed.

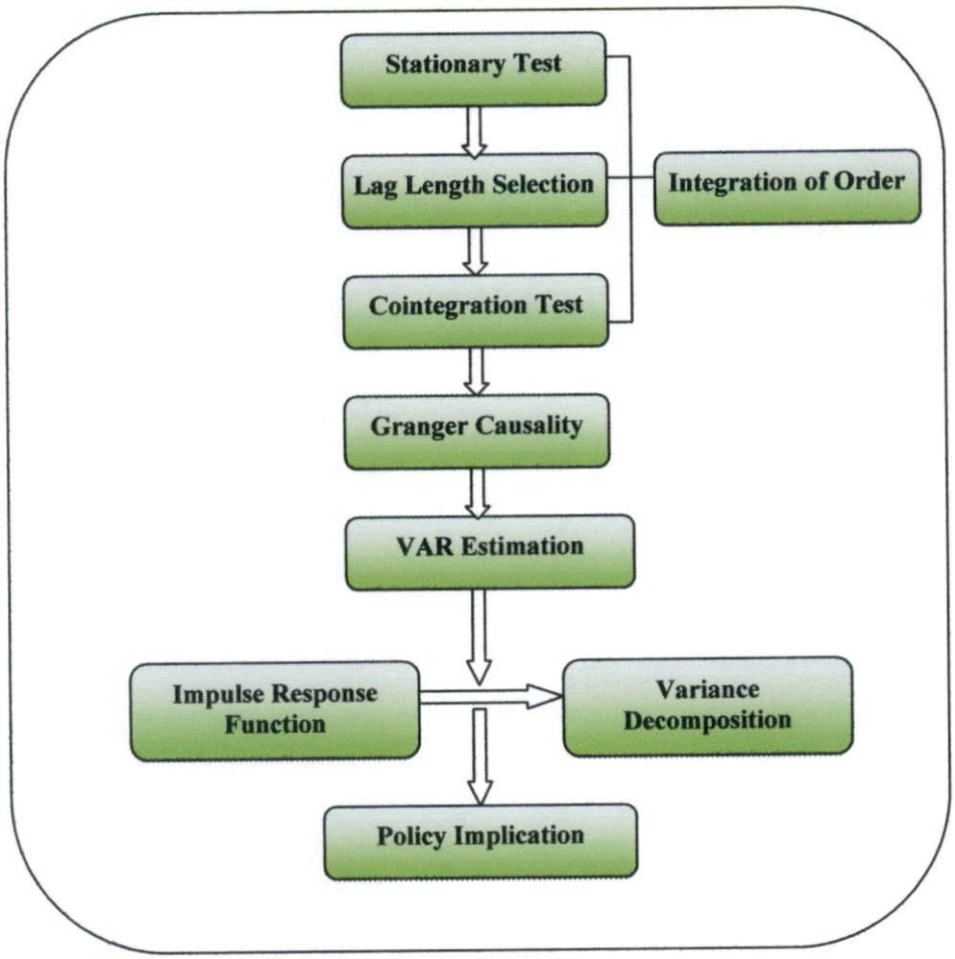
- **Cholesky / Variance Decomposition**

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.

In simple, procedure of method figured in following graph.

Figure 3.1 : Method Procedure



CHAPTER IV

TRENDS OF WORLD OIL PRICE FLUCTUATION AND AN OVERVIEW OF INDONESIA ECONOMY

4. 1 The Development of World Oil Price

Crude oil prices behave much as any other commodity with wide price swings in times of shortage or oversupply. The crude oil price cycle may extend over several years responding to changes in demand as well as OPEC and non-OPEC supply.

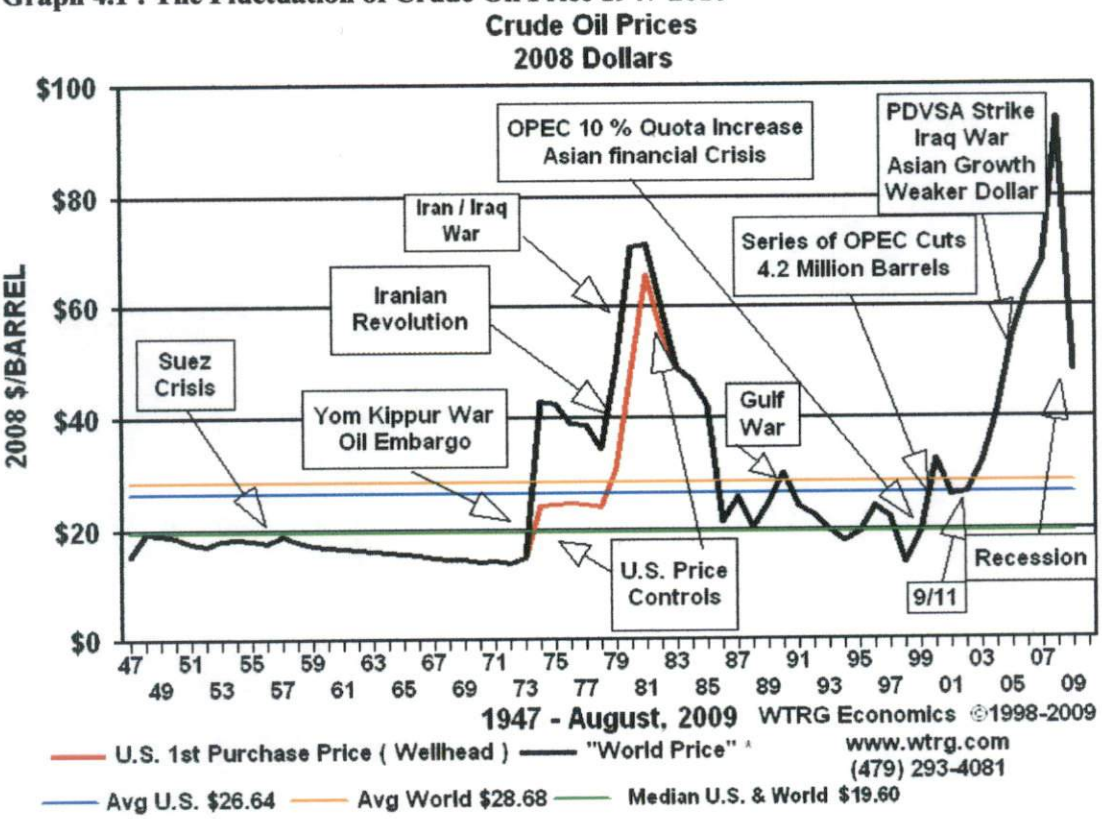
World oil prices have fluctuated since 1940s. Fluctuations in oil prices were influenced by the amount of supply and demand of the net exporters and importers of crude oil. Moreover, geopolitical risk, speculative markets, the oscillating value of the US dollar and interest rates, domestic and foreign 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.

4.1. 1 The Period of Oil Crisis

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 oil crisis period was marked at the time of the oil embargo in 1967, a day after the beginning of the "Six-Day War", along with the decision of Uni Arab Emirates to deter any country that supports Israel's military. Middle East countries ultimately limit their oil shipments. Some countries simply do the embargo against the United States and Britain, while other countries imposed a total ban on oil exports (Wikipedia).

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.

4.1. 2 The Period of Oil Glut

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)

4.1. 3 The Price of Oil after Year of 2000

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.

There are several factors affecting the world oil price shocks. First is the geopolitical risk. Geopolitical risk is the risk of returns on an investment associated with political changes or instability in a country. A change in government, legislative bodies, other foreign policy makers, or military control can constrain oil production (Investopedia, 2008).

For the oil industry, turmoil in Iran, Iraq, Nigeria, Venezuela, and Russia can create a geopolitical risk for investors. Also, the longer the time horizon of an investment, the riskier it becomes. Almost ten percent of the recent oil price spikes could be attributed to geopolitical concern in the Middle East (Bob Tippee, 2007).

The second is speculation motive. Speculation and investment-grade money entering the commodities market has attributed to the recent price increase.

"People want to own contracts and this created additional demand for the oil industry" (Sieminski, Adam). Speculation assures that we have enough supply to support the demands of the market (Alaron, 2007).

Third, the US dollar and interest 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 surplus 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.

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.

4. 2 An Overview of Indonesian Economy toward Oil Price Shock

4.2. 1 Indonesian Economic Growth

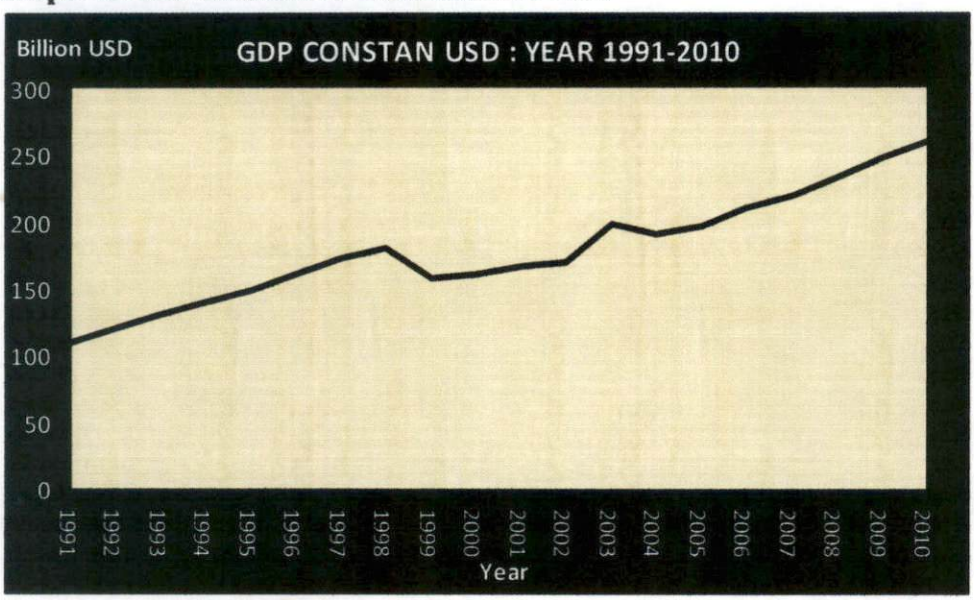
The global economic growth forecasts increasing made by various institutions including the IMF to the range of 4.4 percent or up 0.2 percent compared to the previous projections.

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 4.2)

Graph 4.2 GDP Constant of Indonesia 1991-2010



Source : Nation Master

From the graph 4.2 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 4.2, 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.

Table 4.1 : Revenues and Subsidies of Crude Oil

Year	In Billion Rp		
	Revenue from Oil	Subsidy	Revenue from others
2005	72.8	104.5	353.7
2006	125.1	94.6	418.6
2007	93.6	116.9	499.1
2008	169.0	223.0	671.5
2009	123.0	103.6	839.8
2010	75.6	105.1	739.4

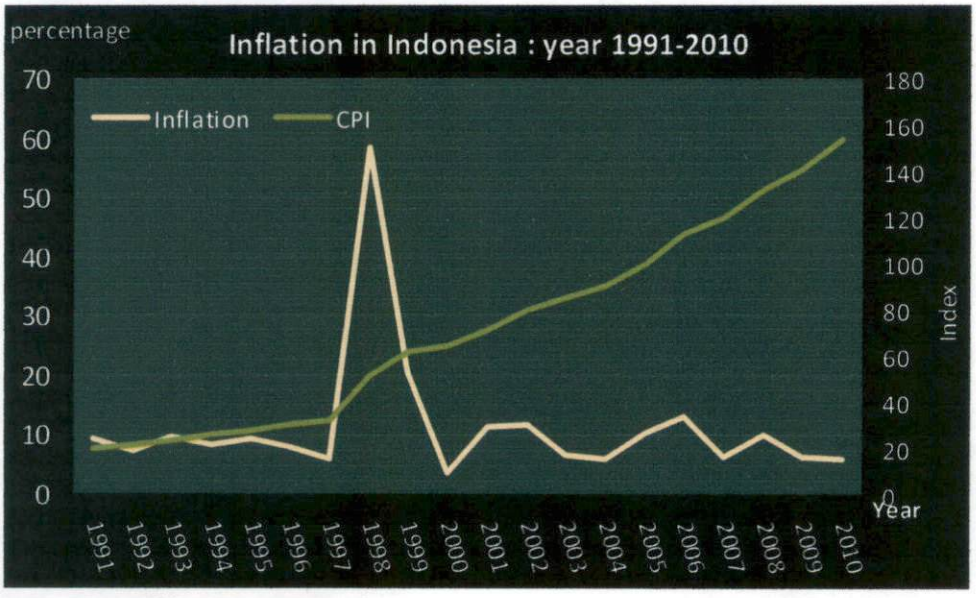
From table 4.1 we can answer the question of why Indonesia's GDP continues to increase while fuel subsidies issued by the government exceed the revenues from the oil sector, resulting in a deficit balance of payments. This is because state revenues in other areas (in this case from tax revenues and non-oil revenues are higher than for crude oil so that it can achieve a surplus of revenues and GDP of Indonesia continues to thrive.

4.2. 2 Indonesian Inflation Tendency

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. As seen on the graph, 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.

Graph 4.3 CPI and Inflation Rate of Indonesia: 1991-2010



Data processed by using Mc.Excel

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. Based on the results of the FAO world food organization's publications, shocks in world oil prices affect the world food price index by 231 in February to 236 (Kompas, March 10, 2011). 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.

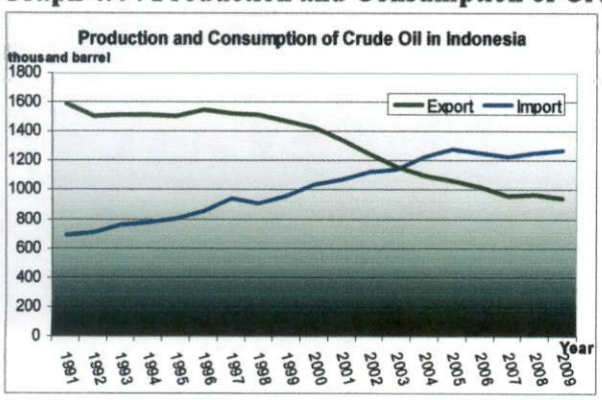
When there is scarcity of oil, the supply is limited, while demand is relatively stable or even tended to increase, according to 'law of demand (supply-demand)' will cause prices to rise. We know that the role of oil as an energy source holds a central role in all human activity. Especially in the economic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

. 3 Indonesian Oil's Export and Import Performances

In attempts to improve the economic growth, an export activity is one way to encourage it which implement by many countries. Export activities able to run, when Indonesia implements open economy. Indonesia is one of the countries that became net exporter commodity in the world because Indonesia is rich in natural resources that not all States have it. One of them is oil. Indonesia became the petroleum exporting countries since the 1960s; with the largest share of exports is the United States and Japan.

According to the *Hecksher-Ohlin* theory in Salvator (1997), a country will export the commodity they produce more of absorbing the factors of production are relatively abundant and cheap in the country, and in the same time it will import the commodity whose production requires a relatively scarce resource and expensive in the country. In simple, if the production of one commodity in a country is bigger than its consumption of that product, so the country will sell the commodity to abroad or they export it. But instead, if the consumption is greater than production, so to fulfill the consumption the country have to buy that commodity from abroad, or they import it.

Graph 4.4 : Production and Consumption of Crude Oil Price

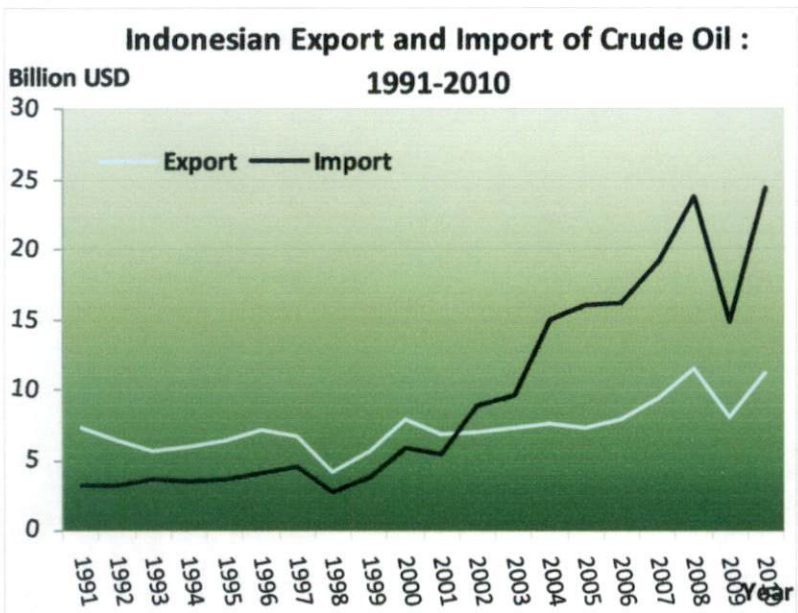


Source : : "SEKI" Bank of Indonesia

Graph 4.3 above illustrates the conditions of supply and demand for crude oil in Indonesia. From the table we can see that the oil production of Indonesia at the beginning of 1991 reached 1600 thousand barrels per year, then decrease to 1500 thousand barrels in 1992. Indonesian crude oil production from year to year has decreased significantly. This has become one of the reasons Indonesia out from the organization of oil exporting countries (OPEC) because Indonesia is unable to produce oil according to the standard amount set by the OPEC production.

Decline in crude oil production would be accompanied by an increase in oil consumption (fuel) in Indonesia. It can be seen in graph 4.3 where for the last 20 years Indonesia has consumptive patterns. It is also likely make Indonesia will begin to increase imports of crude oil to match the pattern of domestic consumption.

Graph 4.5 Indonesian Export and Import of Crude Oil



Source : : "SEKI" Bank of Indonesia

The table above describes the value of exports and imports of Indonesia's crude oil in billion US dollars. In line with production, export of Indonesian crude

oil has fluctuated. In 1991 to 1997, the export value of Indonesian crude oil tends to increase but not significantly. In 1998, the value of oil exports fell to U.S. $ 4.14 billion from U.S. $ 6.77 billion in 1997. then export value return to rise gradually to reach the peak in 2008 amounted to U.S. $ 11.4 billion because at that time the world oil price also has increased very sharply. Value of exports fell again in 2009 and then rise again in 2010.

In the other hand, the value of Indonesian crude oil imports increased consistent with the increasing of consumption. From the graph 4.4, the value of import of Indonesian crude oil is fluctuated from 1991 until 2010. The value import was increase until 2008, and felt down in 2009, but then increased slowly until 2010. Decline in exports and imports in 2009 due to global crisis that affected the performance of national trade balance. And also at the time, the destination of export and import hit recession. Percent increase in oil imports coincided with a rise in oil exports, which is an average of 2-3 percent annually, but Indonesian total oil imports is much greater than oil exports.

From the explanation of the value of exports and imports of Indonesia's crude oil above, it can be concluded that the increase in value of Indonesian exports are also accompanied by an increase in the value of Indonesian oil imports. Based on the theory of economic growth, when imports higher than exports, then the state will have deficit.

CHAPTER V

EMPIRICAL RESULT AND ANALYSIS

5.1 Method

This study aims to examine the impact of world oil price fluctuation on Indonesial economy. Data used in this research is secondary data. More specific, writer used time series data. It takes from 1991-2010. The data contains by; the economic growth data by using gross domestic product as measurement in billion US Dollars, since this data is an economic growth indicators. For oil price data, writer use crude oil world prices from West Texas Intermediate in US Dollar per barrel. For export data and import data are taken from total value of Indonesian export and import of crude oil in billion US dollars. Last, the data of inflation represented by consumer price index.

Writer use Microsoft Excel and Eviews 6 to processed and estimate the data. From the estimation result, we can see the relationship of each variable.

5.2 Empirical Findings

5.2.1 Summary of Statistic

The summary statistic for GDP, Oil Price, Inflation, Oil's Export, and Oil's Import from 1991 to 2010 are reported in table 5.1

Table 5.1 Summary of Statistic

	GDP	Oil Price	CPI	Export	Import
Mean	178.32	38.149	72.38	7.40	9.51
Median	171.11	26.03	67.78	7.24	5.57
Maximum	259.87	99.57	154.21	11.44	24.35
Minimum	109.39	14.39	20.15	4.14	2.62
Std.Dev	41.08	25.15	43.54	1.73	7.31
Skewness	0.31	1.07	0.37	0.85	0.8
Kurtosis	2.39	2.89	1.89	3.92	2.25
Jarque-Bera	0.63	3.81	1.49	3.11	2.62
Probability	0.73	0.15	0.47	0.21	0.27
Sum	3566.42	762.98	1447.65	147.92	190.25
Sum Sq.Dev.	32061.34	12018.29	36016.59	56.80	1016.61
Observations	20	20	20	20	20

Data processed by Eviews 6 (See Appendix 1)

Based on table 5.1 we can see that the number of observations used in this analysis are 20. It also provides the maximum, minimum, mean and median value of each variables used. During first year of 1991 up to last year of 2010 for GDP, its maximum value is 259.87 (in billion USD); minimum value is 109.39; median is 171.11 and mean is 178.32. While Oil price reaches its maximum value at 99.57; minimum at 14.39, median at 26.03 and mean at 38.15. Furthermore, Consumer Price Index maximum value is 154.21; minimum is 20.15; median is 67.78 and mean is 72.38. Export maximum value is 11.44 (in billion USD); minimum is 4.14; median is 7.24; and mean is 7.4. And the last is Import maximum value is 24.35 (billion USD); minimum value is 2.62; median is 5.57; and mean is 9.51.

5.2.2 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 5.2 below:

Table 5.2 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	**GDP**	-4.15	0.01	-4.12	0.02	-2.82	0.01
	Oil Price	-6.22	0.00	-6.26	0.00	-5.88	0.00
	CPI	-2.95	0.06	-3.91	0.03	-1.05	0.25
	Export	-4.85	0.00	-5.29	0.00	-5.65	0.00
	Import	-7.30	0.00	-7.41	0.00	-6.21	0.00

Data processed by using Eviews 6 (See Appendix 2)

The estimated results for the unit root test are presented in table 5.2 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. 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 (see appendix 2).

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 5.2 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. We can summarize that all the variable are stationer in First Difference (I(1)).

Table 5.3 Stationary Level Table

Variables	Stationary Level
GDP	**I(1)**
Oil Price	**I(1)**
Inflation	**I(1)**
Oil's Export	**I(1)**
Import's Export	**I(1)**

Data processed by using Eviews 6 (See Appendix)

5.2.3 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 5.4 Johansen Cointegration Test

Sample (adjusted): 1993 2010
Included observations: 18 after adjustments
Trend assumption: Linear deterministic trend
Series: GDP OIL CPI EXPORT IMPORT
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 *	0.910582	114.4331	69.81889	0.0000
At most 1 *	0.774415	70.97326	47.85613	0.0001
At most 2 *	0.741972	44.17020	29.79707	0.0006
At most 3 *	0.487613	19.78583	15.49471	0.0106
At most 4 *	0.349840	7.749676	3.841466	0.0054

Trace test indicates 5 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 processed by using Eviews 6

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 5.4 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.

5.2.4 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 5.5 Lag Length Criteria

Criteria	Value	Lag Selection
LR Statistic	117.17	1
Final Prediction Error	20703.7	2
Akaike Information Criterion	23.13	2
Schwarz Information Criterion	25.85	2
Hannan-Quinn Information Criterion	23.51	2

Data processed by using Eviews 6 (See appendix 4)

Based on table 5.5, 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)

5.2.5 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 5.6 Granger Causality Test

Pairwise Granger Causality Tests
Date: 07/22/11 Time: 19:40
Sample: 1991 2010
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
OIL does not Granger Cause GDP	18	3.40650	*0.0446
GDP does not Granger Cause OIL		1.36152	0.2905
CPI does not Granger Cause GDP	18	4.91223	*0.0258
GDP does not Granger Cause CPI		3.01316	0.0841
EXPORT does not Granger Cause GDP	18	5.49036	*0.0187
GDP does not Granger Cause EXPORT		3.00165	0.0848
IMPORT does not Granger Cause GDP	18	3.58871	0.0574
GDP does not Granger Cause IMPORT		0.39515	0.6814
CPI does not Granger Cause OIL	18	2.67119	0.1067
OIL does not Granger Cause CPI		0.27111	0.7667
EXPORT does not Granger Cause OIL	18	1.84174	0.1976
OIL does not Granger Cause EXPORT		16.3631	*0.0003
IMPORT does not Granger Cause OIL	18	4.50757	*0.0326
OIL does not Granger Cause IMPORT		4.77756	*0.0278
EXPORT does not Granger Cause CPI	18	1.08845	0.3655
CPI does not Granger Cause EXPORT		8.73605	*0.0039
IMPORT does not Granger Cause CPI	18	0.29137	0.7520
CPI does not Granger Cause IMPORT		3.85130	*0.0486
IMPORT does not Granger Cause EXPORT	18	9.44381	*0.0029
EXPORT does not Granger Cause IMPORT		0.72297	0.5038

Data processed by using Eviews 6

Table 5.6 describes the interrelationships among variables (Granger causality). Star symbol (*) on the table indicates that the null hypothesis is rejected, or there is a relationship between these variables. From table 5.6 shows

that for variable price of oil to GDP produces a small probability value of 5%, and the F statistic is 3.41. This shows that we reject the null hypothesis, in other words, oil prices affect the formation of GDP in Indonesia. Instead, GDP does not affect the formation of oil prices since the probability value is greater than 0.05. This indicates that there is relationships between variable price of oil to GDP in one direction, namely the formation of GDP is influenced by oil prices.

On the oil price and import variable, the t-test results are smaller than significant level of 5% with each of the F-statistic are 4.50 and 4.78, which means that we reject the null hypothesis. In other words, the variable oil prices and oil's import are two-way relationship or granger causality.

Then, at 5% significance level there are evidences that CPI granger caused GDP, export granger caused GDP, oil price granger caused export, CPI granger caused Export, CPI granger caused Import, and import granger caused export. The relationship that occurred here is one-way relationship, where only the first variable affects the formation of the second variables while the second variable has no effect on the first variable. And the other granger causality is not statistically significant.

5.2.6 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 6. As explained in research methodology, all variables in VAR/VECM can be exogenous either endogenous. In findings, GDP is set as first variable as endogenous, thus followed by oil price, inflation, oil's export then at last by oil's import.

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 1.753. If the t-test is greater than the t-table, so it's mean that there is significant influence between variable.

Tabel 5.7 : VAR Estimation

Vector Autoregression Estimates
Date: 07/22/11 Time: 21:05
Sample (adjusted): 1993 2010
Included observations: 18 after adjustments
Standard errors in ( ) & t-statistics in [ ]

	GDP	OIL	CPI	EXPORT	IMPORT
GDP(-1)	0.224490	0.273074	0.275500	-0.008715	0.095587
	(0.37522)	(0.43166)	(0.17824)	(0.03985)	(0.09940)
	[0.59829]	[0.63261]	[1.54563]	[-0.21871]	[0.96164]
GDP(-2)	0.186771	-0.192622	0.114721	-0.025541	-0.108202
	(0.29172)	(0.33561)	(0.13858)	(0.03098)	(0.07728)
	[0.64023]	[-0.57395]	[0.82782]	[-0.82441]	[-1.40010]
OIL(-1)	-2.115298	0.220356	1.187649	-0.162455	-0.183656
	(1.22811)	(1.41285)	(0.58340)	(0.13042)	(0.32534)
	[-2.54811]	[0.15597]	[2.03572]	[-1.24560]	[-0.56450]
OIL(-2)	0.687959	0.999134	-0.178733	0.141305	0.195729
	(0.54853)	(0.63104)	(0.26057)	(0.05825)	(0.14531)
	[0.05419]	[1.58330]	[-0.68592]	[2.42572]	[1.34694]
CPI(-1)	1.813205	-1.551121	-0.586737	0.101601	-0.257154
	(1.45713)	(1.67633)	(0.69220)	(0.15474)	(0.38602)
	[1.24436]	[-0.92531]	[-0.84764]	[0.65657]	[-0.66617]
CPI(-2)	-2.224608	1.883972	1.717916	-0.079557	0.411579
	(1.67696)	(1.92923)	(0.79663)	(0.17809)	(0.44425)
	[-1.32657]	[0.97654]	[2.15648]	[-0.44672]	[0.92646]
EXPORT(-1)	20.77480	-11.83466	-10.96314	0.813336	-1.831205
	(10.6054)	(12.2007)	(5.03799)	(1.12627)	(2.80951)
	[1.95890]	[-0.97000]	[-1.17609]	[0.72215]	[-0.65179]

EXPORT(-2)	-5.524047	-7.141710	4.768720	-1.365762	-1.403621
	(4.04970)	(4.65890)	(1.92378)	(0.43007)	(1.07282)
	[-1.36406]	[-1.53292]	[2.47883]	[-3.17567]	[-1.30834]
IMPORT(-1)	4.051600	3.625840	-0.899024	0.202716	1.023766
	(2.11473)	(2.43285)	(1.00459)	(0.22458)	(0.56022)
	[1.91589]	[1.49037]	[-0.89492]	[0.90265]	[1.82743]
IMPORT(-2)	4.817099	-2.308704	-3.259776	0.219733	-0.103722
	(3.90123)	(4.48809)	(1.85325)	(0.41430)	(1.03349)
	[1.23476]	[-0.51441]	[-1.75895]	[0.53037]	[-0.10036]
C	9.847144	93.44852	-16.16140	12.58204	18.26995
	(34.8332)	(40.0731)	(16.5472)	(3.69921)	(9.22780)
	[0.28269]	[2.33195]	[-0.97668]	[3.40128]	[1.97988]
R-squared	0.879872	0.946072	0.956531	0.906543	0.914908
Adj. R-squared	0.781118	0.869032	0.941575	0.773033	0.814777
Sum sq. resids	463.1463	612.9686	104.5160	5.223369	32.50342
S.E. equation	8.134111	9.357721	3.864046	0.863826	2.154842
F-statistic	34.07767	12.28031	201.0880	6.790079	19.24772
Log likelihood	-54.76993	-57.29237	-41.37161	-14.40583	-30.85966
Akaike AIC	7.307770	7.588041	5.819067	2.822870	4.651073
Schwarz SC	7.851887	8.132157	6.363184	3.366986	5.195189
Mean dependent	185.3900	40.05222	78.10147	7.449611	10.22100
S.D. dependent	36.79051	25.85760	42.09839	1.813197	7.381382

Determinant resid covariance (dof adj.)	1907.306
Determinant resid covariance	16.96477
Log likelihood	-153.1847
Akaike information criterion	23.13164
Schwarz criterion	25.85222

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

$$\begin{aligned} GDP = {} & 0.22GDP(-1) + 0.19GDP(-2) - 2.12OIL(-1) + 0.69OIL(-2) + 1.81CPI(-1) \\ & \quad (0.60) \qquad (0.64) \qquad (-2.55)^{*} \qquad (0.05) \qquad (1.24) \\ & - 2.22CPI(-2) + 20.77EXP(-1) - 5.52EXP(-2) + 4.05IMP(-1) + 4.82IMP(-2) \\ & \quad (-1.33) \qquad (1.96)^{*} \qquad (-1.36) \qquad (1.92)^{*} \qquad (1.23) \\ & - 9.85 \\ & \quad (0.28) \end{aligned}$$

The sign of (*) denotes significant of 95% confidence level
Data processed by Eviews 6 (see Appendix 7)

Based on the results of VAR estimation GDP as dependent variable, can be seen that the variables that affect the GDP is significantly present only in the

oil price variable at t-1 (short term or at lag one previous periods)) with t-statistics of -2.05, variable export t-1 with t-statistics 1.96, and imports t-1 with t-statistics 1.92, while the other variables are not statistically significant effect.

Number of variable are not significantly affect the GDP in t-1 or short time due to changes in the variables independent indirect effect on the dependent variable. Inflation, Oil's Export and Import and also the GDP itself are positively affect GDP in short term (one previous period), but in long term only import and oil price are positively affect the GDP while the other variables are negatively affected.

For the price of oil at t-1 negative and significant impact on GDP, while oil prices at t-2 (at two previous period) gave a positive but not significant effect on GDP. It means that oil prices give a negative impact on GDP after one year of change. This is because Indonesia is oil importer country, if the fluctuations in oil prices has exceeded the benchmark of State Budget, then every 1 dollar per barrel increase in oil prices last year led to Indonesia's GDP fell by 2.12 billion U.S. Dollar.

The coefficient determination of adjusted R-squared is 0.781 which means 78% of GDP is determined by factors in model, and the rest, about 22% is formed by other variables exclude them. For simply, all variables can put together output (GDP) in long term, but if there is no variables effected output, the output will decrease about 9.85.

The second equation estimating vector autoregression (VAR) for Oil price as dependent variable as follow:

$$
\begin{aligned}
Oil = {} & 0.27GDP(-1) - 0.19GDP(-2) + 0.22OIL(-1) + 0.99OIL(-2) - 1.55CPI(-1) \\
& \quad (0.63) \qquad (-0.57) \qquad (0.16) \qquad (1.58) \qquad (-0.93) \\
& + 1.88CPI(-2) - 11.83EXP(-1) - 7.14EXP(-2) + 3.63IMP(-1) - 2.31IMP(-2) \\
& \quad (0.98) \qquad (-0.97) \qquad (-1.53) \qquad (1.49) \qquad (-0.51) \\
& + 93.45 \\
& \quad (2.33)
\end{aligned}
$$

The sign of (*) denotes significant of 95% confidence level
Data processed by Eviews 6 (see Appendix 7)

For short term even long term with lag, no one of the variables are significant to variable of Oil price, because the t-statistic of each variable is less than 1.753 and not significant at 95% confidence level. In short term, variable of Oil price itself and Oil's import are positive compose long run relationship while the others are negative relationship to oil price.

In the second equation with Oil price as dependent variable, the variable Oil Price has a positive influence on the lag of two previous periods. The results of this equation indicate that every increase in oil price and inflation will raise price of oil at two upcoming periods. And the variable of Oil's Import has a positive significant influence on the lag one previous period. In other words, oil price and oil's import increased in the period of this study will increase oil price its self at the current time.

The adjusted coefficient determination of R-squared is 0.869 which means 87% of Oil is determined by factors in model, and the rest, about 13% is formed by other variables exclude them. For simply, all variables can put together oil price in long term, even there is no variables effected, the variable dependent still has value about 93.45.

The Third equation estimating vector autoregression (VAR) for CPI as dependent variable as follow.

$$
\begin{aligned}
CPI = {} & 0.28GDP(-1) + 0.11GDP(-2) + 1.19OIL(-1) - 0.18OIL(-2) - 0.59CPI(-1) \\
& \quad (1.55) \qquad (0.83) \qquad (2.04)^{*} \qquad (-0.69) \qquad (-0.85) \\
& + 1.72CPI(-2) - 10.96EXP(-1) + 4.77EXP(-2) - 0.91IMP(-1) - 3.26IMP(-2) \\
& \quad (2.16)^{*} \qquad (-1.17) \qquad (2.47)^{*} \qquad (-0.89) \qquad (-1.76)^{*} \\
& - 16.16 \\
& \quad (0.97)
\end{aligned}
$$

The sign of (*) denotes significant of 95% confidence level
Data processed by Eviews 6 (see Appendix 7)

In the estimation results above where the CPI as a dependent variable can be seen that the variable price of oil and oil exports have a significant effect on the CPI, where a significant positive impact of oil prices on the CPI. It means that every increase of 1 dollar per barrel oil prices lead to rising inflation by 1% to the next year. Conversely, export of oil in short term (with one lag previous period) gave a significant negative impact on the CPI, meaning that every increase of 1 billion dollars in oil exports will reduce the consumer price index of 10.96.

When viewed from two previous period, exports and imports of oil and includes the CPI itself significant impact on the CPI variable, where only the CPI (t-2) and oil exports (t-2) positive influence on the CPI itself, while oil imports brought negative influence on CPI. From the above estimation results in the previous two-year period, every 1% increase in the CPI and oil exports will cause an increase in the CPI itself in the next two years.

The adjusted coefficient determination of R-squared is 0.94 which means 94% of CPI 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 in long term, even there is no variables effected the , the variable dependent still has value about 16.16.

The Fourth equation estimating vector autoregression (VAR) for Oil Exports as dependent variable as follow.

$$\begin{aligned}\text{OIL'S EXPORT} = {} & -0.01\text{GDP}(-1) - 0.03\text{GDP}(-2) - 0.16\text{OIL}(-1) + 0.14\text{OIL}(-2) \\ & \quad (0.22) \qquad (-0.82) \qquad (-1.25) \qquad (2.43)^{*} \\ & + 0.10\text{CPI}(-1) - 0.08\text{CPI}(-2) + 0.81\text{EXP}(-1) - 1.37\text{EXP}(-2) \\ & \quad (0.66) \qquad (-0.45) \qquad (0.72) \qquad (-3.18)^{*} \\ & + 0.20\text{IMP}(-1) + 0.22\text{IMP}(-2) + 12.58 \\ & \quad (0.93) \qquad (0.53) \qquad (3.4)^{*}\end{aligned}$$

The sign of (*) denotes significant of 95% confidence level
Data processed by Eviews 6 (see Appendix 7)

VAR estimation results show that long-term Oil price significantly affect Oil Exports positively with t-test 2.43 and with estimated parameters for 0.14. this means in the long term, increasing oil price by 1 dollar per barrel contributed to the increase of oil exports of 0.14 billion US Dollar. Then, increasing 1 billion oil export will decline the value of itself for two upcoming period.

The adjusted coefficient determination of R-squared is 0.877 which means 88% of oil exports is determined by factors in model, and the rest, about 12% is formed by other variables exclude them. For simply, all variables can put together in long term, even there is no variables effected the , the variable dependent still has value about 12.58.

The last equation estimating vector autoregression (VAR) for Oil Imports as dependent variable as follow.

$$\begin{aligned}\text{OIL'S IMPORT} = {} & 0.10\text{GDP}(-1) - 0.11\text{GDP}(-2) - 0.18\text{OIL}(-1) + 0.20\text{OIL}(-2) \\ & \quad (0.96) \qquad (-1.40) \qquad (-0.56) \qquad (1.35) \\ & - 0.26\text{CPI}(-1) + 0.41\text{CPI}(-2) - 1.83\text{EXP}(-1) - 1.40\text{EXP}(-2) \\ & \quad (-0.67) \qquad (0.93) \qquad (-0.65) \qquad (-1.30) \\ & + 1.02\text{IMP}(-1) - 0.10\text{IMP}(-2) + 18.27 \\ & \quad (1.82)^{*} \qquad (-0.10) \qquad (1.98)^{*}\end{aligned}$$

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

For short term even long term with lag, no one of the variables are significant to variable of Oil Imports, because the t-statistic of each variable is less than 1.753 and not significant at 95% confidence level. In short term, variable of Oil Imports itself and GDP are positive compose long run relationship while the others are negative relationship to oil price.

In the last equation with Oil Imports as dependent variable, the variable Oil Price has a positive influence on the lag of two previous periods. The results of this equation indicate that every increase in 1 dollar per barrel of oil price raised price of oil at two upcoming periods. Meanwhile every increase of 1 dollar per barrel of oil price lead to decrease oil imports in the short term. This is because in short term every increase of oil price not accompanied by increasing the GDP, so it will make oil imports fall. However, the rise in oil prices give impact but not significant on oil imports. That is, oil prices give a small impact on oil imports. The main cause is the high of oil import of fuel consumption in Indonesia is not accompanied by domestic oil production, the higher oil consumption in Indonesia and the lower the level of production, so it will make he higher oil imports.

The adjusted coefficient determination of R-squared is 0.81 which means 81% of Oil Imports is determined by factors in model, and the rest, about 11% is formed by other variables exclude them. For simply, all variables can put together oil price in long term, even there is no variables effected, the variable dependent still has value about 18.27.

5.2.7 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.

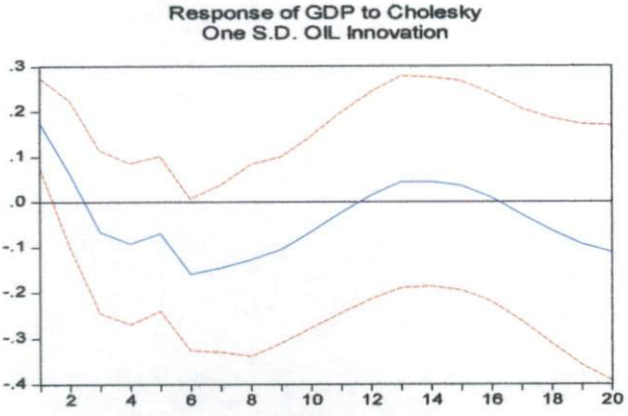
This impulse response function is needed to see changing on one variable on to other variables include itself. Impulse Response Function estimates made for this emphasis on the response of a variable on the change of one standard deviation of the variable itself and other variables contained in the model.

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 GDP, CPI, Oil's Export, Oil's Import and even the variable price of oil itself to shocks in world oil prices). Through the impulse response function will be the conclusion of this study.

1. Impulse Response Function of GDP to Oil Price Shocks

The GDP response to oil price shock can be seen in graph 5.1 and table in appendix 8. The vertical axis is the response of macroeconomic variables the GDP 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 variables to shocks in oil prices, while the red line is the constraint error (error bands) which gives an overview of its significance response (Ellison, 2003).

Graph 5.1 : Response of GDP to Oil Price



Data processed by using Eviews 6 (See Appendix 7)

The trend of GDP response to Oil price shocks is significant negative at the beginning period and the current account positive above average since the period 4 to period 20. Graph 5.1 shows the first period, the standard deviation of GDP is equal 0.176693. it means the oil price shocks of the early period have an impact on output (GDP). After one period, standard deviation decrease to 0.064370 below the average and the next period is negative and still below to the average which the value of standard deviation is -0.064129. In period four, the increase in GDP of Indonesia still negative with a standard deviation above the average that is equal to -0.090462.

In period six up to the mid period, the standard deviation of GDP still negatively above the average, but in the period twelve to sixteen began experiencing positively to the respective standard deviations below average, i.e. 0.015704, 0.046318, 0.045790, 0.046318, 0.037546 and 0.011423. But in the last three periods, the impulse response of GDP to shocks in oil prices again showed a negative standard deviation.

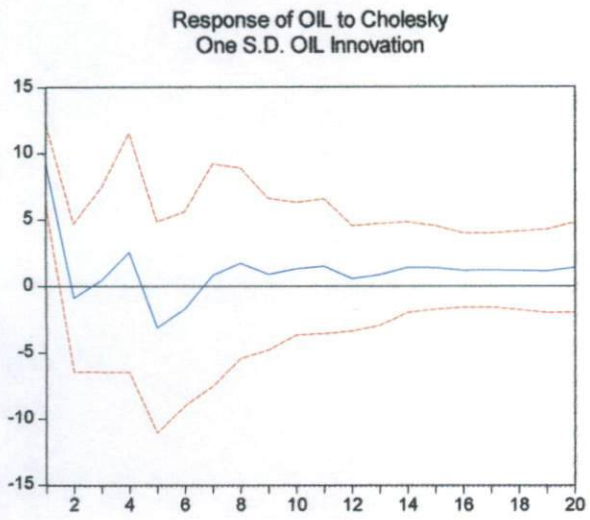
From the description of the graph can be concluded that the GDP response to oil price shock after three period is significant negative and began response

positively from the twelve period until the sixteen period but not significant. 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 trend.

2. Impulse Response Function of Oil Price to Oil Price Shocks

Graph 5.2 below illustrates the impulse response function of oil prices on the shock price itself. Response of Oil price to itself is positive above the average of the beginning period is about 9.184831, but dropped drastically in period two which the standard deviation is below average, about -0.821238. In period three and four began to increase the standard deviation compared to the previous period but still below average, each of them are 0.507480 and 2.593829.

Graph 5.2 : Impulse Response Function of Oil Price to Oil Price Shock



Data is processed by using Eviews 6 (See Appendix 8)

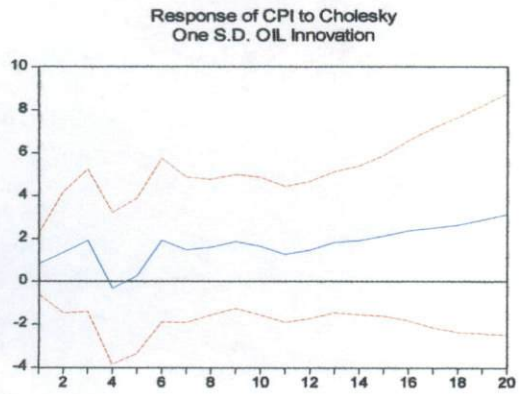
Furthermore oil price response to the oil price shock itself again experienced a significant reduction in the period of five and six, then step-by-step started to take off but remains the standard deviation is still below average.

Until the last ten periods, the response to the oil price shock of oil price itself is not too volatile. It can be seen in graph 5.2. on the graph, the response to the oil price shock of oil price itself tends to be stable and positive with an average standard deviation of 1.2, where the highest response occurred in a period of fourteen of 1.464661.

3. Impulse Response Function of CPI to Oil Price Shocks

In the impulse response graph5.3 below shows the changes in the CPI variable in response to a shock or a change of variable oil prices. At the beginning of the period, the oil price shock has positive response by the CPI until the third period with the standard deviation about 1.948067 above average. In the next period, oil price shocks are negatively response by the CPI and the CPI decreased by -0.288572 below average. Moving on from period four, the response of CPI has increased in the period of five and six and then continued to increase in response from period seven to the last period.

Graph 5.3 : Impulse Response Function of CPI to Oil Price Shock



Data is processed by using Eviews 6 (See Appendix 8)

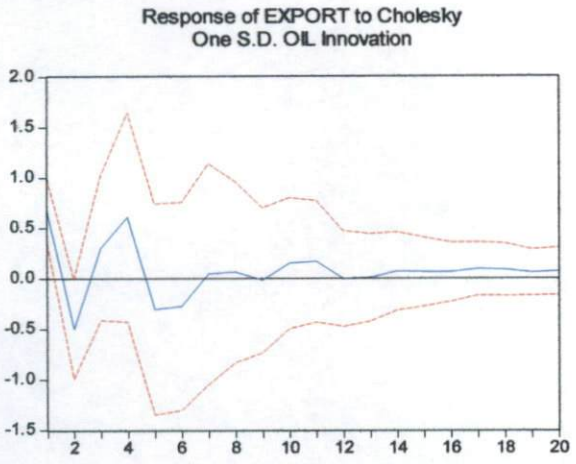
Judging from the overall response that was given of CPI to changes in world oil prices, it can be concluded that oil price shocks since the beginning gives a positive response of CPI, means by which changes in oil prices in line with CPI response to the change itself.

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 intended to cover the budget deficit due to rising oil prices.

4. Impulse Response Function of Oil's Export to Oil Price Shocks

Based on graph 5.4 will be seen that the response variable Export to oil prices is when there is rise in oil price shock will impact on oil exports initially declined in period two with a standard deviation of 0.492246 and then rose and peaked in the period 4 for 0.616228 above average and drops again in the period five amount -0.297289 below average.

Graph 5.4 : Impulse Response Function of Oil's Export to Oil Price Shock



Data is processed by using Eviews 6 (See Appendix 8)

When viewed on the response of export of oil to oil prices so when the oil price increase so the impact is quite volatile (up and down) and began to stabilize after period 10 to the end of the period approaching the balance point.

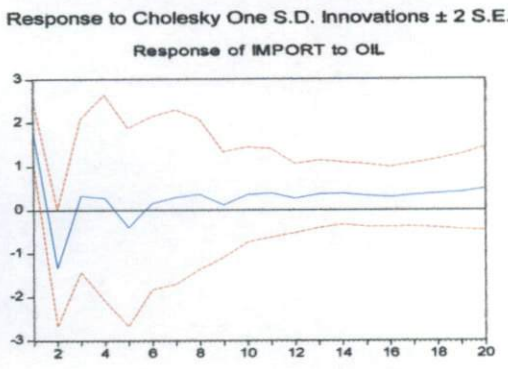
The increase in world oil prices responded flatly by crude oil exports during the period with a period of seven to 20. This is because Indonesia is unable to meet production targets so that Indonesia exports of crude oil from year to year decreases, but still at reasonable levels.

5. Impulse Response Function of Oil's Import to Oil Price Shocks

The import variable response to oil price shock can be seen in graph 5.5 and appendix 8. The response shown by variable import of any increase in oil prices is positive in the early period with the highest value of standard deviation of 1.789454 is above average and the lowest response rate occurred in period 2 where the value of the lowest standard deviation is -1.313854.

The second negative response is shown in a period of 5 where the value of standard deviation below average is -0.385292, and a positive return after a period of 6. Response of oil import is likely to be stable starting from the middle period until the end of the period.

Graph 5.4 : Impulse Response Function of Oil's Import to Oil Price Shock



Data is processed by using Eviews 6 (See Appendix 8)

This means that Indonesia's oil imports are still increasing despite the oil price increase itself. This is because Indonesia is now an oil importer country, which has to import oil from exporting countries to meet domestic oil consumption which is increasingly higher as rising oil prices.

In simple, impulse response functions for testing the impact of world oil price fluctuation toward Indonesian economy finds that response of variables to shock or changes of oil price is come and go. Response of Oil price to its own shock make this variable fluctuated in long run, even it just at the beginning period. The biggest response to shock of Oil price comes from inflation. Inflation of CPI has such deep reaction to respond shock of Oil price, it can be seen since earlier period. The response is up and down. Whereas response of GDP to Oil price which the main focus of this study, result that response is quite big. Changing in oil price will shift the GDP. The changes are significantly negative, while response of GDP is positive after midterm period but not significant. It caused in short term, there is lag to correct changes of price, but then in long term state will make adjustment. Changes in inflation is tend to positive while the oil shock price because Indonesia depend on the oil importing that high in oil price led to high in overall price.

5.2.8 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 9. In the first row respectively is a period, the standard error, and the next is the explanatory variable model, namely GDP, the price of oil itself, oil export and oil import. Interpretation of the results will be focused in looking at the variance decomposition of each variable to changes in oil prices. Variance decomposition in Eviews obtained the following results.

1. Variance Decomposition of GDP

From the table 5.8 indicate for variable of GDP the estimated error variance completely (100%) explained by itself in the first period while the other variables is 0%. But in the second period variable oil price has an influence of estimates of error variance as 0.05 percent, CPI as 16.62 percent, export oil as 16.1 percent and import oil as 6.24 percent and the rest explained by itself about 60.99 percent. In the third period, the error variance of Oil price is 1.84 percent explained the GDP constant. In the sixth year, the effect of oil price increases with the estimated error variance was 10.24 percent, followed by an increase in the influence of exports and imports of oil, while the influence of CPI to GDP declined in this period. In the next period, the influence of error variance in world oil prices decreased to 9.88 percent of GDP in line with the decline in the influence of error variance with a value of 12.9 percent of CPI. Decrease the influence of error variance of oil prices on GDP variable is held for six consecutive periods.

Table 5.8 Variance Decomposition of GDP Constant

Period	S.E.	GDP	Oil Price	CPI	Export	Import
1	8.134	100.00	0.000	0.000	0.000	0.000
2	10.924	60.993	0.054	16.618	16.099	6.235
3	12.969	54.421	1.835	15.314	21.006	7.424
4	13.520	50.664	4.816	14.097	21.705	8.718
5	14.317	45.201	9.029	12.897	24.147	8.726
6	14.929	41.587	10.241	12.553	26.386	9.233
7	15.452	39.025	9.877	12.499	28.733	9.866
8	15.785	38.792	9.483	12.809	28.871	10.044
9	16.144	40.235	9.070	13.286	27.653	9.756
10	16.831	42.865	8.399	14.282	25.475	8.980
11	17.798	45.219	8.314	15.531	22.797	8.139
12	18.850	47.597	8.790	15.940	20.352	7.321
13	19.882	50.364	9.184	15.555	18.314	6.583
14	20.827	52.866	9.492	14.772	16.703	6.167
15	21.698	54.819	9.723	13.902	15.400	6.156
16	22.520	56.153	9.929	13.155	14.313	6.449
17	23.343	56.949	10.185	12.655	13.404	6.807
18	24.226	57.287	10.530	12.460	12.681	7.040
19	25.220	57.468	10.816	12.535	12.096	7.085
20	26.363	57.832	10.942	12.802	11.483	6.941

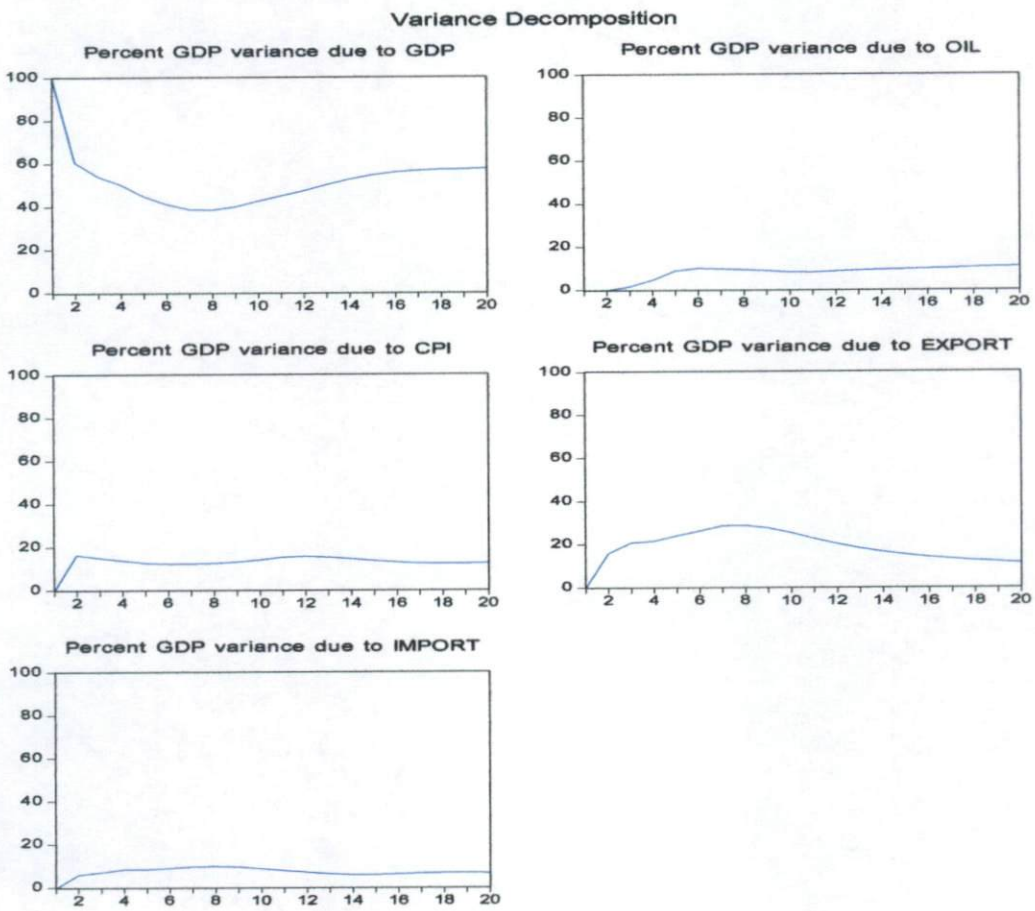
Data processed by using Eviews 6

Next on the period of thirteen, the influence of world oil prices began to show an increased level of the error variance of 9:18 percent, in contrast, the effect of inflation began to decline during the period amounting to 13.90 percent and lasted until the final period, as well as the variable export decline in a period of twelve to the end of the period. Until the end of the period, the influence of oil price variance decomposition of GDP amounted to 10.94 percent, the influence of variance decomposition of inflation to GDP amounted to 12.8 percent, the influence of variance decomposition of exports to GDP is 11.48 percent, the influence of variance decomposition imports to GDP amounted to 6.94 percent,

and the influence of the variance decomposition of GDP itself amounted to 57.83 percent.

Based on the results of variance decomposition of the study is devoted to the world oil price shock, it can be concluded is over 20 periods, the price of oil effect the variance decomposition for 8.035 percent of GDP while the influence of variance decomposition of other variables is 13.183 percent, 18 881 percent and 7.384 percent. The influence of variance decomposition of oil price to GDP was highest in the period of twenty that is equal to 10.94 percent, and the lowest in the first period and the second is equal to 0.05 percent. For more details can be seen in the graph below the variance decomposition.

Graph 5.5 : Variance Decomposition of GDP



Data processed by using Eviews 6 (See Appendix 8)

2. Variance Decomposition of Oil Price

From the table 5.9 below indicates the estimated error variance decomposition for Oil price. In the first period can be seen that only oil price variable itself that gives its impact on oil prices with the variance decomposition of 96.34 percent and the rest is given by the variable error variance of GDP by 3.66 percent. but in the second period, the Oil's exports already has bigger influence on estimates of error variance as 19.17 percent, imports as 4.8 percent, CPI as 1.67 percent, and GDP as 5.9 percent. In third period, the error variance decomposition of its own variable is 61.39 percent, the error variance of CPI as 7.22 percent, the error variance of Export as 19.7 percent, as imports of 6.02 percent and error variance decomposition of GDP as 5.66 percent

Table 5.9 Variance Decomposition of Oil Price

Period	S.E.	GDP	Oil Price	CPI	Export	Import
1	9.358	3.661	96.339	0.000	0.000	0.000
2	11.145	5.918	68.457	1.662	19.165	4.798
3	11.788	5.663	61.386	7.224	19.705	6.021
4	13.640	10.059	49.458	5.514	28.526	6.443
5	14.145	10.054	50.682	5.666	26.722	6.875
6	14.697	10.829	48.210	6.615	27.889	6.456
7	15.169	11.649	45.583	9.578	26.355	6.835
8	15.766	13.573	43.454	11.185	24.399	7.389
9	16.327	17.144	40.855	11.972	22.754	7.274
10	16.890	20.946	38.824	12.086	21.265	6.879
11	17.250	23.349	38.017	11.599	20.386	6.649
12	17.604	25.650	36.631	11.191	19.723	6.805
13	17.896	27.000	35.711	10.829	19.213	7.247
14	18.131	27.490	35.442	10.589	18.786	7.693
15	18.377	27.780	35.110	10.463	18.575	8.072
16	18.662	28.160	34.487	10.587	18.463	8.304
17	19.013	28.812	33.654	10.949	18.290	8.294

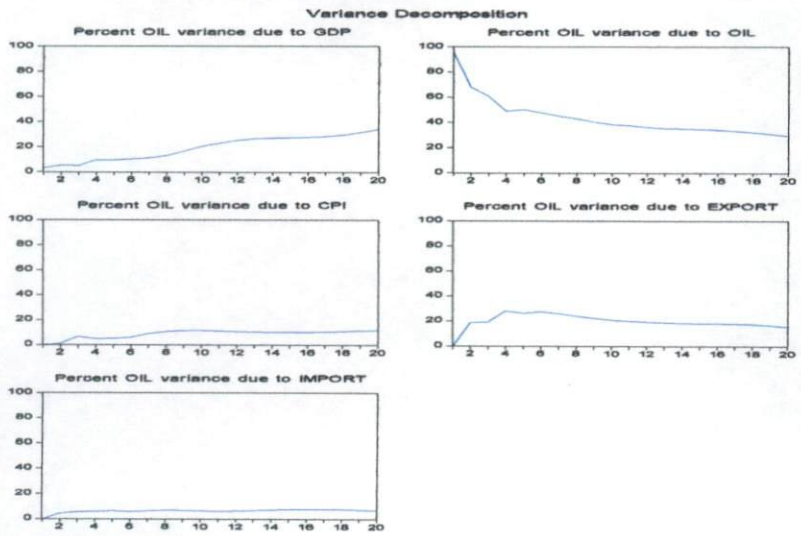
18	19.428	30.045	32.626	11.377	17.844	8.109
19	19.955	32.081	31.274	11.840	17.034	7.770
20	20.623	34.618	29.778	12.294	15.993	7.317

Data processed by using Eviews 6 (See Appendix 8)

In mid-period, the influence of the variance decomposition of its own variable (in this case is oil price) began to decline. In the period of ten, the influence of error variance decomposition of oil prices by 38.82 percent, down from last period which amounted to 40.86 percent. While the higherinfluence of the variance decomposition of GDP on oil prices started from a period of eight and continued until the period of twenty.

Based on table of variance decomposition of oil price above can be concluded that the price of oil influences include all the variables with the varies degree of influence. The effect of oil price itself is highest in the early period of the variance decomposition of 96.34 percent and decreased until the end of the period with the lowest error variance occurred in the period of twenty of 29.78 percent, so it show a negative trend. For more details the influence of the variance decomposition of all variables can be seen in the chart below.

Graph 5.5 : Variance Decomposition of Oil Price



Data processed by using Eviews 6 (See Appendix 8)

3. Variance Decomposition of CPI

From the table 5.10, it is indicated the estimated error variance for inflation or CPI. From the first period we can see that CPI was explained by three variables, i.e. GDP, Oil price, and CPI itself. For the first period, the variables that affect CPI is explained by the CPI itself with the error of variance decomposition of 60.33 percent, followed by GDP and the error of variance of 34.68 percent, then prices by 4.99 percent, where other variables have no effect because the value of variance decomposition is equal to zero. But in a period of two, was beginning to look the rising influence of oil prices on the CPI is the value of error of variance decomposition of 7.11 percent, followed by the CPI by 47.21 percent.

In sixth period, the estimated error variance of oil price is 10.21 percent, and carrying on export amounted to 10.93 percent and import as 0.93 percent. Until the end of period thirteen, the error variance of oil price showed the trend positively with the highest amount of variance decomposition on period 10 as 12.83 percent. Effect of error variance of oil prices on the CPI began to decline during the period of fourteen and then fluctuated until the end of the period.

Table 5.10 Variance Decomposition of CPI

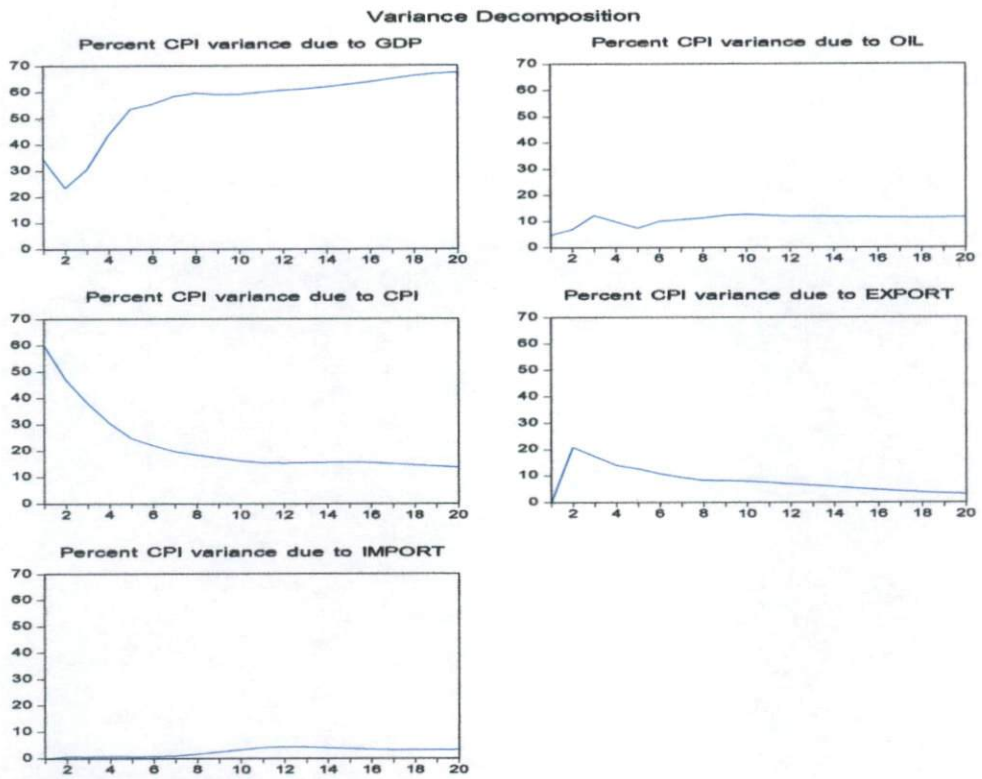
Period	S.E.	GDP	Oil Price	CPI	Export	Import
1	3.864	34.680	4.994	60.326	0.000	0.000
2	6.131	23.698	7.106	47.206	21.014	0.974
3	7.199	30.855	12.476	38.244	17.539	0.886
4	8.065	43.963	10.068	30.762	14.153	1.052
5	9.336	53.743	7.615	24.935	12.792	0.913
6	10.125	55.680	10.207	22.257	10.926	0.927
7	10.823	58.580	10.801	19.936	9.510	1.174
8	11.609	59.799	11.426	18.590	8.360	1.822
9	12.346	59.243	12.459	17.473	8.252	2.571
10	13.038	59.287	12.826	16.373	8.046	3.466

11	13.750	60.105	12.429	15.645	7.554	4.265
12	14.578	60.845	12.114	15.502	6.991	4.546
13	15.525	61.298	12.124	15.605	6.507	4.464
14	16.622	62.118	11.955	15.748	5.972	4.206
15	17.875	63.057	11.798	15.855	5.394	3.893
16	19.232	64.048	11.757	15.694	4.877	3.623
17	20.662	65.214	11.685	15.272	4.372	3.455
18	22.162	66.319	11.609	14.766	3.907	3.397
19	23.727	67.133	11.636	14.285	3.524	3.420
20	23.358	67.653	11.743	13.860	3.235	3.507

Data processed by using Eviews 6 (See Appendix 8)

The influence of variance decomposition of world oil price to CPI is not too much if we see from the number. Based on the graph of variance decomposition can be seen below percent CPI variance due to oil shaped line that is not too bumpy, or nearly stable lines. It can be concluded that the influence of variance decomposition of oil prices relatively stable and positive against the CPI (see graph 5.6). Meanwhile, percent CPI of variance due to GDP showed a trend that varies with an increase in the value of the error of variance is very sharp in the period three.

Graph 5.6 : Variance Decomposition of Oil Price



Data processed by using Eviews 6 (See Appendix 8)

4. Variance Decomposition of Export

For the variable Export, in the first period, the estimated error of variance for export are described by all variables except the Oil's imports, where the value of each error of variance for the variables GDP by 6.54 percent, prices by 61.15 percent, an inflation of 21.1 percent and exports itself for 11.22 percent, with the highest influence explained by the of variance decomposition of oil prices in the first period.

In period two, the influence of of oil prices on oil exports increased with the estimated error of variance was 66.38 percent. The fourth period, the influence of oil prices began to decline in value by 42.59 percent of variance decomposition. This is inversely proportional to the four other variables which the influence of these variables have increased in each period, especially in the

variable GDP is very noticeable increase in the value of its error of variance. It can take a look at the chart 5.7.

Table 5.11 Variance Decomposition of Oil's Export

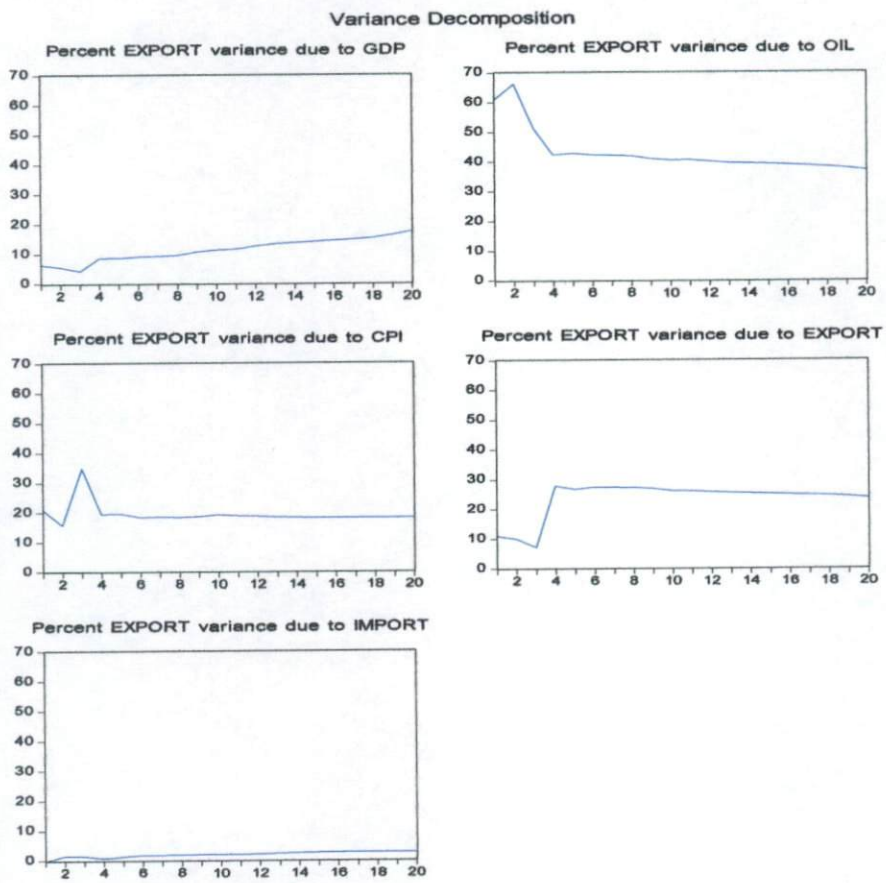
Period	S.E.	GDP	Oil Price	CPI	Export	Import
1	0.864	6.537	61.146	21.103	11.215	0.000
2	1.026	5.719	66.385	15.923	10.203	1.770
3	1.242	4.445	51.492	35.035	7.373	1.656
4	1.661	8.790	42.587	19.673	28.020	0.930
5	1.713	8.843	43.040	19.791	26..863	1.463
6	1.771	9.263	42.535	18.599	27.612	1.992
7	1.776	9.376	42.386	18.734	27.500	2.005
8	1.785	9.728	42.126	18.584	27.466	2.096
9	1.805	10.843	41.190	18.781	27.050	2.135
10	1.834	11.500	40.628	19.370	26.283	2.218
11	1.851	11.774	40.754	19.076	26.214	2.181
12	1.863	12.760	40.233	18.852	25.882	2.273
13	1.876	13.541	39.720	18.609	25.657	2.473
14	1.883	13.897	39.564	18.460	25.449	2.631
15	1.890	14.234	39.396	18.332	25.259	2.774
16	1.900	14.615	39.139	18.321	25.053	2.872
17	1.913	14.954	38.856	18.386	24.903	2.900
18	1.928	15.471	38.496	18.386	24.733	2.915
19	1.945	16.417	37.933	18.363	24.366	2.920
20	1.967	17.652	37.259	18.337	23.856	2.896

Data processed by using Eviews 6 (See Appendix 8)

From the table 5.11 indicates in the mid period, the influence of world oil prices on oil exports at the level of 40.63 percent, the influence of GDP on oil exports with a value amounting to 11.5 percent decomposition of variance, the effect of inflation of 19.37 percent, the influence of oil exports itself by 26.28 percent, and the influence of oil imports against oil exports to the error of variance reaches 2.2 percent.

Next on the period of the last ten years there is a decline in the value of variance decomposition of oil prices but not very significant, with the average forecast error of variance was 39 percent. This is contrary with the influence of other variables in the period in which the last ten years has increased the value of error variance decomposition.

Graph 5.6 : Variance Decomposition of Oil's Export



Data processed by using Eviews 6 (See Appendix 8)

In the graph above we can see the influence of each variable on oil exports tend to fluctuate in the early period, and began to stabilize in the mid-period to the end. Based on table 5.11 and graph 5.6 we can conclude that oil prices are high enough to give the influence to export oil if seen from the magnitude of the estimated error of variance decomposition for twenty periods. Instead variable oil

import give a very small effect on exports if viewed from the large value of its error of variance decomposition.

5. Variance Decomposition of Oil's Import

From the table 5.12, it indicates the estimated error of variance for Oil's import in the first period is explained by the price of oil as the influence of the highest where the error of variance was at 68.96 percent, the error variance decomposition of GDP of 14.23 percent, inflation of 3.58 percent, export of 3.47 percent, and variable import itself with the error of variance decomposition of 9.76 percent.

In the third period, there is a decline in oil price influence to oil's import which forecasting of error variance as 57.45 percent followed by the influence of GDP that has been decrease at that time as 7.79 percent. This is contrary to the influence of the oil export itself that it is looking at a period of four increased by 23.7 percent.

Table 5.12 Variance Decomposition of Oil's Import

Period	S.E.	GDP	Oil Price	CPI	Export	Import
1	2.155	14.226	68.962	3.578	3.471	9.763
2	2.820	8.417	61.975	4.777	13.156	11.675
3	2.964	7.794	57.464	8.745	14.000	11.996
4	3.220	8.876	49.497	7.409	23.696	10.533
5	3.345	12.404	47.188	8.278	22.347	9.785
6	3.459	13.415	44.374	11.945	20.948	9.318
7	3.646	16.582	40.620	13.857	19.611	9.330
8	3.789	20.386	38.602	13.858	18.271	8.884
9	3.934	25.492	35.919	12.326	17.013	8.250
10	4.072	29.137	34.309	12.726	16.095	7.733
11	4.167	31.070	33.691	12.161	15.377	7.701
12	4.257	32.887	32.704	11.661	14.738	8.010

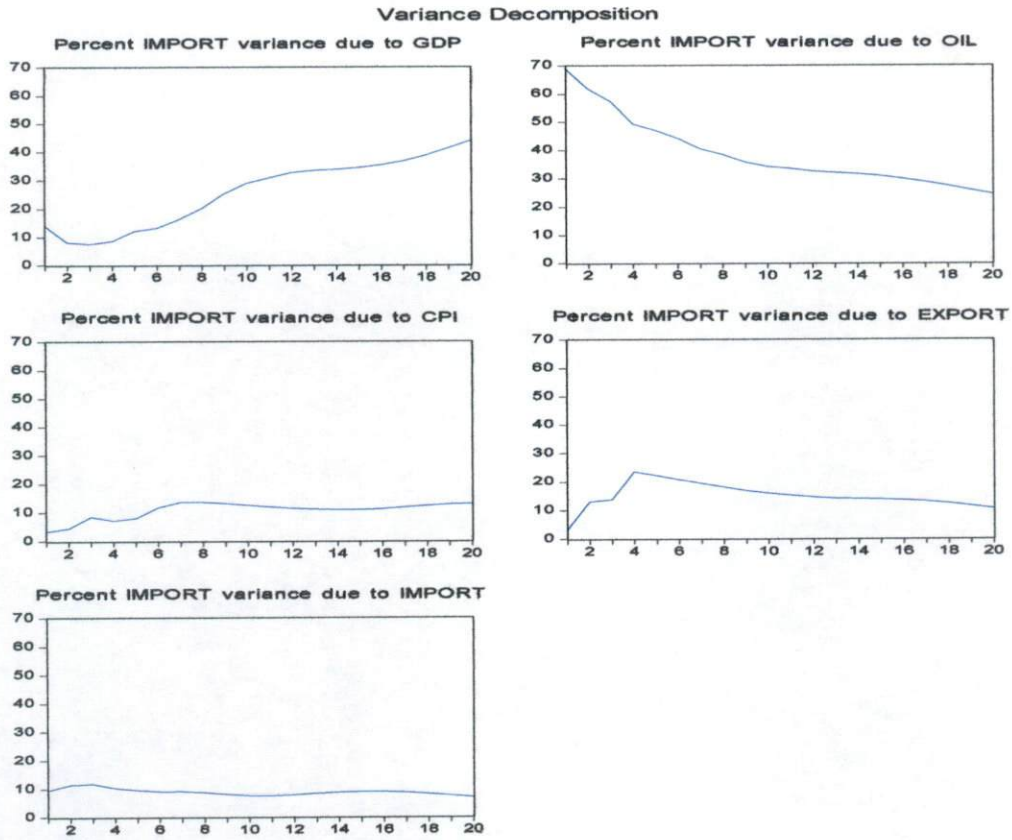
13	4.339	33.675	32.220	11.347	14.245	8.512
14	4.424	34.052	31.756	11.147	14.135	8.909
15	4.515	34.632	31.067	11.148	13.976	9.176
16	4.624	35.584	30.071	11.462	13.719	9.163
17	4.762	36.981	28.911	12.010	13.245	8.852
18	4.932	38.945	27.585	12.552	12.551	8.367
19	5.140	41.494	26.078	13.000	11.650	7.777
20	5.380	44.211	24.669	13.256	10.693	7.172

Data processed by using Eviews 6 (See Appendix 8)

From mid period, variance of oil price becomes weaker which about 34.31 percent but still has an authority that affect variable of Oil's import, where the value of variance decomposition of these variables respectively are 29.14 percent for GDP, 12.73 percent for CPI, 16 percent for oil's export, and 7.73 percent for itself. For the last period, that is period twenty, variance of oil price is smallest than ever which about 24.67 percent and put together variance of GDP become 44.21 percent, and variance of inflation become highest as 13.26. From variance decomposition estimation respect to oil's export result that oil price influence power is decreasing as the time goes and opposite with GDP.

All changes for variables are above the average of the beginning of the period until the end of the period. Response of Oil's import variables can also be shown by the figure 5.7

Graph 5.7 : Variance Decomposition of Oil's Import



Data processed by using Eviews 6 (See Appendix 8)

In conclusion, the variance decomposition illustrates how variables change in percent of GDP, Inflation, Exports, and Import of oil prices in each period. From the five variance decomposition above, a large percentage change in GDP on oil prices almost stable until the end of the period. It is also in line with the percentage change in inflation, which affected oil prices showed a steady rate each period. Meanwhile, the percentage change in value of export and import to the effects of declining oil prices until the end of the period.

CHAPTER VI

CONCLUSION AND RECOMMENDATION

6.1 Conclusion

This study uses a method of VAR (Vector Autoregression) to analyze the effect of oil price fluctuations on Indonesian economy with indicators of Gross Domestic Product (GDP) in constant 2000 prices in units of billion U.S. dollar, inflation as measured by the consumer price index, export and import of crude oil Indonesia in units of billion U.S. dollars over the past 20 years, from 1991 to 2010.

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

1. There is relationship between fluctuations of world oil price toward Indonesian economy. There is negative relationship between GDP and oil price. 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. This is consistent with the conclusions drawn by Hamilton (1983), Burbidge and Horrison (1984), Mork (1989), Lee Ni and Ratti (1995), and Weiqi Tang and Libowu (2009) stated that there is asymmetric relationship between world oil price fluctuation to the economic (GDP).
2. Fluctuations in world oil prices gives influence on inflation. This is explained by looking at impulse response functions of inflation to oil price shocks. Estimated cointegration and impulse response of inflation shows that there is

a positive and significant relationship between inflation and oil price. 1 dollar increase in oil price per barrel leads to an increase in inflation by 1.2%. Furthermore, the results also show positive and significant relationship between export of oil and oil price. 1 dollar per barrel increase in oil price leads to an increase in value of export by 0.14 billion US dollar. Increase in 1 dollar of oil price will leads to increase 0.2 billion US dollar of import value.

3. These findings are consistent with economic theory that suggests:

- The higher oil price, the higher of inflation. The higher inflation, leads the lower of GDP.
- Deficits occur when import exceeds export.
- Final conclusion, fluctuations in oil prices has a positive effect on inflation, exports, and imports of oil, but negative effect on GDP.

6.2 Recommendation

1. In anticipation of rising world oil prices and punched the state budget, the government should begin to reduce fuel 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 such as education, health, the National Program for Community Empowerment (PNPM), People's Business Credit (KUR) and the provision of infrastructure to be reduced.

2. The Government better to have making adjustments in fuel prices, which raise fuel prices gradually. The advantages of gradual adjustments in fuel prices compared to adjustment once the burden of rising fuel prices are not

perceived well by the society at a given moment, but are divided throughout the year.

3. Besides the reduction in fuel subsidies and fuel 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 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.

4. The reduction of fuel subsidy would raise the cost of living and increase the burden for many people. Therefore, before deciding to increase fuel price, the Government should set up programs to ease the burden on low-income communities. For example in the form of *Bantuan Tunai Langsung* (BLT). All policies are ultimately expected to further strengthen and stimulate the national economy and improve social justice for all Indonesian people.

REFERENCES

Abdul Jalil, Norasibah., Mat Ghani, Gairuzazmi, and Duasa, Jarita (2009). "Oil Prices and the Malaysia Economy". Sultan Idris Education University (UPSI) and International Islamic University (IIU).

Agustina, D. Dian (2011). "Money Neutrality". Skripsi. International Economics of Andalas University.

Akaike, Hirotugu (1978). "On The Likelihood of a Time Series Model". *The Statistician,* 27.

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.

Aversa, Jeane (2005). "*Economy Struggles with Rising Prices, Slow Growth*". YahooNews.

Bahang Dama, Laurens (2011). "Dampak Kenaikan Minyak Terhadap APBN dan Perekonomian Nasional". (Article)

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

Bank Indonesia (2005). "Pengaruh Kenaikan Harga BBM terhadap Inflasi". *Laporan Tahunan Bank Indonesia.*

Barro, J.Robert. (1984). "Inflationary Finance Under Discretion and Rules". NBER Working Paper 0889. National Bureau of Economic Research.

Berument, Hakan, and Basac Ceylan, Nildag (2005). "The Impact of Oil Price Shocks on the Economic Growth of the Selected *MENA* Countries". *JEL* codes (C22, F02, and O40).

Boediono. (2001). "Indonesia Menghadapi Ekonomi Global". BPFE-UGM. Jogjakarta.

Bopp and Lady. 1991. "The Effectiveness of Arbitrage and Speculation in the Crude Oil Futures Market". Journal Economics.

Boslaugh, Sarah. (2004). "Secondary Data Source". Cambridge University Press.

Braisinger, Clemens., Engelke, Wielfried., and Oliver Eicker (2011). " Petroleum Subsidies in Yemen: Reveraging Reform for Development". *Policy Research Working Paper* 5577.

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

Burbidge, John; Horrison, Alan. (1982). "Testing for The Effects of Oil Price Rises using Vector Autoregression". School of Economics Working Paper. University of Adelaide.

Central Intelligence Agency. www.cia.org

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

Data Warehouse, "Production, Consumption, Export, and Import of Indonesian Oil". *Ministry of Energy and Mineral Resources Republic of Indonesia.* www.esdm.go.id

Djalal, Nachrowi., Usman, Hardius (2006). "Ekonometrika: Untuk Analisis Ekonomi dan Keuangan". Fakultas Ekonomi Universitas Indonesia.

Energy Information Administration. www.eia.gov/petroleum/

Gao Jian and Xiucheng, Dong (2009). "How Oil Fluctustion Impact National Economy – Model Establishment and Its Application". School of Management, University of Petroleum (Beijing), P.R. China, 102249.

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

Glassbuner, Bruce; Chandra, Aditiawan. (1981). "Ekonomi Makro dan Kebijaksanaan Ekonomi". LP3ES. Jakarta.

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

Hamilton, D. James, and Maria Herrera (2000). "Oil Shocks and Aggregate Macroeconomic Behavior: The Role of Monetary Policy". Discussion Paper, Department of Economics, University of California, San Diego.

Hamilton, D. James (2008). "Understanding Crude Oil Prices". Working Paper, *National Bureau of Economic Research*, Cambridge University.

Hamilton, D. James (2010). "Nonlinearities and the Macroeconomic Effects of Oil Prices". Working Paper, *National Bureau of Economic Research*, Cambridge University.

Hamilton, D. James (2011). "Historical of Oil Shocks". *National Bureau of Economic Research*, Working Paper 16790, Cambridge University.

Hooker, Mark. (1996). "Exploring the Robustness of the Oil Price-Macroeconomy Relationship". Federal Reserve Board. Washington.

Ilmi, Nurul (2010). "Economic Integration". Skripsi. International Economics of Andalas University.

Kennedy, Simon Paulson (2008). "*Darling Face 'Stagflation' Risk on Oil Price*" (Update2). YahooNews.

Leblanc; Chinn, Michael (2004). "Do High Oil Prices Presage Inflation?". IDEAS.

Lee, Kiseok; Ni, Shawn; and Ratti, A.Ronald. (1995). "Oil Shock and The Macroeconomy: The Role of Price Variability". University of Missouri. Columbia.

Lipsey, E. Robert. (2002). "Home and Host Country Effects of FDI". Journal Economics.

Mork, K. (1989). "Oil and the Macroeconomy When Prices Go Up and Down. A Extension of Hamilton's Results". Journal of Political Economy.

Nopirin (1997). "Ekonomi Moneter, 4nd Edition". BPFE-UGM. Jogjakarta.

ŐZENÇ, Çiğdem., AKTAŞ, Erkan, and ARICA, Feyza (2010). "The Impact of Oil Prices in Turkey on Macroeconomics", Department of Economics, Mersin Turkey University and Çanakkale Turkey University.

Robert Pirog, (2005). "World Oil Demand and Its Effect on Oil Prices". *Congressional Research Service*.

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

Selim Elekdag., Lalonde, Renè., Laxton, Douglas., Dirk Muir., and Presenti, Paolo (2008). "Oil Price Movements and the Global Economy: A Model-Based Assesment". *IMF Staff Papers,* Vol. 55 No. 2.

Silalahi, Dameuli (2008). "Structural Vector Autoregression (SVAR): Goncangan Harga Minyak Terhadap Inflasi di Indonesia dan Arab Saudi 1980:1-2008:4". Skripsi. Economic Faculty, Andalas University.

Sims, Cristhoper. (1980). "Econometrica". EconPapers.

Smith, L. Lewis (2010). "The Relation between Oil Prices and Economic Activity". (Article)

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

Statistik Ekonomi Keuangan Indonesia. Bank Indonesia. 1991 - 2010

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.

Vanesha, Vike (2011). "Analysis of Factors Affecting the Total Value of Indonesian Non-Oil Export". Skripsi, International Economic, Andalas University.

Voon, P. Jan (2009). "Does Oil Price Shock Affect Small open Economy? Evidence from Hong Kong, Singapore, South Korea, and Taiwan". *JEL* Classification: C53, E32.

Weiqi Tang, Libo Wu., and Zhang, ZhongXiang (2009). "Oil Prices Shocks and Their Short- and Long-Term Effects on the Chinese Economy". *East-West Center Working Papers.*

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

Winarno, Wing Wahyu. (2009). "Analisis Ekonometrika dan Statistika dengan Eviews". UPP STIM YKPN.

www.wtrg.com

www.tradingeconomics.com

www.indexmundi.com

www.worldbank.com

www.nationmaster.com

www.bappenas.go.id

APPENDIX

(Data Processed by Using Eviews 6)

Appendix 1 : Summary Statistical

	GDP	OIL	CPI	EXPORT	IMPORT
Mean	178.3210	38.14900	72.38270	7.396000	9.512450
Median	171.1050	26.02500	67.77599	7.240500	5.572500
Maximum	259.8700	99.57000	154.2100	11.44200	24.34500
Minimum	109.3900	14.39000	20.15484	4.141000	2.623000
Std. Dev.	41.07845	25.15101	43.53861	1.729030	7.314764
Skewness	0.307799	1.067246	0.371857	0.849443	0.802878
Kurtosis	2.387428	2.887753	1.889031	3.918274	2.247837
Jarque-Bera	0.628505	3.807213	1.489469	3.107867	2.620170
Probability	0.730335	0.149030	0.474860	0.211415	0.269797
Sum	3566.420	762.9800	1447.654	147.9200	190.2490
Sum Sq. Dev.	32061.34	12018.89	36016.59	56.80137	1016.610
Observations	20	20	20	20	20

Appendix 2 : Stationary Test

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		0.065422	0.9538
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.*
Augmented Dickey-Fuller test statistic		-1.500077	0.7930
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		3.368118	0.9993
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		-4.149116	0.0055
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: 0 (Automatic based on SIC, MAXLAG=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.117503	0.0232
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(GDP) has a unit root
Exogenous: None
Lag Length: 0 (Automatic based on SIC, MAXLAG=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.820118	0.0076
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: 0 (Automatic based on SIC, MAXLAG=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.904673	0.0000
Test critical values:	1% level	-3.886751	
	5% level	-3.052169	
	10% level	-2.666593	

*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: 3 (Automatic based on SIC, MAXLAG=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.595792	0.0679
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(GDP,2) has a unit root
Exogenous: None
Lag Length: 0 (Automatic based on SIC, MAXLAG=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.129167	0.0000
Test critical values:	1% level	-2.708094	
	5% level	-1.962813	
	10% level	-1.606129	

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

OIL PRICE

I(0) – Intercept

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

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.069560	0.9391
Test critical values:	1% level	-3.857386	
	5% level	-3.040391	
	10% level	-2.660551	

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

I(0) – Trend and Intercept

Null Hypothesis: OIL 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		-2.479465	0.3328
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: OIL has a unit root
Exogenous: None
Lag Length: 1 (Automatic based on SIC, MAXLAG=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		1.153830	0.9290
Test critical values:	1% level	-2.699769	
	5% level	-1.961409	
	10% level	-1.606610	

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

I(1) – Intercept

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

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.221320	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(OIL) 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		-6.260659	0.0004
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(OIL) has a unit root
Exogenous: None
Lag Length: 0 (Automatic based on SIC, MAXLAG=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.875070	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(OIL,2) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic based on SIC, MAXLAG=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-9.505287	0.0000
Test critical values:	1% level	-3.886751	
	5% level	-3.052169	
	10% level	-2.666593	

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

I(2) – Trend and Intercept

Null Hypothesis: D(OIL,2) 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		-9.449786	0.0000
Test critical values:	1% level	-4.616209	
	5% level	-3.710482	
	10% level	-3.297799	

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

I(2) – None

Null Hypothesis: D(OIL,2) has a unit root
Exogenous: None
Lag Length: 0 (Automatic based on SIC, MAXLAG=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-9.836594	0.0000
Test critical values:	1% level	-2.708094	
	5% level	-1.962813	
	10% level	-1.606129	

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

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		2.508309	0.9999
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		-1.729006	0.6979
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		7.202020	1.0000
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		-2.946933	0.0596
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		-3.909428	0.0338
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		-1.047232	0.2546
Test critical values:	1% level	-2.699769	
	5% level	-1.961409	
	10% level	-1.606610	

I(2) – Intercept

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

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.068282	0.0011
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(CPI,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		-4.872415	0.0070
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(CPI,2) has a unit root
Exogenous: None
Lag Length: 1 (Automatic based on SIC, MAXLAG=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.023676	0.0001
Test critical values:	1% level	-2.717511	
	5% level	-1.964418	
	10% level	-1.605603	

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

OIL'S EXPORT

I(0) – Intercept

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

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.562349	0.4815
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: EXPORT 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		-3.573681	0.0598
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: EXPORT has a unit root
Exogenous: None
Lag Length: 2 (Automatic based on SIC, MAXLAG=4)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	1.406753	0.9535

Test critical values:	1% level	-2.708094
	5% level	-1.962813
	10% level	-1.606129

I(1) – Intercept

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

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.852770	0.0015
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(EXPORT) 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		-5.292395	0.0030
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(EXPORT) has a unit root
Exogenous: None
Lag Length: 0 (Automatic based on SIC, MAXLAG=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.651207	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(EXPORT,2) has a unit root
Exogenous: Constant
Lag Length: 2 (Automatic based on SIC, MAXLAG=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.789512	0.0022
Test critical values:	1% level	-3.959148	

	5% level	-3.081002
	10% level	-2.681330

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

I(2) – Trend and Intercept

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

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.530387	0.0139
Test critical values:	1% level	-4.728363	
	5% level	-3.759743	
	10% level	-3.324976	

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

I(2) – None

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

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.946044	0.0001
Test critical values:	1% level	-2.728252	
	5% level	-1.966270	
	10% level	-1.605026	

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

OIL'S IMPORT

I(0) – Intercept

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

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		0.404503	0.9772
Test critical values:	1% level	-3.857386	
	5% level	-3.040391	
	10% level	-2.660551	

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

I(0) – Trend and Intercept

Null Hypothesis: IMPORT 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		-2.928305	0.1818
Test critical values:	1% level	-4.728363	
	5% level	-3.759743	
	10% level	-3.324976	

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

I(0) – None

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

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		2.049540	0.9865
Test critical values:	1% level	-2.699769	
	5% level	-1.961409	
	10% level	-1.606610	

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

I(1) – Intercept

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

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.294990	0.0000
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(IMPORT) 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		-7.411412	0.0001
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(IMPORT) has a unit root
Exogenous: None
Lag Length: 0 (Automatic based on SIC, MAXLAG=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.210605	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(IMPORT,2) has a unit root
Exogenous: Constant
Lag Length: 2 (Automatic based on SIC, MAXLAG=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.838419	0.0020
Test critical values:	1% level	-3.959148	
	5% level	-3.081002	
	10% level	-2.681330	

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

I(2) – Trend and Intercept

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

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.858121	0.0080
Test critical values:	1% level	-4.728363	
	5% level	-3.759743	
	10% level	-3.324976	

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

I(2) – None

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

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.013531	0.0001
Test critical values:	1% level	-2.728252	
	5% level	-1.966270	
	10% level	-1.605026	

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

Appendix 3 : Johansen Cointegration Test

Date: 07/22/11 Time: 19:33
Sample (adjusted): 1993 2010
Included observations: 18 after adjustments
Trend assumption: Linear deterministic trend
Series: GDP OIL CPI EXPORT IMPORT
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 *	0.910582	114.4331	69.81889	0.0000
At most 1 *	0.774415	70.97326	47.85613	0.0001
At most 2 *	0.741972	44.17020	29.79707	0.0006
At most 3 *	0.487613	19.78583	15.49471	0.0106
At most 4 *	0.349840	7.749676	3.841466	0.0054

Trace test indicates 5 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Appendix 4 : Lag Length Selection

VAR Lag Order Selection Criteria
Endogenous variables: GDP OIL CPI EXPORT IMPORT
Exogenous variables: C
Date: 07/22/11 Time: 19:38
Sample: 1991 2010
Included observations: 18

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-285.6052	NA	72613360	32.28947	32.53680	32.32358
1	-197.7305	117.1663*	76604.21	25.30339	26.78734	25.50801
2	-153.1847	34.64673	20703.70*	23.13164*	25.85222*	23.50677*

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

Appendix 5 : Granger Causality

Pairwise Granger Causality Tests
Date: 07/22/11 Time: 19:40
Sample: 1991 2010
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
OIL does not Granger Cause GDP	18	3.40650	0.0446
GDP does not Granger Cause OIL		1.36152	0.2905
CPI does not Granger Cause GDP	18	4.91223	0.0258
GDP does not Granger Cause CPI		3.01316	0.0841
EXPORT does not Granger Cause GDP	18	5.49036	0.0187
GDP does not Granger Cause EXPORT		3.00165	0.0848
IMPORT does not Granger Cause GDP	18	3.58871	0.0574
GDP does not Granger Cause IMPORT		0.39515	0.6814
CPI does not Granger Cause OIL	18	2.67119	0.1067
OIL does not Granger Cause CPI		0.27111	0.7667
EXPORT does not Granger Cause OIL	18	1.84174	0.1976
OIL does not Granger Cause EXPORT		16.3631	0.0003
IMPORT does not Granger Cause OIL	18	4.50757	0.0326
OIL does not Granger Cause IMPORT		4.77756	0.0278
EXPORT does not Granger Cause CPI	18	1.08845	0.3655
CPI does not Granger Cause EXPORT		8.73605	0.0039
IMPORT does not Granger Cause CPI	18	0.29137	0.7520
CPI does not Granger Cause IMPORT		3.85130	0.0486
IMPORT does not Granger Cause EXPORT	18	9.44381	0.0029
EXPORT does not Granger Cause IMPORT		0.72297	0.5038

Appendix 6 : VAR Estimation

Vector Autoregression Estimates
Date: 07/22/11 Time: 21:05
Sample (adjusted): 1993 2010
Included observations: 18 after adjustments
Standard errors in ( ) & t-statistics in [ ]

	GDP	OIL	CPI	EXPORT	IMPORT
GDP(-1)	0.224490	0.273074	0.275500	-0.008715	0.095587
	(0.37522)	(0.43166)	(0.17824)	(0.03985)	(0.09940)
	[0.59829]	[0.63261]	[1.54563]	[-0.21871]	[0.96164]
GDP(-2)	0.186771	-0.192622	0.114721	-0.025541	-0.108202
	(0.29172)	(0.33561)	(0.13858)	(0.03098)	(0.07728)
	[0.64023]	[-0.57395]	[0.82782]	[-0.82441]	[-1.40010]
OIL(-1)	-2.115298	0.220356	1.187649	-0.162455	-0.183656
	(1.22811)	(1.41285)	(0.58340)	(0.13042)	(0.32534)
	[-2.54811]	[0.15597]	[2.03572]	[-1.24560]	[-0.56450]
OIL(-2)	0.687959	0.999134	-0.178733	0.141305	0.195729
	(0.54853)	(0.63104)	(0.26057)	(0.05825)	(0.14531)
	[0.05419]	[1.58330]	[-0.68592]	[2.42572]	[1.34694]
CPI(-1)	1.813205	-1.551121	-0.586737	0.101601	-0.257154
	(1.45713)	(1.67633)	(0.69220)	(0.15474)	(0.38602)
	[1.24436]	[-0.92531]	[-0.84764]	[0.65657]	[-0.66617]
CPI(-2)	-2.224608	1.883972	1.717916	-0.079557	0.411579
	(1.67696)	(1.92923)	(0.79663)	(0.17809)	(0.44425)
	[-1.32657]	[0.97654]	[2.15648]	[-0.44672]	[0.92646]
EXPORT(-1)	20.77480	-11.83466	-10.96314	0.813336	-1.831205
	(10.6054)	(12.2007)	(5.03799)	(1.12627)	(2.80951)
	[1.95890]	[-0.97000]	[-1.17609]	[0.72215]	[-0.65179]
EXPORT(-2)	-5.524047	-7.141710	4.768720	-1.365762	-1.403621
	(4.04970)	(4.65890)	(1.92378)	(0.43007)	(1.07282)
	[-1.36406]	[-1.53292]	[2.47883]	[-3.17567]	[-1.30834]
IMPORT(-1)	4.051600	3.625840	-0.899024	0.202716	1.023766
	(2.11473)	(2.43285)	(1.00459)	(0.22458)	(0.56022)
	[1.91589]	[1.49037]	[-0.89492]	[0.90265]	[1.82743]
IMPORT(-2)	4.817099	-2.308704	-3.259776	0.219733	-0.103722
	(3.90123)	(4.48809)	(1.85325)	(0.41430)	(1.03349)
	[1.23476]	[-0.51441]	[-1.75895]	[0.53037]	[-0.10036]
C	9.847144	93.44852	-16.16140	12.58204	18.26995
	(34.8332)	(40.0731)	(16.5472)	(3.69921)	(9.22780)
	[0.28269]	[2.33195]	[-0.97668]	[3.40128]	[1.97988]
R-squared	0.879872	0.946072	0.996531	0.906543	0.964908
Adj. R-squared	0.781118	0.869032	0.991575	0.773033	0.914777
Sum sq. resids	463.1463	612.9686	104.5160	5.223369	32.50342
S.E. equation	8.134111	9.357721	3.864046	0.863826	2.154842

F-statistic	34.07767	12.28031	201.0880	6.790079	19.24772
Log likelihood	-54.76993	-57.29237	-41.37161	-14.40583	-30.85966
Akaike AIC	7.307770	7.588041	5.819067	2.822870	4.651073
Schwarz SC	7.851887	8.132157	6.363184	3.366986	5.195189
Mean dependent	185.3900	40.05222	78.10147	7.449611	10.22100
S.D. dependent	36.79051	25.85760	42.09839	1.813197	7.381382

Determinant resid covariance (dof adj.)	1907.306
Determinant resid covariance	16.96477
Log likelihood	-153.1847
Akaike information criterion	23.13164
Schwarz criterion	25.85222

VAR Model - Substituted Coefficients:

GDP = 0.224489614903*GDP(-1) + 0.18677073954*GDP(-2) - 2.11529805267*OIL(-1) + 0.687958698567*OIL(-2) + 1.81320537266*CPI(-1) - 2.2246079537*CPI(-2) + 20.7747994817*EXPORT(-1) - 5.52404743326*EXPORT(-2) + 4.0516001732*IMPORT(-1) + 4.81709877351*IMPORT(-2) + 9.84714434579

OIL = 0.273074056961*GDP(-1) - 0.192621826609*GDP(-2) + 0.220355753469*OIL(-1) + 0.999134235905*OIL(-2) - 1.55112080286*CPI(-1) + 1.8839722534*CPI(-2) - 11.8346644906*EXPORT(-1) - 7.14171029412*EXPORT(-2) + 3.62584000763*IMPORT(-1) - 2.308703987*IMPORT(-2) + 93.4485154379

CPI = 0.275499956654*GDP(-1) + 0.114720656278*GDP(-2) + 1.18764899407*OIL(-1) - 0.178733156016*OIL(-2) - 0.586736562516*CPI(-1) + 1.71791625049*CPI(-2) - 10.9631374104*EXPORT(-1) + 4.76871958849*EXPORT(-2) - 0.899024337436*IMPORT(-1) - 3.25977574769*IMPORT(-2) - 16.1613966959

EXPORT = - 0.00871522679687*GDP(-1) - 0.0255405476615*GDP(-2) - 0.162454827503*OIL(-1) + 0.141305086383*OIL(-2) + 0.101601150427*CPI(-1) - 0.079557285452*CPI(-2) + 0.81333595156*EXPORT(-1) - 1.36576178349*EXPORT(-2) + 0.202716209122*IMPORT(-1) + 0.219733057293*IMPORT(-2) + 12.5820405705

IMPORT = 0.0955873472897*GDP(-1) - 0.108202087415*GDP(-2) - 0.183655563671*OIL(-1) + 0.195728758002*OIL(-2) - 0.257154041008*CPI(-1) + 0.4115792617*CPI(-2) - 1.83120546444*EXPORT(-1) - 1.40362119927*EXPORT(-2) + 1.02376617079*IMPORT(-1) - 0.10372160626*IMPORT(-2) + 18.2699484513

Appendix 7 : Impulse Response Function

1. Response of GDP, Oil Price, Inflation, Oil's Export, Oil's Import to Oil Price Shocks

Period	GDP	OIL	CPI	EXPORT	IMPORT
1	0.176693	9.184831	0.863526	0.675474	1.789454
	(0.04965)	(1.53081)	(0.72188)	(0.16147)	(0.36375)
2	0.064370	-0.821238	1.387616	-0.492246	-1.313854
	(0.08121)	(2.77833)	(1.41758)	(0.24534)	(0.67078)
3	-0.064129	0.507480	1.948067	0.309738	0.345484
	(0.08991)	(3.46163)	(1.66285)	(0.35749)	(0.87842)
4	-0.090462	2.593829	-0.288572	0.616228	0.291219
	(0.08862)	(4.50246)	(1.77204)	(0.52008)	(1.18363)
5	-0.067521	-3.062522	0.298316	-0.297289	-0.385292
	(0.08546)	(3.97452)	(1.81416)	(0.52207)	(1.13650)
6	-0.157970	-1.651483	1.955850	-0.268436	0.168506
	(0.08341)	(3.65594)	(1.91234)	(0.51463)	(0.99343)
7	-0.144680	0.872368	1.510438	0.050048	0.306583
	(0.09189)	(4.17856)	(1.69656)	(0.54659)	(0.99980)
8	-0.126671	1.768879	1.629473	0.068621	0.372999
	(0.10549)	(3.58275)	(1.58398)	(0.44754)	(0.86123)
9	-0.104072	0.946280	1.894954	-0.012387	0.129272
	(0.10246)	(2.85164)	(1.56350)	(0.35899)	(0.60509)
10	-0.064656	1.354335	1.676856	0.157122	0.361281
	(0.10544)	(2.49195)	(1.60756)	(0.32412)	(0.54461)
11	-0.022028	1.542793	1.302209	0.173836	0.398780
	(0.11433)	(2.53021)	(1.58511)	(0.30078)	(0.50632)
12	0.015704	0.624385	1.498538	0.002715	0.278768
	(0.11708)	(1.97523)	(1.60129)	(0.23682)	(0.39577)
13	0.045790	0.921607	1.864842	0.014143	0.371973
	(0.11708)	(1.91642)	(1.64961)	(0.21660)	(0.38732)
14	0.046318	1.464661	1.952247	0.077068	0.388203
	(0.11562)	(1.69683)	(1.73533)	(0.19342)	(0.35748)
15	0.037546	1.433195	2.160298	0.069316	0.342009
	(0.11569)	(1.57098)	(1.87343)	(0.17077)	(0.35875)
16	0.011423	1.240047	2.405369	0.069005	0.312453
	(0.11497)	(1.39407)	(2.09966)	(0.14675)	(0.34328)
17	-0.026214	1.247095	2.530492	0.100096	0.356625
	(0.11726)	(1.38852)	(2.32746)	(0.13104)	(0.36307)
18	-0.061591	1.221569	2.669833	0.092049	0.390653
	(0.12397)	(1.47631)	(2.50528)	(0.12969)	(0.39250)
19	0.091708	1.179018	2.914900	0.063624	0.423197
	(0.13261)	(1.56783)	(2.65861)	(0.11410)	(0.43046)
20	-0.110590	1.449463	3.162233	0.075317	0.499939
	(0.14040)	(1.68846)	(2.81537)	(0.11759)	(0.47718)

Appendix 8 : Variance Decomposition

1. Variance Decomposition of GDP Constant

Period	S.E.	GDP	OIL	CPI	EXPORT	IMPORT
1	8.134111	100.0000	0.000000	0.000000	0.000000	0.000000
2	10.92441	60.99311	0.053995	16.61826	16.09915	6.235492
3	12.96874	54.42096	1.835177	15.31428	21.00585	7.423738
4	13.52008	50.66388	4.815981	14.09726	21.70452	8.718357
5	14.31683	45.20125	9.029225	12.89668	24.14662	8.726226
6	14.92932	41.58724	10.24081	12.55273	26.38620	9.233026
7	15.45213	39.02484	9.876805	12.49886	28.73304	9.866462
8	15.78541	38.79210	9.483087	12.80953	28.87110	10.04418
9	16.14358	40.23491	9.070351	13.28616	27.65262	9.755963
10	16.83139	42.86453	8.398836	14.28166	25.47483	8.980143
11	17.79782	45.21938	8.313958	15.53055	22.79682	8.139290
12	18.85010	47.59697	8.789735	15.94008	20.35222	7.320990
13	19.88220	50.36363	9.184045	15.55504	18.31391	6.583375
14	20.82710	52.86565	9.492287	14.77178	16.70320	6.167081
15	21.69753	54.81906	9.723191	13.90206	15.40008	6.155615
16	22.51997	56.15344	9.929368	13.15468	14.31315	6.449366
17	23.34279	56.94930	10.18547	12.65463	13.40380	6.806812
18	24.22614	57.28739	10.53031	12.46044	12.68147	7.040398
19	25.22012	57.46834	10.81583	12.53521	12.09551	7.085108
20	26.36289	57.83222	10.94198	12.80183	11.48278	6.941195

2. Variance Decomposition of Oil Price

Period	S.E.	GDP	OIL	CPI	EXPORT	IMPORT
1	9.357721	3.660992	96.33901	0.000000	0.000000	0.000000
2	11.14531	5.918184	68.45668	1.661922	19.16537	4.797843
3	11.78751	5.662947	61.38607	7.224186	19.70542	6.021380
4	13.64035	10.05906	49.45794	5.514079	28.52610	6.442823
5	14.14461	10.05403	50.68229	5.666399	26.72206	6.875213
6	14.69650	10.82944	48.21007	6.615220	27.88943	6.455850
7	15.16917	11.64876	45.58313	9.578480	26.35467	6.834953
8	15.76647	13.57295	43.45351	11.18519	24.39898	7.389376
9	16.32736	17.14390	40.85518	11.97236	22.75444	7.274124
10	16.88954	20.94560	38.82370	12.08636	21.26528	6.879065
11	17.25033	23.34905	38.01654	11.59885	20.38607	6.649485
12	17.60381	25.65053	36.63095	11.19082	19.72250	6.805189
13	17.89574	27.00058	35.71079	10.82869	19.21260	7.247336
14	18.13104	27.48999	35.44249	10.58875	18.78616	7.692614
15	18.37655	27.78020	35.11007	10.46328	18.57468	8.071761
16	18.66171	28.15985	34.48679	10.58650	18.46251	8.304342
17	19.01322	28.81284	33.65363	10.94918	18.28994	8.294414
18	19.42848	30.04500	32.62575	11.37696	17.84360	8.108696
19	19.95547	32.08148	31.27439	11.84045	17.03385	7.769827
20	20.62262	34.61768	29.77764	12.29446	15.99331	7.316900

3. Variance Decomposition of CPI

Period	S.E.	GDP	OIL	CPI	EXPORT	IMPORT
1	3.864046	34.67939	4.994198	60.32641	0.000000	0.000000
2	6.131017	23.69830	7.106146	47.20638	21.01443	0.974746
3	7.199308	30.85498	12.47563	38.24416	17.53910	0.886128
4	8.065100	43.96331	10.06889	30.76262	14.15312	1.052052
5	9.336345	53.74305	7.615683	24.93519	12.79217	0.913905
6	10.12455	55.67989	10.20787	22.25764	10.92699	0.927606
7	10.86263	58.57790	10.80129	19.93629	9.510252	1.174279
8	11.60915	59.79924	11.42693	18.59096	8.360422	1.822452
9	12.34621	59.24326	12.45905	17.47305	8.252867	2.571777
10	13.03786	59.28686	12.82640	16.37384	8.046644	3.466257
11	13.75003	60.10546	12.42906	15.64551	7.554441	4.265536
12	14.57799	60.84462	12.11400	15.50279	6.991646	4.546948
13	15.52496	61.29830	12.12410	15.60528	6.507642	4.464685
14	16.62257	62.11750	11.95516	15.74819	5.972558	4.206597
15	17.87520	63.05730	11.79890	15.85565	5.394425	3.893721
16	19.23179	64.04769	11.75737	15.69476	4.877058	3.623123
17	20.66218	65.21369	11.68572	15.27215	4.372695	3.455739
18	22.16167	66.31939	11.60920	14.76682	3.907093	3.397495
19	23.72743	67.13282	11.63678	14.28521	3.524414	3.420772
20	25.35766	67.65312	11.74377	13.86046	3.235299	3.507350

4. Variance Decomposition of Export

Period	S.E.	GDP	OIL	CPI	EXPORT	IMPORT
1	0.863826	6.536910	61.14552	21.10256	11.21501	0.000000
2	1.025821	5.718941	66.38464	15.92264	10.20348	1.770301
3	1.242169	4.444563	51.49175	35.03502	7.372897	1.655772
4	1.660507	8.789549	42.58705	19.67318	28.02005	0.930173
5	1.712774	8.842586	43.04026	19.79083	26.86317	1.463156
6	1.771393	9.262583	42.53523	18.59859	27.61200	1.991591
7	1.776172	9.375580	42.38606	18.73387	27.49973	2.004759
8	1.784772	9.728134	42.12636	18.58394	27.46584	2.095721
9	1.805056	10.84333	41.18962	18.78136	27.05039	2.135312
10	1.834137	11.50044	40.62766	19.37042	26.28290	2.218581
11	1.851423	11.77429	40.75414	19.07638	26.21432	2.180870
12	1.863378	12.76016	40.23312	18.85203	25.88151	2.273170
13	1.875501	13.54081	39.72037	18.60952	25.65680	2.472506
14	1.883185	13.89663	39.56433	18.45907	25.44863	2.631336
15	1.890435	14.23860	39.39590	18.33247	25.25862	2.774401
16	1.899843	14.61522	39.13861	18.32120	25.05339	2.871579
17	1.913479	14.95435	38.85644	18.38584	24.90324	2.900126
18	1.928139	15.47101	38.49574	18.38555	24.73254	2.915158
19	1.945116	16.41730	37.93364	18.36253	24.36605	2.920478
20	1.966528	17.65221	37.25877	18.33734	23.85576	2.895929

5. Variance Decomposition of Import

Period	S.E.	GDP	OIL	CPI	EXPORT	IMPORT
1	2.154842	14.22644	68.96202	3.577547	3.471008	9.762982
2	2.819970	8.416943	61.97453	4.777387	13.15565	11.67549
3	2.963802	7.794478	57.46408	8.745361	13.99995	11.99614
4	3.220149	8.875654	49.49702	7.408536	23.69625	10.52254
5	3.345362	12.40352	47.18760	8.277812	22.34652	9.784538
6	3.459035	13.41463	44.37446	11.94461	20.94820	9.318100
7	3.647224	16.58186	40.61993	13.85657	19.61135	9.330284
8	3.789204	20.38561	38.60192	13.85809	18.27069	8.883684
9	3.934073	25.49251	35.91928	13.32609	17.01298	8.249133
10	4.072330	29.13653	34.30879	12.72636	16.09520	7.733123
11	4.166519	31.07041	33.69120	12.16097	15.37651	7.700911
12	4.256926	32.88682	32.70419	11.66118	14.73774	8.010078
13	4.338542	33.67509	32.22039	11.34702	14.24541	8.512088
14	4.424090	34.05246	31.75632	11.14714	14.13531	8.908770
15	4.514767	34.63161	31.06737	11.14830	13.97630	9.176413
16	4.624145	35.58392	30.07160	11.46237	13.71860	9.163508
17	4.762420	36.98098	28.91147	12.01021	13.24525	8.852096
18	4.931951	38.94533	27.58542	12.55161	12.55066	8.366971
19	5.139779	41.49438	26.07763	13.00074	11.65039	7.776852
20	5.379549	44.21066	24.66850	13.25592	10.69275	7.172172

Variance Decomposition Graph