OIL PRICE AND ECONOMIC GROWTH:EVIDENCE
FROM 10 SUB-SAHARAN AFRICA COUNTRIES

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(3) Equal contribution has been made by each group member is completing the research project.

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Abstract

The goal of this paper is to examine the long run relationship between oil prices and real GDP in ten Sub-Saharan countries by using the Panel data for the period of 1980-2008. We find a strong positive relationship between positive oil price changes on economic growth in the selected oil exporting countries. This paper applies the unit root test such as Levin, Lin and Chu (LLC) test and Im, Pesaran and Shin (IPS) test, and test of cointegration developed by Johansen (1988) which is the Fisher panel cointegration test and Pedroni, lastly, ARDL test. The empirical results show that there is at least one long run relationship exits. The paper makes some policy recommendations.

CHAPTER 1: INTRODUCTION

1.0   Overview

Oil holds an important role in our daily life. Oil price brings huge effects in influencing world's economic growth through the volatility itself until today as the increase in oil price triggers inflation and recession and further slows down the world economy (Barrell & Pomerantz, 2004). Besides, Rodgoff (2006) stated that oil consumption is much concentrated in final goods consumption (in heating and transportation), hence, the impact on rich countries is less vulnerable because of energy utilization. However, developing countries faces greater impact because energy prices are an important consideration to them. According to Gallo (2010); Larsson and Nossman (2011), there are many factors behind oil price shock occurs from micro level to macro level such as the role of OPEC, rapid growing of China, oil consumption in U.S., Iraq invasion of Kuwait and Gulf war, Asian crisis and Russian market and the 2008 financial crisis.

1.1   Research Background

Sub Saharan Africa (SSA) is a region of Africa which consists of around 48 countries are categorized as developing country. According to the (SESRTCIC) Statistical, Economic and Social Research and Training Centre for Islamic Countries (2007), it is the only region in the world where proportion of the poor is increasing over time. With its extremely low GDP per capita and savings rates, most of the countries needed external public investment to encounter the high

poverty level. From the observation made through understanding the ten selected Sub- Saharan African countries background (Botswana, Congo, Cote d'Ivoire, Gabon, Kenya, Senegal, South Africa, Sudan, Swaziland and Zambia) as below, it is found that the ten SSA comprise of low to middle income countries only and the performance of the country is not in a satisfactory level. Countries are selected based on oil- exporting countries (Democratic Republic of Congo, Cote d'Ivoire, Gabon, South Africa and Sudan) and non oil- exporting countries or oil- importing countries (Botswana, Swaziland, Kenya, Senegal and Zambia) in order to observe their condition during oil price fluctuation. Nkomo (2006) indicates that low income countries and poorer households tend to suffer the largest impact on increase oil price. Besides that, explanations in the next sub- section is about the economy activities, performance and problems in the countries.

1.1.1 Economics growth for Cote d'Ivoire

Figure 1: GDP growth for Cote d'Ivoire from year 1980 - 2008
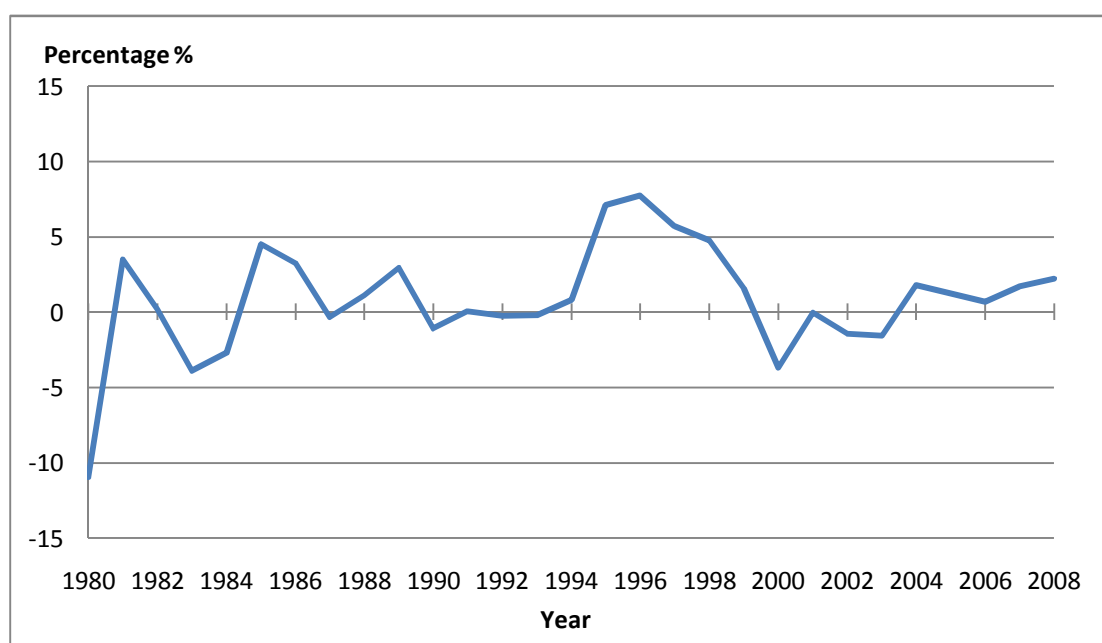
Source: World Bank

Cote d'Ivoire is listed as a fragile country in the Sub- Saharan Africa. It reaches independence in year 1960 and being the wealthiest land in the West African states because of the close relationship with France, exports in cocoa production and foreign investments. Their economy is heavily dependent on agricultural sector which 68 % of the population engaged in this related activities (Bureau of African Affair, 2011 and The World Factbook, 2011). However, the glory of Cote d'Ivoire ended by the political turmoil (The World Factbook, 2011) and during year 1980 they began to face the economic slowdown due to the drop in export revenues, increase in the import costs and vulnerable debt- service cost resulted on the borrowing in the boom years (Encyclopedia of the Nations, 2011).

According to Bureau of African Affair (2011), during the year 1994, the devaluation of CFA France and the increased in competitiveness in agricultural, service and light industrial sectors, gives a good chance for Cote d'Ivoire to taste the economic growth. Government encouraged the diversification in exports and cocoa beans production. However, in year 2003, the civil war ends but the political turmoil continued to damage the economy and left the country with slow growth and loss in foreign investments (The World Factbook, 2011).

In these recent years, petroleum exports have increases and are being the country's largest foreign exchange earner (Bureau of African Affairs, 2011). They exports 115,700 barrels of oil per day and imports 80,960 barrels per day as estimated in 2007 and now oil is also one of the top revenue earners in the country (The World Factbook, 2011). Besides that, it is listed as the world's largest producer and exporter of cocoa beans and being an important producer and exporter of palm oil and coffee bean. These agricultural products are the main revenue to the country. Their exporting commodities are petroleum, timber, banana, cotton, pineapple, palm oil, fish, cocoa and coffee and importing

commodities are fuel, foodstuffs and capital equipment (The World Factbook, 2011).

Figure 1 shows the GDP of Cote d'Ivoire at year 1980 was in -11% and dramatically rebound back to 4 % in year 1981. The GDP in year 1994 slowly rise to the peak in the observation period from 1% to 7% due to the devaluation of CFA Franc that gives an opportunity for the country to improve but slowly decline to -4% by the year 2000.

1.1.2 Economic Growth for Gabon

Figure 2: GDP growth for Gabon from year 1980 - 2008
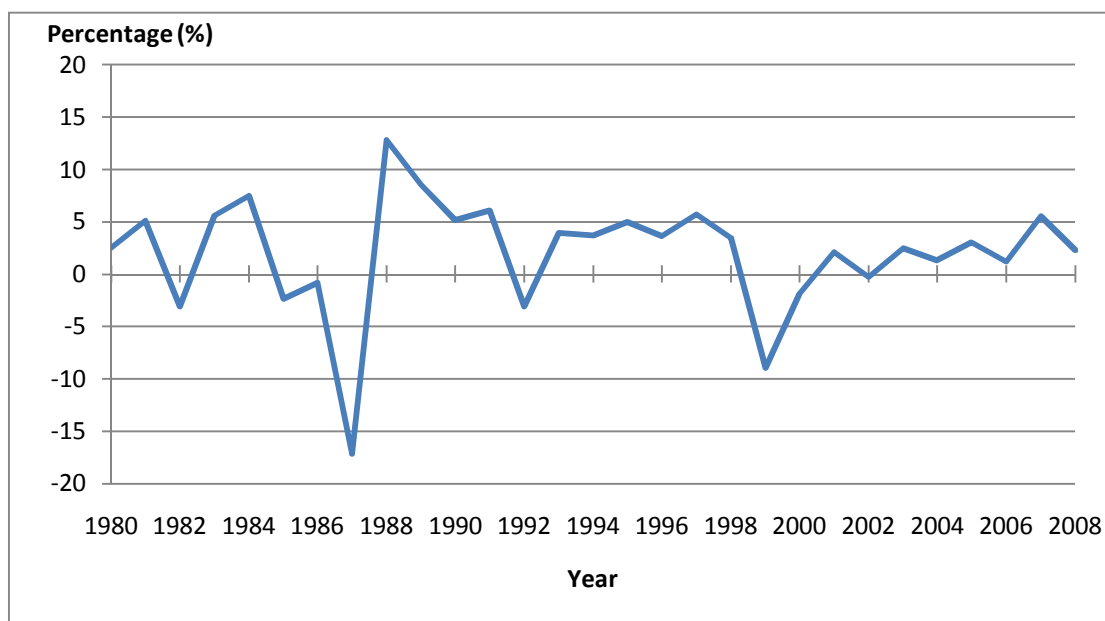
Source: World Bank

Gabon country is one of the SSA countries which earn 4 times per capita income in most Sub- Saharan African nation. However, the population remains in poor condition due to the high income inequality (The World Factbook, 2011). Gabon has vast natural resources but their government management hinders

Gabon from improving (MBendi, 2011). According to Bureau of African Affairs (2011), oil revenue is the main source of income to the nation which is 46% of the government's budget, 81% of exports and 43% of gross domestic products. They exports 227,300 barrels of oil per day (figure as estimated in year 2007) and imports on 4,185 barrels per day (figure as estimated in year 2007) (The World Factbook, 2011).

However, the poor management in government spending had significantly wasted the oil revenue. Serious debts caused by overspending on the Transgabonais railroad, oil price crisis in year 1986 and low oil price in year 1990s (The World Factbook, 2011). Gabon gains a poor reputation with International Monetary Fund (IMF) and Paris Club. IMF mission to Gabon criticized on the overspending of government budget, heavy debts to central bank and slipping on the schedule of administrative privatization reform (The World Factbook, 2011; Bureau of African Affairs, 2011).

Besides that, they produce agricultural products such as fish, cocoa, coffee, rubber, sugar, okoume (a type of tropical softwood) and cattle and involved in industries production such as petroleum extraction and refining, gold, ship repair, manganese, food and beverages, cement, textile and lumbering and plywood (The World Factbook, 2011). The abundant of agricultural and fishery resources was not given attention and hence underdeveloped. Most of the population now depends on subsistence farming (MBendi, 2011).

According to Bureau of African Affairs (2011), some estimates suggested that the Gabonese oil will be used up year in 2025. Nowadays, Gabon major income generator is logging and manganese mining. The World Factbook (2011) stated that the rebound of oil price in year 1999 to 2008 had helped in the economic growth but the drop in production had prevented Gabon to fully

realizing their gain. Besides that, Gabon signed a 14-month Stand-By Arrangement with the IMF in May 2007, and following that year, they issued a $1 billion sovereign bond to buy back its debt from Paris Club.

Figure 2 shows a great decrease in GDP of the country from year 1984 to year 1987 and on the same year, it rebound to the peak of 13% at the year 1988. Gabon is an oil- exporting and the decline in GDP in the year 1991 is maybe the after effect of low oil price which affected the country's trade.

1.1.3 Economic Growth for Sudan

Figure 3: GDP growth for Sudan from year 1980 - 2008
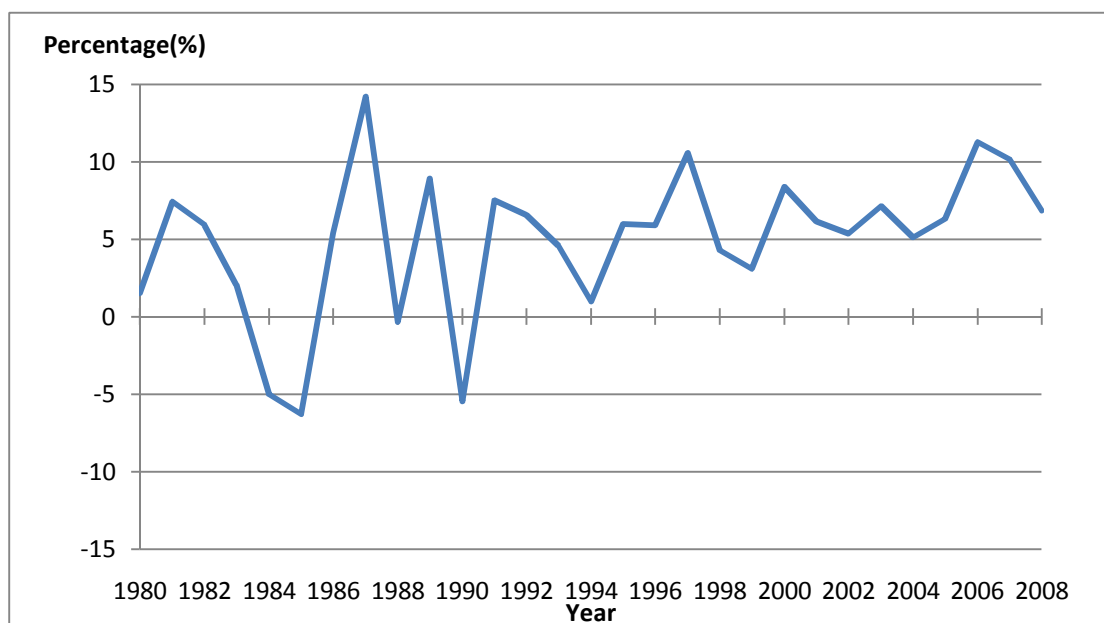
Source: World Bank

Sudan country is a country which has high level of poverty and income inequality. Besides that, the government unable to perform its social services to its nation and lead the nation in a poor condition (MBendi, 2011). In the year of 1993, Sudan was imposed on currency control, making it as a barrier for foreign

exchange (Bureau of African Affairs, 2011).

According to The World Factbook (2011), Sudan works with IMF in year 1997 to implement macroeconomic reforms including a managed float of the exchange rate and large reserve of foreign exchange. The primary resource in Sudan is agricultural resources, however, it was taken over by the oil production and export since October 2000 and it has reduced the country's outflow of foreign exchange for imported petroleum products. Besides that, diversification in major agricultural exports on cash crops, gum Arabic and cotton (Bureau of African Affairs, 2011). In the last quarter of year 1999, they began to increase in the production and export on crude oil. They exports 303,800 barrels of oil per day and imports 11,400 barrels of oil per day as estimated in year 2007 in The World Factbook (2011). In the year of 2000 to 2001, Sudan is able to gain in current account surplus for the first time since independence (Bureau of African Affairs, 2011). The oil production, increase in oil price and foreign direct investment had help the economy to boomed until second half of year 2008 (The World Factbook, 2011).

Figure 3 shows the instability of Sudan's GDP throughout the year 1980 to year 2008. A big fall happens within 5 years in the year 1981 which is from 7% to year 1985 to -6% and dramatically rebound back to 14% in year 1987 within 2 years. However, the rise and fall of GDP in the country from year 1994 to year 2008 was still within the positive gap.

1.1.4 Economic growth for South Africa

Figure 4: GDP growth of South Africa in the year of 1980 - 2008
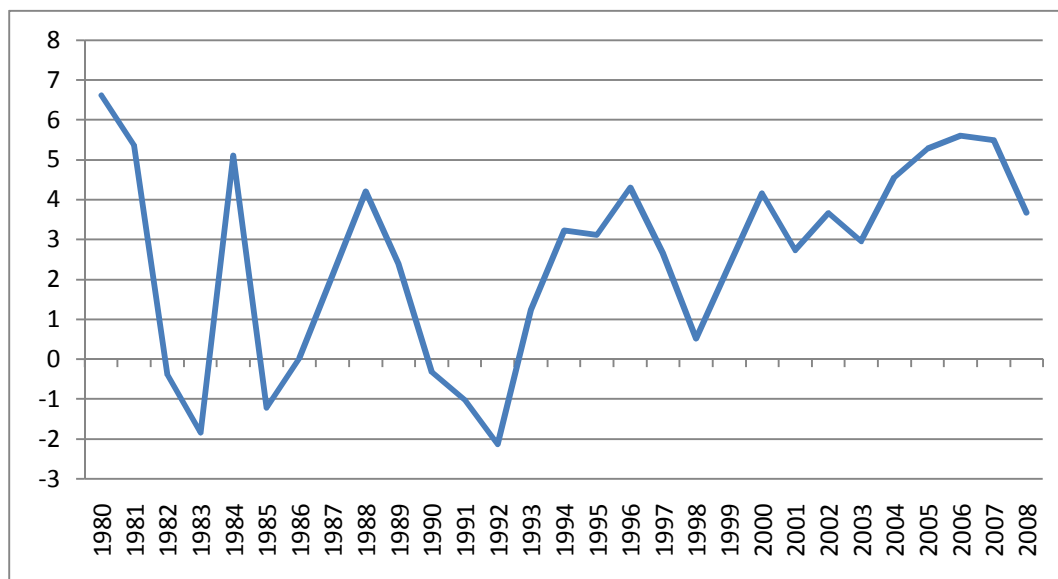
Source: World Bank

South Africa is one of the Sub Saharan countries which define as a middle income country. It is an emerging market which has vast supply of natural resources. South Africa has well-developed financial, legal, energy, communication and transport sector and their stock exchange is the 18th largest in the world (The World Factbook, 2011).The major sector in South Africa are the mining sector, manufacturing and agricultural. Mining sector is the largest sector in South Africa and followed by manufacturing, oil and gas, chemicals, agricultural and tourism. Clothing and textiles, financial services and banking sectors are experiencing growth in these recent years (MBendi, 2011). Besides, they exports oil about 128,500 barrels per day based on the estimation in year 2007 (The World Factbook, 2011). Bureau of African Affairs (2011) indicates that they trade with United States, China, Germany, United Kingdom, Sub- Saharan Africa and Japan and their exports are motor vehicles and parts, minerals and metals and agricultural products.

Figure 4 shows the line graph of GDP in South Africa throughout the period of 30 years. As we can observe, the GDP was highly fluctuated between years 1980 to 2000. South Africa experienced 2 great increase and decrease in GDP at the year of 1980 to 1984 and 1990 to 2000. According to Mohamed and Finnoff (2004), the capital flight happened in the year of 1980 to 1984 and 1990 to 2000. The annual average capital flight was 6.6 % of the GDP where the first time happened may caused by the instability of politic and the second time happened may caused by the wealth Africans were uncomfortable with the democratic rules. Besides, The World Factbook (2011) indicates that the robust growth from year 2004 to 2007 as South Africa gain benefits from its economic stability and commodity boom. However, electricity crisis and global financial crisis's in the second half of year 2007 impact on commodity prices and demand and the growth had began to slowdown.

1.1.5 Economic Growth for Democratic Republic of Congo

Figure 5: GDP growth of South Africa in the year of 1980 - 2008
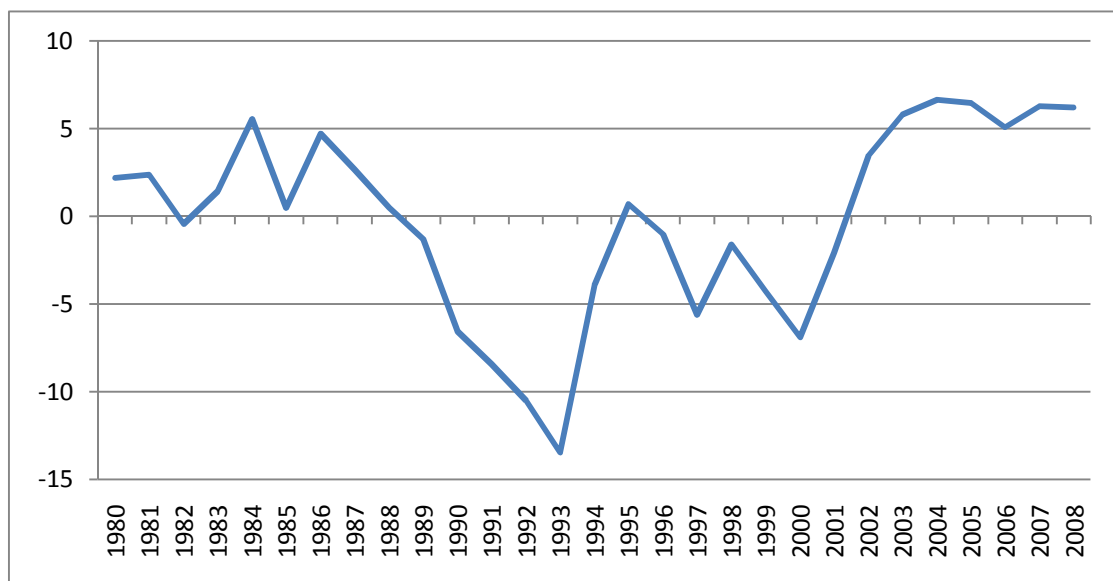
Source: World Bank

Democratic Republic of Congo (DRC) is one of the Sub- Saharan African countries which define as a fragile country. According to Bureau of African Affairs 2011, DRC is a country with large scale of mineral and natural resources. The continuous corruption since 1960 and conflict which starts on May 1997 had dampened the economic conditions and abuse in human rights. Their main economic activity is mining which is the main export income. It has contributed to a boost in fiscal position and lead to a GDP growth from 2006 to 2008. However, the fall of world market prices in year 2009 weakened the output growth in DRC's mineral exports and the review of mining contracts in year 2006 has caused them balance of payment crisis. Agricultural gains 37.4%, industry gains 26% and services sector gains 36.6% of the composition of GDP based on estimation in year 2008. Besides, they also export oil by 20,090 barrel per day (estimated figure in 2007) (The World Factbook, 2011). Their trading products are diamonds, gold, cobalt, coffee, wood, petroleum and copper (Bureau of African Affairs, 2011). DRC depends on imports of food and the foreign exchange for food and other imports are generated through exports of coffee, diamond and crude petroleum (Encyclopedia of the Nations, 2011). As we can observed, there is no consistent economic activity which can DRC rely on to.

In the research, we used the GDP growth (annual percentage) in the period of year 1980 to 2008. In Figure 5, it shows that the GDP growth rate of Democratic Republic of Congo fluctuates greatly in that period. The most tremendous fluctuation starting on the year of 1987 leads to negative growth until the year of 2002. The GDP after year 2002 starts to experience a sharp positive growth until it becomes stable in the year of 2004.

1.1.6 Economic Growth for Botswana

Figure 6: GDP growth for Botswana from 1980-2008
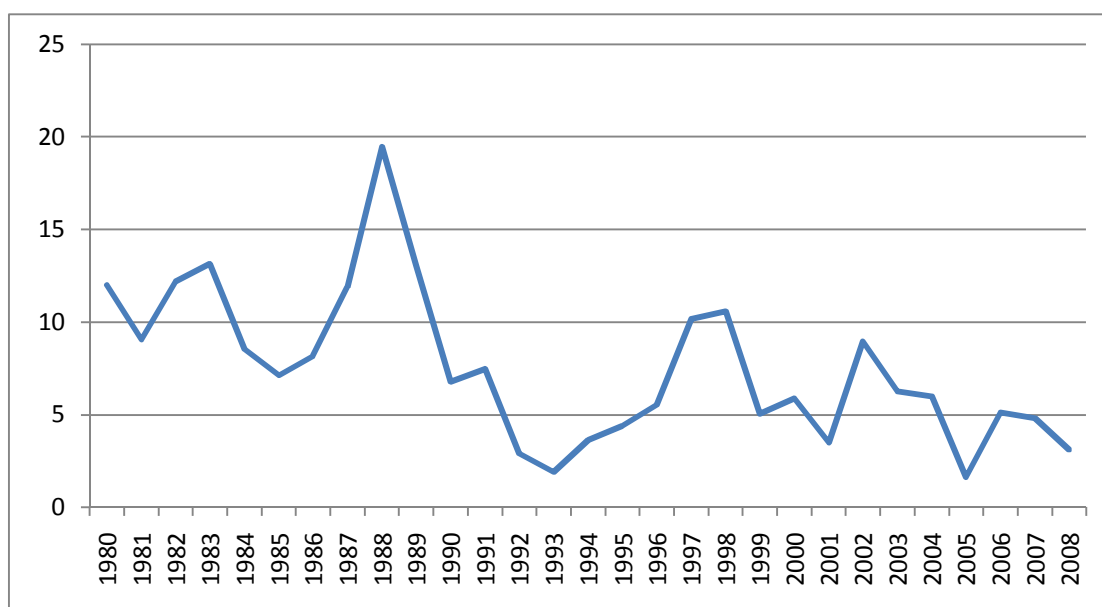
Source: World Bank

Botswana is an upper middle income country with the abundant resources in the world. It is the important diamonds exporter in Africa country and is the world's most diamond dependent economy. As a result, their large proportion of GDP is comes from exporting. Other than that, economy is basically depends on the agricultural industry where more than 80% of the population are depending on it as a livelihood. Others, the economy also dominated by a few sectors such as mining also contributes around 40% to GDP. In the year of 1966 until 1997, Botswana had the highest rate of economic growth in the world, but thereafter, it is an adverse effect. According to the Ministry of Finance and Development Planning, in 2008, inflation was stable with challenges and consists of high global food and fuel prices. Thus, the average year-on-year inflation rate was 12.6%.

In figure 6, the GDP slowly decline from year 1980 to year 1985 and following by the rise to 19% of GDP which reaches the peak at year 1988.

However, the GDP started to decline in that particular year to 2% of the GDP at the mid of year 1992. The GDP after year 1992 was not stable but still can maintain in the positive gap.

1.1.7 Economic Growth for Kenya

Figure 7: GDP growth for Kenya from 1980-2008
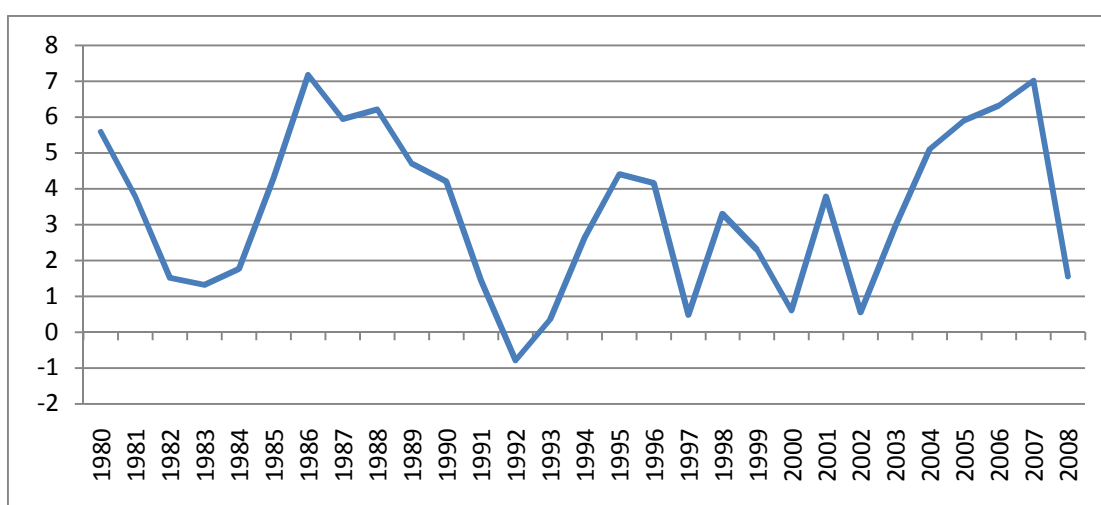
Source: World Bank

Kenya is non-oil exporting countries with a large trade deficit which allocated in East Africa and the economic structure is highly depending on the agricultural production. Besides, it is a low-income country in East Africa and it independent in the year of 1963. Economy Watch stated that the industrial sector in Kenya is underdeveloped. Therefore, large quotas of consumer goods were imported from abroad. From the above diagram, it is noticed that there is volatility in GDP growth per annum.

By reviewing Bureau of African Affairs (2011) in the mid of 1990s, Kenya government had implemented economic reform to steady the economy and to restore the sustainable economy. But, there is poor governance and corruption

which brings negative impact to the economic growth. In the year of 1991 to 1993, Kenya had its worst economic performance, the inflation also boost up to 100% in August 1993. This is due to the inappropriate agricultural, land, and industrial policies which compounded by poor international trade and the governance weaknesses. Still, in the year between 1997 until 2002, the economy grew by an annual average of only 1.5%. IMF and World Bank offered loans to the Kenya country to prevent a severe economic crisis with GDP growth falling to 0.2% in year of 2000.

According to Federal Research Division (2007), the largest contributor to the Kenya economic is the agricultural sector which including forestry and fishing and accounted for 24 percent of GDP in year of 2005. Others, 14 percent of GDP are come from the wage of employment and 50 percent revenue is come from exports which are horticultural products and tea followed by coffee.

In figure 7, it can be observed that the country reaches its peak at the GDP of 7% and slowly declines to -1% at the year 1991. The GDP fluctuates between the positive in the gap of 4.5% and 0.5% from the year 1994 to mid year 2001. The GDP had risen again to the peak at the year 2007 and had a sharp to the year 2008.

1.1.8 Economic growth for Senegal

Figure 8: GDP growth for Kenya from 1980-2008
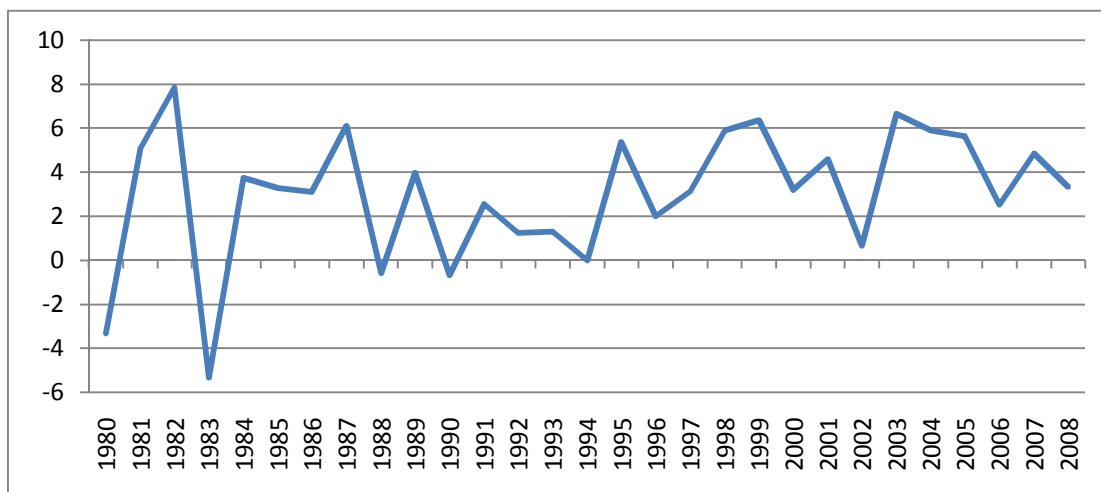
Source: World Bank

Senegal is classified as the least developed country with the lowest income in Sub Saharan Africa. The economy is largely depends on the agricultural, as well as the foreign aid. Agricultural is accounted for the two-thirds of exports revenue, also employed up to 70 percent of the population in the country and the most important crop is peanuts. In addition, through The World Factbook (2011), we noticed that the oil export in Senegal country is 5653 bbl per day in 2007. However, the oil imports are 42,850 bbl per day in 2007. Others, Senegal country does not produce any oil production except the peanut oil with the purpose for exporting. From the diagram above, we noticed there is a deep recession in the year of 1984. The GDP growth is drop to a negative value. According to African Economic Outlook (2011), Senegal was highly affected by the global financial crisis in 2009 and is compounded by domestic shocks. The real GDP growth in 2009 had estimated to drop to 1.5% as compared in 2008. External affairs such as current-account deficit highly affected Senegal's economic growth. Current-account deficit is mainly due to trade deficit which had worsened the economy.

Figure 8 show the GDP of Senegal which sharply increase from year 1980 from -3% to 8% in the mid of year 1983 and sharply falls after that to -5% in the mid year 1984. The fluctuation was not stable after the rebound to 4% in the year 1984 but still can maintain in the positive gap.

1.1.9 Economic Growth for Swaziland

Figure 9: GDP growth for Swaziland from 1980-2008
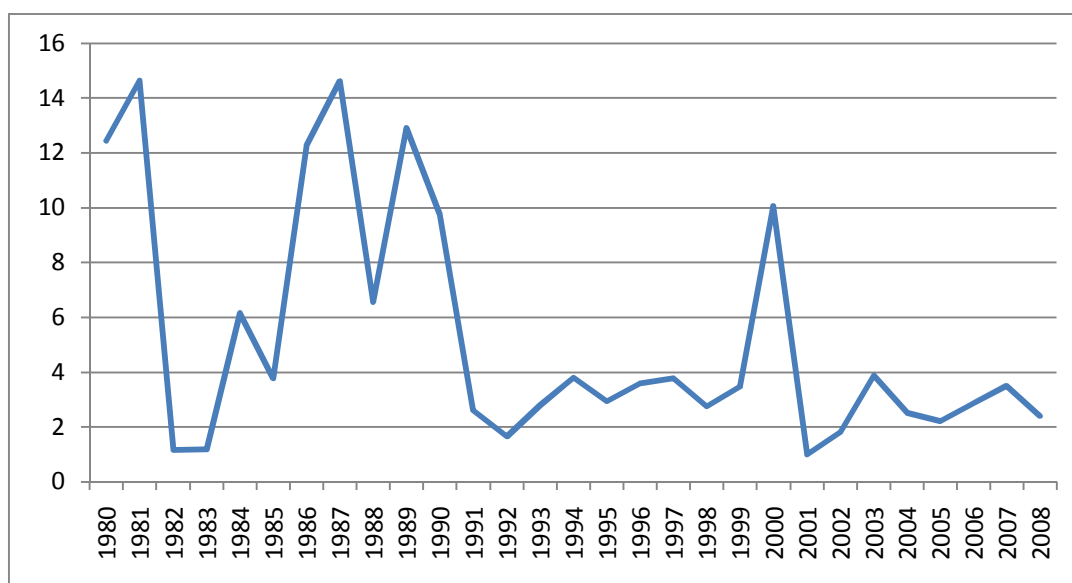
Source: World Bank

Swaziland is the second smallest country after Lesotho in Sub- Saharan Africa and it is define as a middle- income country. It has diversified manufacturing sector since 1980s and sugar and wood pulp were the major foreign exchange earner (The World Factbook, 2011). Encyclopedia of the Nations stated that the small size of Swaziland relies heavily on export sector which were mostly large firms owned by foreigner. In year 1999, the diversified industrial sectors had accounted for 43% of GDP in the economy. It's economic condition influenced by its dominant neighbour, South Africa. In the year 1996, South Africa's imports on Swaziland's export were 96%, 60% were Swaziland's export and 50% of its

foreign direct investments. Trade based on year 2008 were soft drink concentrates, sugar, wood pulp, canned fruits, cotton yarn and citrus (Bureau of African Affairs, 2011).

Figure 9 shows that the GDP in Swaziland increased and decreased dramatically from year 1980 to 1992 and stabilize thereafter. However, Swaziland still remains in positive GDP in our research period.

1.1.10 Economic Growth for Zambia

Figure 10: GDP growth for Zambia from 1980-2008
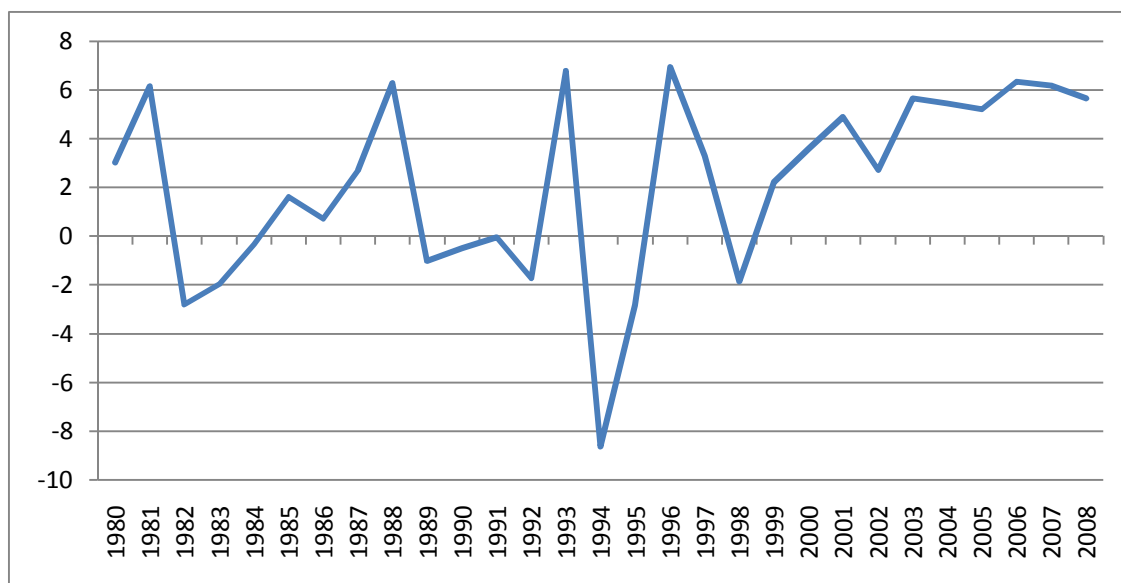
Source: World Bank

Zambia is one of the Sub- Saharan countries which are defined as a low-income country. Zambian economy was in an insecure state during the 1990s. Their economic condition was harmed by the high inflation, severe drought, declining export prices and failure of economic policies. Copper industry was gain 80% of the export revenues in year 1999. However, the depressed in world price of coppers remains the low revenue of the copper (Encyclopedia of the Nation,

2011). According to African Economic Outlook (2011), the government began to privatize the industry since 1991 to reduce the dominance of mining sector. Surprisingly, after the privatization of the industry, there was an increasing economic growth. Since year 2004, copper had increased its output steadily due to the foreign investment and higher copper prices. Their trading products based on year 2008 are copper, tobacco cobalt, cotton, lead and zinc (Bureau of African Affairs, 2011).

In Figure 10, it shows that Zambia's GDP fluctuates greatly from year 1980 to 1998. There was a great fall in GDP from about 7% to -8% in 2 years which is from year 1992 to 1994. According to African Economic Outlook (2011), the governments' tight cash budget limits its capacity to purchase the increase in crops production after the severe drought. However, the economic rebound back to 7% in 2 years time. This is due to the reform of key economics in the later 1990s (African Economic Outlook, 2011)

1.2   Problem statement

Oil price fluctuation has significant impact on economic growth of countries which especially oil exporting and importing countries. Besides that, countries which involve in massive manufacturing and producing that input is oil intensifying also be affected. The increase in oil price gives positive impact on economic growth to oil exporting countries and negative impact to oil importing countries and to other countries that consumes on oil (Abeysighe, 2001; Berument, Ceylan & Dogan, 2010). However, during the research and evaluation on the Sub-Saharan countries economic condition and economic activities, it is found that some of the countries which have vast oil resources and probably oil as the country's main revenue as such as Sudan, Democratic Republic of Congo and

Cote d'Ivoire do not seem to enjoy from the increase in oil price. According to Syed (2010), crude oil or oil is a scarce resource and is one of the costs in manufacturing and production. Thus, increase in oil price will significantly increases the cost of production and hence increases the price of the trading partners and gives negative effects to the export and economic growth (Wakeford, 2006).

Besides that, oil price gives effects to the trade. Due to the oil price is considered as one of the cost of production, the increase of oil price will directly reduces the demand on exports. However, Berument, Ceylan and Dogan (2010) shows that there is different effects on different countries. Trade is important to economic growth. Positive balance of trade contributes to an improvement in gross domestic product (GDP) and vice versa. Din (2004); Azgun and Sevinc (2010) shows that there is no causality relationship between export and economic growth. Theoretically, imports are said to bring negative impact to the economic growth. However, Chen (2009) stated that certain amount of imports will improves the productivity and technological skills in the nation. Besides that, Chen further note that the negative effects of the imports to the economy will be offset through the positive effects from household consumption either wholly or partially.

Therefore, this study is concerned on the issue related to the fluctuation in oil price throughout the research period of year 1980 to 2008 to the economic growth of the 10 selected countries in Sub-Saharan Africa which comprised of oil exporting and importing countries. There are questions reveal to this study such as:

1. Is the fluctuation of oil price gives a relevant impact to the economic growth in these countries?
2. Is there any relationship exist between the oil price, inflation, export and

import to economic growth?

Previous economists such as Abeysighe (2001); Din(2004); Lardic and Mignon (2005); Olomala and Adejumo (2006); Akanni (2007); Yu (2007); Ito (2008); Marterbauer (2008); Abidemi and Naliq (2010); Azgun and Servinc (2010); Berument, Ceylan and Dogan (2010); Ismail (2010); Pahlavani *et.al* (2010); Samad (2011) had done related research on oil price, inflation and export and imports to economic growth. However, there is still lack of study on the Sub-Saharan countries' economic growth research especially on oil price fluctuation. Thus, this research is aimed to focus on 10 Sub- Saharan Countries which 5 of it were oil- exporting countries and the other 5 were non oil- exporting countries but still oil –importing.

1.3   Research Objective

1.3.1 General Objective

The general objective in this research is to study on the relationship of the fluctuation in oil price given to economic growth in the ten selected SSA oil exporting country and non oil- exporting country which assesses the historical oil price from year 1980 to 2008. It is believed that an increase in oil price will affect the trend in the economic growth for exporting oil countries and vice versa for oil importing countries.

1.3.2 Specific Objective

Specifically, our objectives of the study are as following:

a) To examine the effect(s) of oil price on economic growth in 10 SSA countries

b) To provide policy implication to relevant parties on the role of oil price in SSA country

1.4 Significance of the study

In this study, we attempted to determine the long run relationship between the fluctuation of oil price and economic growth in the ten SSA countries. In the world economic condition, we realize that SSA was categorizing as a poor and less developed countries. Yet, oil is a main commodity resource in Africa and hugely affected the revenue or income for the exporting oil countries. Same researches had been conducted in many countries by other researchers such as Abeysighe (2001); Olomola and Adejumo (2006); Akanni (2007); Aliyu (2009) and but not in the SSA countries. Therefore, our contribution in this research is to further the current research and develops on understanding to the economics of SSA.

Further, our contribution in this study is to evaluate how and to what extend the fluctuation oil price may contribute to the economic condition and so do its growth. Besides, inflation consider is a part of the factors that affecting the economic growth. In this case, we want to examine whether the inflation happens in these SSA will act in a reverse way to the theory. Moreover, policies can be implemented in this study may can be used to revised on and lead to a more optimistic economic condition. Lastly, this research work is attempting to achieve

to arouse the interest of more researchers to engage in the study in economic growth in SSA countries especially in fluctuation in oil price and this can become a references to others researchers in their future time.

1.5   Chapter layout

Our research paper will divided into five parts. Chapter 2 provides a brief synoptic review of theoretically and empirical literature review. Chapter 3 outlines about the methodology and data sources that used in the research. Chapter 4 reports on the result and interpretation from the estimations performed to our model. This research concludes with chapter 5 which summaries this study and recommendations of policy implications.

CHAPTER 2 LITERATURE REVIEW

2.0 The relationship between Oil Price and Economic Growth

Oil plays an important role in many economic activities and the demand on oil has not been reducing until today. Its price brings great concern to countries around the world.

Previous study by Brown and Yucel (2002) documented that oil price shocks may have an impact on the economic activity. According to Olomala and Adejumo (2006), oil price increase causes increase in production cost and lead to decrease in production so does investments. Furthermore, Ferdered (1996) also concluded with the same result that there is negative relationship between economic growth and investment. Moreover, service sectors and small scale manufactures suffer from the increase in production cost in the short run. In order to maintain themselves in the market, they change the existing structure of production and operation by cutting down the existing workers (which creates a problem of unemployment), finding alternative substitution for the high cost inputs and having their production more diversified to enables to maintain to the long run (Lardic & Mignon, 2005).Theoretically, these conditions could dampen the economic growth of the countries.

However, some of the researchers such as Chang and Wong (2003); Nkomo (2006) argue that there is a weak relationship between oil price and growth. Besides that, Narayan *et al.* (2007) used VAR model to analyze on the relationship of oil price and real GDP for Fiji Islands. They concluded that an

increase in oil price has a small but positive impact on real GDP with GDP and other macroeconomic variable should be taking into consideration. Moreover, they also observe unidirectional causality among oil price and real GDP in the short run but only oil price Granger cause real GDP in long run. Nkomo (2006) explained on the weak relationship which is due to the offset between oil intensifies substitution and oil consumption, but latter is specified in short run.

Therefore, price level on inputs and final consumption product increase and inflation will arise. Higher inflation level will certainly hurts the economic growth and the poor in the country will be much suffering. Cologni and Manera (2008) signify that there is positive relationship between inflation and oil price due to directly which come from behavioral response from consumer and indirectly which categorized as behavioral response from firms and wages on economic growth. Consumers will be neglected to spend more on consumption and private and public investment may drop due to the loss of confidence in the market. Thus, the consumption and investment in the country drops (Aliyu, 2009; Berument, Ceylan & Dogan, 2010). In addition, Syed (2010) stated that the increase in oil price will hurts the exports due the loss of competitiveness in the world market. On the other hand, if the oil price is stable, it will increase the demand of products hence the national income. The increase in potential output capacity induces investments in the long run.

In fact, we can say that the fluctuation of oil price would not only affect the growth and performance within the country but also internationally. Oil price fluctuation gives significant impact on the economic growth which is positively to oil- exporting countries and negatively to non- oil exporting and oil- importing countries. However, this effect is limited to certain extend in the country which has proved by the economists and researchers on the further explanation in this paper. Besides that, impact of oil price fluctuation differs among developed and

developing countries.

Cologni and Manera (2008) conducted a structural cointegrated vector autoregression (VAR) analysis and they found negative impact of the oil price shock on output in selected developed countries (France, U.S, Canada and Italy). Hamilton (2003) further examined the relationship by developing a flexible model to capture the effect of economic growth when oil price shocks occurred by using the post-war US data and conclude on the same result as Abeysinghe (2001) and Cologni and Manera (2008). Zhang (2008) continues the research conducted by Hamilton (2003) by using the basis of non-linear approach to examine the oil price relationship with Japan economic growth. He found that the oil price changes and macroeconomic activities are significantly affected by the non-linear relationship.

Abeysinghe (2001) who had same result (negative relationship between oil price and economic growth) as Hamilton (2003) and Zhang (2008) further examine on oil price decreases. Surprisingly, Zhang (2008); Jayaraman and Choong (2009), found that the decrease in oil price would not bring to expansion to the country's productivity. Besides that, Cologni and Manera (2008) conduct a structural cointegrated vector autoregression (VAR) analysis, they found a negative impact of the oil price shock on output in selected developed countries (France, U.S, Canada and Italy). Wakeford (2006) also highlighted that the impact on developing countries will be more vulnerable than developed countries due to the ability of energy utilization which enables the developed countries to save in cost as compares to developing countries (Rodgoff, 2006).

Theoretically, positive or negative relationship between oil price and economic growth mainly depends on whether it is oil-exporting, oil-importing, or non-oil countries. Guo (2008) examined the sensitivity of GDP to the changes in

oil price by using VAR model with cointegration test and the result shows that increase in international oil price will lead to an improve economics growth for an oil exporting country (Russia) but tends to dampen the oil importing country (Japan). Pahlavani *et al.* (2010) proposed their result on the test asymmetric cointegration of oil price and GDP and have evidence on the asymmetric relation between the two variables. The positive and negative relationship between oil-exporting and non- oil exporting or oil- importing countries is mainly due to the transfer of wealth from oil-importing countries to oil- exporting countries (Berument, Ceylan and Dogan, 2010).

Ismael, Margarat and Ramos (2009) stated that large and rapid increase in the oil price experienced to have a negative effect on the Gross Domestic Product (GDP) in the overall world especially it bring an adverse effect in the oil-importing countries (South Africa). Besides, African Development Bank (2009) also brings a conclusion which a high oil price can have very harmful effects to the African oil-importing countries, especially to those heavily debt-burdened countries. African Development Bank (2009) testing the average annual real GDP growth using data from 1990 until 2004. It found that, there is a significant result of a high oil prices in the oil-exporting countries (Angola, Chad, Congo, Gabon, and Nigeria) where it brings a huge amount in export revenue and hence higher the economic growth. Abeysighe (2001) comes with an explanation that in the short run, the direct impact of oil price increase to the oil- exporting certainly increases their country's economic growth but in the long run they will lose out because of the trading partners (non- oil exporting and oil- importing countries) contractionary effects. Previously, there was significant result shows that increase in oil price will lead to world economic recession.

Extensions to examine the relationship between oil price and economic growth were conducted. Cunado and de Gracia (2003) applied the Co-integration

and Granger causality test to estimate the short run and long run impact of oil price with the inflation and economic growth in the Asian Economics and in European country during the period between 1975Q1 until 2002Q2 for 6 Asian Countries (net oil exporter -Malaysia and net oil importers -Japan, Singapore, South Korea, Philippines, and Thailand) have been selected. The result indicated that there is no co-integrating long run relationship of oil price on growth was also supported by Lardic and Mignon (2006). However, in short run, oil price shocks are found to be Granger cause economic growth in South Korea, Japan and Thailand.

Gallo *et al.* (2010) further extend the research on the oil price fluctuation and economic performance by conducting an examination using unrestricted VAR models to analyses the relationship oil price movement between world oil demand and world oil supply. They shows that there is enough evidence to conclude that real culprits for fluctuations in oil prices for economics performance is more appropriately associated with supply factors but not cause by consumption of oil which conclude that there is negative relationship between oil price movement and economics growth especially oil price in the supplying country rather than demanding country.

However, the effects of oil price fluctuation to the countries is mainly depends on the policy implemented and economic conditions before it happens. Besides that, the degree of after- effects is also depends on how the government taking care of the country.

2.1 The Relationship between Inflation and Economic Growth.

Theoretically, inflation brings uncertain impact or effects; either positive or negative effects, to the country's economic growth. The negative effect is the inflation tends to slow down and dampened the current economic growth while the positive effect is it may bring to improve in the standard of living.

Odusola & Akinlo(2001), Frimpong and Abayie (2010), Shitundu and Luvanda (2000), Tehranchian, Samimi and Behravesh (2010), Saaed (2007), Ahmed and Mortaza (2005) and Rousseau and Yilmazkudaym(2009) shows negative relationship between inflation and economic growth. Besides that, Wilson (2006), Hwang (2007) and Narayan, Narayan and Smyth (2009) clearly stated according to their strong empirical result that the high inflation brings harm for economic growth in the country which had supported the statement by Odusola and friends. The 'harm' which had been stated means the harm or deterioration on economic activities and growth as the increase in inflation may lead to depreciation of local currency and leads to decrease in consumer purchasing power and investments and even unemployment.

Besides that, findings from Tehranchian et al. (2010) contend that negative bidirectional relationship exists between inflation and economic growth in Iran, while Saaed (2007) and Ahmed and Mortaza (2005) claimed that there is a significant long run inverse relationship between CPI and economic growth in the research observed countries. In the study by Yamamoto (1995), he found that there is no causality relationship was between economic growth to inflation, but, causality relationship exists between inflation to the economic growth and unidirectional causality run from inflation to economic growth and this indicates that the inflation will have impact on growth.

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However, Mallik and Chowdhury (2001) had argued on the statement of the negative impact of inflation to economic growth based on the result on the research in Bangladesh, India, Pakistan and Sri Lanka. They found that there is a positive long run relationship between inflation and economic growth. Reason behind this finding is the moderate inflation in these countries which may helpful to growth.

On the other hand, inconclusive result reached by Bhatia (1960), Johansen (1967) and Chimobi (2010) on whether there is positive or negative relationship exists in between inflation and economic growth. In addition, Chimobi (2010) found that there is no long run relationship between inflation and economic growth as compared to Mallik and Chowdhury (2001)'s result.

In reality, inflation rate fluctuation and it will affect the price level and directly affect economic growth not only in short run but also in long run. Due to the fluctuation movement of inflation rate, Hwang (2007) are concern on the volatility of inflation. On these researches, he indicates that economy with high inflation is likely to be followed by higher volatility of inflation and volatility in real growth.

Guerrero (2006) indicate that causality between inflation and economic growth are not appropriate by examine the relationship of only these two variable. This is because these researcher uses past hyperinflation experiences and excludes other macroeconomic variables to conclude that a negative effects of inflation on long term economic growth. However, ambiguity exists when conducting an examination on the hyperinflation on long term economic growths. But, in reality, hyperinflation has a long lasting effect to affect the long term economic growth. Thus, inflation rate is one of the important macroeconomic variables that need to

take in account in the research.

In conclusion, effect on inflation is either positive or negative effects to the economic growth. So, inflation was an argument variable among economist to determine the economic growth due to its inconclusive effects. Besides that, inflation also can be a useful tool for government and central bank to encounter distress in the economic growth.

2.2 The relationship among Export and Import towards Economic Growth.

Exports are revenue generating activities to a country which theoretically gives positive impacts to the country's economic growth as supported by Din (2004), Azgun & Sevinc (2010) and Samad (2011). Export may help to promote economic growth, employment in certain industries and income Azgun and Sevinc (2010) and Samad (2011). Export holds as outward strategies to boost the economic growth. Exports can lead to improvement of capital by expanding their technology and enrich the knowledge of their labors to gain in specialization in production and comparative advantages. However, gaining comparative advantage in the world market is not an easy task and needs to be maintained.

However, negative relationship between export and economic growth exist in the long run as stated by Ismail, Zaman, Arif, Jadoon and Seemab (2010) and Samad (2011). This is because of the intense in export may lead to currency appreciation as the foreign demand for the home country currency increase and hence leads to higher growth in the short run. Due to the appreciation of currency against foreign currency which trades with the country, home country losses competitiveness the in trading market and hence makes imports by foreigner will

be more expensive. Thus, in the long run, the foreign demand on export will drop so do the national income as exports generate revenue in the country's current account.

Besides that, there is positive bidirectional causality relationship determined between export and growth (Wong, 2007; Jun, 2007; Samad, 2011). However, the long run relationship between export and economic growth is unidirectional only from economic growth to export (Reppas and Christopoulos, 2005).

In a country, certainly there is outflow and inflow in their current account. Export generates inflow while import generates outflow to the country. Theoretically, import are said to bring negative impacts to the economic growth. This had proved by Azgun & Sevinc (2010). He indicates that as the import increases, the gross national product will increase and balance of payment fall. Besides, the increase in imports will increase the current account deficits. However, in the research between GDP and economic condition which trades are included as one of the estimation factor, import is important to take into account. This is because import act as one of the activity which brings negative impact to the economic condition or growth.

However, some researchers found that there is a positive relationship between import and economic growth. Although import may increases the current account deficits but imports of capital goods and intermediate goods may stimulate the domestic growth (Samad, 2011) which will leads to more investments. Huan (2009) says that the economy will have positive growth if the exports of the country exceed the imports. Besides, the negative impact of the import can be offset by the consumption and give positive effects to the country. Din (2004) further stated that there is a causal relationship from import to GDP

and have evidence of bidirectional causality between import and economic growth.

CHAPTER 3: METHODOLOGY

3.0 Introduction

This chapter deals with the theoretical framework where established the long run relationship among oil price movement, inflation rate, export and import from the periods of 1980 – 2008. All the variables are taken on an annual basis where it issue from World Bank. We selected 10 SSA countries in our study such as Cote d'Ivoire, Gabon, Sudan, South Africa, Democratic Republic of Congo (DRC), Botswana, Kenya, Senegal, Swaziland and Zambia. In order to test the long run relationship, panel data analysis is being used. Panel data econometrics uses both time series and cross sectional data sets to help us to minimize the chances to get biased results in our estimation, also, to avoid repeated observations over time for the same individuals.

Unit root tests validate the stationarity in the series. Hence, first and important, we applying the panel unit roots test such as Levin and Lin (1992, 1993) and Levin, Lin and Chu (2002) the LLC test, and Im, Pesaran and Shin (2003) the IPS test to identify whether our estimation model is in stationary or unit roots. Besides that, Pedroni (1997, 2004) test is also conducted in our analysis to test for estimating the long run relationship of the variables in the model. Then, we will proceed in testing of Johansen Fisher Panel Cointegration test with the purpose to examine how many long run relationships exist among the 5 variables in the series. Furthermore, the ARDL approach to co-integration applied to regress on the empirical model.

3.1 Theoretical Framework

In general, Gross Domestic Product (GDP) growth rate hold the most important role to indicate the economic health. It can be defined as the total market value of all final goods and services which produced in a country in a given year, and is equal to the sum of consumption, investment, government spending and the net export in an open economy. According to Abeysighe (2001); Aliyu (2009); Berument, Ceylan and Dogan (2010) found that the dynamic of oil price is one of the essential variables to affect the economic growth. Therefore, we set our objective to determine whether the dynamic of oil price bring huge effect to the economic growth in SSA country during the period of 1980 – 2008. Besides, we are using the balanced data in our study.

Our estimation model is specified as follows:

$$RGDP_{it} = \beta_0 + \beta_1\, OP_{it} + \beta_2\, INF_{it} + \beta_3\, EX_{it} - \beta_4\, IM_{it} + \mu_t$$

Where:

RGDP	= Real Gross domestic product
OP	= oil price (dollar per barrel)
INF	= Inflation
EX	= Export of goods and services (% of GDP)
IM	= Import of goods and services (% of GDP)
μ	= Random errors (residual)
i	= *i*-th (cross-sectional unit)
t	= *t*-th (time period).

β_0 is a constant term in the model, β_1, β_2, β_3 and β_4 are the slope of coefficients of the four independent variables. Based on the model, there is a Real GDP act as

dependent variable, and this can be shown in the appendix in our research. Besides, in our study, labor and capital variables (supply side) are did not take into consideration due to the lack of data.

Oil is one of the scarce natural resources and is an important input for production in this new era. One of the events in the world which had given a real impact to the world's performance was the oil price shock and it had led some countries to a tight condition. It has driven up the cost of production in manufacturing and production industry and the cost- push inflation exist (Batten, 1981; Syed, 2010). According to the law of demand and supply, when the price of a commodity increase, the demand of the commodity will decrease and the supply will increase as the supplier will tend to gain more from it. The demand for oil is inelastic. Thus, producer and manufacturer will not immediately reduce their consumption or demand for oil due to the intensity and importance of it as an input for manufacturing and production and fuel for transportation as oil is a scarce resources and hard to find substitution to it. As a result, the oil exporting countries will experience additional gain during the oil price shock and improves their current account so do their gross domestic products and vice versa for the oil importing countries (Ito, 2008; Berument, Ceylan & Dogan, 2010). Therefore, we can conclude that there can be positive relationship between oil price and economic growth for oil resource country and vice versa.

In addition, inflation is defined as an increase in the overall price level in the economy. According to Phillips Curve, it expected to have a negative relationship with economic growth because inflation increases the overall price and causes the economy fall into recession due to drop of producing and purchasing output and rising in unemployment. So, when the economy is having inflation, the economic growth of the country will slow down and get hurt (Frimpong & Abayie, 2010) because it will disrupt the smooth function in the

market (Chimobi, 2010).

Din (2004) and Aliyu (2009) stated that a country's exporting in goods and services can bring income or currency inflow to the country and it able to boost the economic growth. However, country's importing in goods and services into the country convey negative relationship with economic growth where imports allow the outflow of currency to other foreign exporting country (Azgun & Sevinc, 2010). Therefore, country with open economy condition is not just affected by only import or export, but both. The difference between exports and imports is the balance of trade of the country. If the exports are larger than the imports, it indicates that there is a surplus in the current account and it would improve the economic condition. But if the imports are larger than the exports, it indicates that there is a deficit in the current account and it would worsen the economic condition. On the other hand, Chen (2009) states that an appropriate amount of import will improve the technology progress and productivity of the country and have some effect on the economic growth. Besides that, the cost of production, cost and availability of inputs for manufacturing and production and prices of domestic product will affects the balance of trade due to the effects of price on imports and exports (Berument, Ceylan & Dogan, 2010).

3.2 Data and Sample

Data in annual basis from the periods of 1980 – 2008 were collected from World Bank on 10 selected countries in Sub Saharan Countries which are Cote dIvoire, Gabon, Sudan, South Africa, Democratic Republic of Congo (DRC), Botswana, Kenya, Senegal, Swaziland and Zambia. The economic growth are measured by gross domestic product (GDP), export of goods and services (EX) and import of goods and services (IM) in percentage, world oil price movement

(OP), inflation rate (INF).

3.3 Econometric Model

Since, we are using the balanced panel data in our study. The methodology employed in this study consists of various test such as panel unit root test (Levin *et al.* (1992, 1993) and Levin *et al.* (2002) (LLC) test, and Im *et al.* (2003) (IPS) test. In addition, we also applied of panel cointegration test such as Pedroni (1997, 2004) test and ARDL approach to cointegration method.

3.3.1 Panel unit root tests

Before conducting panel cointegration test, we need to go through the panel unit root test examine whether our variables in the series are stationary or not ($H_{1:}$ Stationary). Panel unit root tests are a multiple- series of unit root tests in panel data structure which is generated as a multiple series with the existence of cross- sections rather than in a single series. Panel- based unit root test have higher power as compared to the individual time series unit root test. In this test, we aim not to reject the null hypothesis of unit root because a stationary series are said to have strong influence on its properties and behavior. There are 5 types of panel unit root tests which are Fisher- type tests using ADF and PP tests (Mandala & Wu, 1999; Hadri, 2000; Breitung, 2000; Choi, 2001; Levin *et al.,* 2002; Im *et al.*, 2003). These tests had been categorized in 2 types. The first type is use to estimate the regression with lagged difference terms which are Fisher-ADF test, Levin, Lin and Chu test, Im, Pesaran and Shin test and Breitung test. The second type is use to estimate regression which involve in the kernel weighting which are

the Levin, Lin and Chu test, Hadri test and Fisher- PP test.

Besides that, it is important for us to avoid for spurious correlation which exist in long run relationship between levels of non-stationary variables. If the model consists of unit root, it indicates that it is a non-stationary model so that, cointegration techniques can be applied in the model such as running the variable in first differences, such as, stationary I(1) series. Therefore, panel unit root test which proposed by Levin et al. (2002) and Im et al. (2003) which are LLC test IPS test has been used.

3.3.2 LLC Test

According to Levin *et al.* (1992, 1993) and Levin *et al.* (2002) (LLC), we noticed that they have contributed to some new results on panel unit root tests based on Quah's model which allows for heterogeneity of individual deterministic effects in constant and or linear time trend and heterogeneous serial correlation structure of the error terms where assuming there contain of homogeneous of first order autoregressive parameters. Thus, if the series found there is an integrated at order one *I(1),* meaning that, the series are cointegrated. The relationship between oil price, export and import of good and services, inflation and economic growth can be interpreted in long run equilibrium. As a result, the cointegration test (based on Pedroni, 1999) is being employed in our study.

LLC model:

$Dy_{it} = \rho\ y_{it-1} + \alpha_{0i} + \alpha_{1i}t + u_{it,}$

Where:

$i = 1,2,..., N$

$t = 1,2,...,T$.

From the series, time trend ($\alpha_{1i}t$) and individual effect (α_{0i}) are incorporated. The deterministic components are an important source of heterogeneity due to the lagged dependent variable and it is restricted to be homogeneous in all units in the panel. Besides, u_{it} is being assumed to be independently distributed across individuals and follow a stationary invertible ARMA process for each individual:

$$u it = \sum_{j=1}^{\infty} \theta ij \ u_{it\text{-}j} + \varepsilon$$

And the finite-moment conditions are assumed to assure the weak convergence in Phillips (1987) and Phillips-Perron's (Phillips and Perron, 1988) unit root tests.

3.3.3 IPS Test

Im *et al.* (2003) (IPS) suggested a more flexible and computationally simple unit root testing procedure for panels (*t*-bar statistic) using the likelihood framework. It allows for simultaneous stationary and non-stationary series. Besides, this test allows for residual serial correlation and heteroskedastic but cross- sectionally independent other than the existence of the common time effect. Furthermore, it allows heterogeneity of the dynamics and error variances across groups.

IPS consider the mean of (*A*)*DF* statistics computed for each cross-section unit in the panel instead of pooling it when the error term u_{it} of the model is serially correlated with different serial correlation patterns across cross-sectional units and *T* and *N* are sufficiently large. Substituting u_{it} to the model with considering a linear trend for each of the *N* cross-section units, we get:

$$\Delta y_{it} = \alpha_{oi} + \rho_i y_{it\text{-}1} + \sum_{j=1}^{pi} \gamma_{ij} \Delta y_{it\text{-}j} + \varepsilon_{it}$$

Where:

$i = 1, 2, ..., N$,

$t = 1, 2, ..., T$

3.4 Panel cointegration tests

3.4.1 Pedroni (Engle- Granger based) Cointegration Tests

Pedroni (1999, 2004) is a residual- based cointegration test with the null hypothesis of cointegration. This cointegration tests are to examine the long run relationship exist within the variables and between variables. According to Pedroni (1999, 2004), it is a cointegration test for dynamic panels with multiple regressors. The short-run dynamics and the long-run slope coefficients for these dynamic panels can be heterogeneous across individuals. Nonetheless, it has its limitations. In order to overcome the limitations, Pedroni (2004) has revised on the old set of residual- based test statistics to a set of test statistics for null of no cointegration with fully endogenous regressor, no pooled slope coefficients and varying dynamics. Besides, Pedroni also function in controlling for the heterogeneity across units (European Central Bank, 2004). Pedroni had developed 7 residual- based panel cointegration test statistics, with 3 are denoted in the group mean cointegration statistics which based on pooling the variables between-dimension while the other 4 are denoted in the panel cointegration statistics which based on pooling the variables within- dimension. These seven statistics have the comparative advantages when there is a small sample size and the power properties are mainly depends on the underlying data-generating process.

A) Within- dimension (panel test)

    1. Panel v-statistic

$$T^2 N^{3/2} Z_{\hat{V}N,T} \equiv T^2 N^{3/2} \left(\sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{11i}^{-2} \hat{e}_{i,t-1}^2 \right)^{-1}$$

    2. Panel Phillips- Perron (PP) type ρ- statistics

$$T \sqrt{N} Z_{\hat{\rho}N,T} \equiv T \sqrt{N} \left(\sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{11i}^{-2} \hat{e}_{i,t-1}^2 \right)^{-1} \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{11i}^{-2} \left(\hat{e}_{i,t-1} \Delta \hat{e}_{i,t} - \hat{\lambda}_i \right)$$

    3. Panel Phillips- Perron (PP) t- statistics (Non-parametric)

$$Z_{tN,T} \equiv \left(\tilde{\sigma}_{N,T}^2 \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{11i}^{-2} \hat{e}_{i,t-1}^2 \right)^{-1/2} \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{11i}^{-2} \left(\hat{e}_{i,t-1} \Delta \hat{e}_{i,t} - \hat{\lambda}_i \right)$$

    4. Panel augmented Dickey Fuller (ADF) t-statistics (parametric)

$$Z_{tN,T}^* \equiv \left(\tilde{S}_{N,T}^{*2} \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{11i}^{-2} \hat{e}_{i,t-1}^{*2} \right)^{-1/2} \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{11i}^{-2} \left(\hat{e}_{i,t-1}^* \Delta \hat{e}_{i,t}^* \right)$$

B) Between-dimension (group tests)

    5. Group Phillips- Perron (PP) type ρ- statistics (parametric)

$$TN^{-1/2} \tilde{Z}_{\tilde{\rho}N,T-1} \equiv TN^{-1/2} \sum_{i=1}^{N} \left(\sum_{t=1}^{T} \hat{e}_{i,t-1}^2 \right)^{-1} \sum_{t=1}^{T} \left(\hat{e}_{i,t-1} \Delta \hat{e}_{i,t} - \hat{\lambda}_i \right)$$

    6. Group Phillips- Perron (PP) t- statistics (non-parametric)

$$N^{-1/2} \tilde{Z}_{tN,T-1} \equiv N^{-1/2} \sum_{i=1}^{N} \left(\hat{\sigma}_i^2 \sum_{t=1}^{T} \hat{e}_{i,t-1}^2 \right)^{-1/2} \sum_{t=1}^{T} \left(\hat{e}_{i,t-1} \Delta \hat{e}_{i,t} - \hat{\lambda}_i \right)$$

    7. Group augmented Dickey- Fuller (ADF) t- statistics (parametric)

$$N^{-1/2} \tilde{Z}_{tN,T}^* \equiv N^{-1/2} \sum_{i=1}^{N} \left(\sum_{t=1}^{T} \hat{S}_i^{*2} \hat{e}_{i,t-1}^{*2} \right)^{-1/2} \sum_{t=1}^{T} \left(\hat{e}_{i,t-1}^* \Delta \hat{e}_{i,t}^* \right)$$

These seven panel co-integration are based on the equation as follows:

In GDP$_{it}$ = β_{0i} + β_{1i} OP$_{it}$ + β_{2i} INF$_{it}$ + β_{3i} EX$_{it}$ − β_{4i} IM$_{it}$ + μ_{it} ……

μ_{it} is the estimated residual. Therefore if the null hypothesis of no co-integration is rejected, this indicates there is (are) long run relationship(s) exists between GDP, OP, INF, EX and IM. This test has advantage such as it is appropriate to use in providing the asymptotic distributions when there consists of heterogeneous dynamics, individual-specific deterministic trends (Pedroni, 1999).

3.4.2 Johansen Fisher Panel Cointegration

After found out there is a cointegration exists in the estimation model, we conduct the test suggested by Johansen (1988) which is the Johansen Fisher Panel Cointegration test which use to examine the number of cointegrating vectors exist among the five variables. There are two types of test statistic in the Johansen Fisher Panel Cointegration test such as Trace test and Maximum Eigen test, the number of cointegrating vectors are being define by determine the matrix of π where it use to conveys of the long run information which contained in the data. Besides, there is some advantages exist where this test is more easy to compute and the coefficients does not to be assume of homogeneity.

3.4.3 ARDL approach to Cointegration

ARDL approach to cointegration or the bound test approach has its capability in solving the problem of non- stationary data which faced in this research when regresses on the empirical model. Besides, if the OLS are used to regress on non- stationary, loss of long- run information may occur. However, ARDL approach to cointegration encounters this shortcoming while retaining along the short-run information. Pesaran $et\ al.$ (2001) stated that this method will

lead to better and reliable results for small sample studies. Thus, this method is very useful in estimate on our data which is appearing to be non- stationary and due to limited time span. Besides, ARDL approach to cointegration has the ability to solve the endogeneity problem. It also can be applied no matter the regressors are in either $I(0)$ or $I(1)$, but not $I(2)$, in other words means that ARDL has the advantage in avoiding the classification of those variables in the form of $I(0)$ or $I(1)$, and can pass up for the unit root pre-testing (IIhan & Ali, 2010). However, this approach leads to the problem of lack of degree of freedom. It needed numbers of lagged variables which will reduced the available degree of freedom caused inaccuracy exist and reliability of result is ambiguous.

According to Pesaran *et al.* (2001), the ARDL approach to cointegration is formed by the concept of Vector Autoregressive (VAR) and the concept of Vector Error Correction Model (VECM).

VAR of the order of p as denoted as VAR (p):

$$Z_t = \mu + \sum_{i=1}^{p} \beta_i z_{t-I} + \varepsilon_t$$

Where Z_t is the vector of y_t and x_t where y_t is the dependent variable and x_t is the vector matrix of a set of explanatory variables.

This function will further transform to VECM form:

$$\Delta z_t = \mu + \alpha t + \lambda z_{t-I} + \sum_{i=1}^{p-1} \omega_i \Delta y_{t-i} + \sum_{i=0}^{p-1} \omega_i \Delta y_{t-I} + \varepsilon_t$$

The long-run multiplier matrix λ is formed as:

$$\lambda = \begin{bmatrix} \lambda yy & \lambda yx \\ \lambda xy & \lambda xx \end{bmatrix}$$

CHAPTER 4: DATA ANALYSIS

4.0   Introduction

This chapter focuses to the results and interpretation of the relationship between economic growth and oil price in Sub-Saharan countries cover from the period of 1980 to 2008. As outlined in methodology, this research work presenting the regression results for panel unit root test model such as the Levin *et al.* (2002) (LLC) and Im *et al.* (2003) (IPS) test, followed by the panel co-integration test such as Pedroni, Johansen Fisher, and, at last, Autoregressive Distributed Lag (ARDL) model also employed to tested in our study. Foremost, LLC and IPS unit root test are employed to testing the stationarity of the series for instance it examines the null hypothesis of non-stationary. Thereafter, Pedroni and Johansen Fisher co-integration test also in used in testing the long run relationship between the economic growth, oil price, inflation, export and import. Lastly, Fully ARDL model, a technique is employed to indicate whether there exists of a co-integration relationship through country by country.

4.1 Panel Unit Root test results

In analyzing the stationarity in difference series in order to avoid the possibilities of spurious regressions, LLC and IPS test has been applied. The null hypothesis in the LLC and IPS tests presence of unit root, which is non-stationary. According to our results, displayed in Table 4.1 summarized that the LLC and IPS test statistics significantly validate the level values of all series are non-stationary. So, in order to achieve the stationary, we proceed to first difference form. Besides,

Table 4.1 also summarized that the series of the variables, GDP, OP, INF, EX and IM are all turn to be integrated of order one, which is in the *I(1)* process. Thus, we reject null hypothesis of non-stationary at 1% significant level in LLC and IPS test except the oil price are rejected at 10% in LLC test and 5% significant level is being rejected in IPS test, hence, this leading us to conclude that there is a stationary series in the first difference.

Table 4.1: Levin, Lin and Chu unit root test

	Test statistic	
	LLC	IPS
A. In level		
Model specification : Individual intercept and individual linear trend		
GDP	-0.88202 (0.1889)	-0.30711 (0.3794)
OP	12.1263 (1.0000)	15.7957 (1.0000)
INF	-1.02339 (0.1531)	-1.05267 (0.1462)
EX	-0.99935 (0.1588)	-0.76825 (0.2212)
IM	-1.01023 (0.1562)	-0.61207 (0.2702)
B. In first difference		
Model specification: Individual intercept		
D(GDP)	-11.6730*** (0.0000)	-14.2761*** (0.0000)
D(OP)	-1.45437* (0.0729)	-2.24988** (0.0122)
D(INF)	-10.8841*** (0.0000)	-13.3228*** (0.0000)
D(EX)	-5.14143*** (0.0000)	-7.09026*** (0.0000)
D(IM)	-4.06758*** (0.0000)	-6.85430*** (0.0000)

Note: LLC and IPS indicated the Levin et al. and Im et al. (2003) panel unit root tests. All five variables were grouped as one panel with sample N= 290 and T = 10. The parenthesized values are the probability of rejection. These two tests follow the asymptotic normal distribution.

*indicates that the p-value is significant at 10%, ** indicates that p-value is*

significant at 5%, and *** indicates that p-value is significant at 1%.

4.2 Pedroni co-integration test results

All the variables in unit root are integrated of the same order, therefore, it is appropriate to proceed to test whether there is exist of a long run relationship among the five variables (GDP, OP, INF, EX, and IM) in the panel data. Hence, panel co-integration test developed by Pedroni (2004) are employed. Our statistics are being employed in two difference way which is in no deterministic trend and deterministic intercept and trend.

Pedroni (2004) have two different categories of co-integration test, which are the panel test are based on the within dimension approach and between dimension approach. The within dimension approaches basically include four statistics which are the panel v, panel p, panel PP, and lastly panel ADF-statistics. Besides, the between dimension approach also contains of three statistics which are group p, group PP and group ADF-statistics. Nevertheless, we only focus to the panel PP, and panel ADF-statistics and group PP and group ADF-statistic in our study.

Besides, all the statistics in Pedroni (2004) test are based on the null hypothesis of no co-integration, however, the alternative hypothesis indicate there is a co-integration relationship between the series. Given the results in Table 4.2, we find strong evidence to signify that the four out of seven statistics in the Pedroni panel co-integration test are rejected the null hypothesis at the 1% significance level in both no deterministic trend and deterministic intercept and trend. Rejection of the null hypothesis of no co-integration in the *I (1)* series is imply that there is a co-integration in the series. In other words, the five variables

(GDP, OP, INF, EX and IM) are co-integrated and support the long run relationship between each others in the multi-country panel setting.

Table 4.2: Pedroni Residual Co-integration Test

Test statistic	
A. Model specification: No deterministic trend	
Panel co-integration statistics (within-dimension)	
Panel PP- statistic	-6.798286***(0.0000)
Panel ADF- statistic	-3.395114***(0.0000)
Group mean panel co-integration statistic (between dimension)	
Group PP- statistic	-7.617117***(0.0000)
Group ADF- statistic	-3.900733***(0.0000)
B. Model specification: Deterministic intercept and trend	
Panel co-integration statistic (within dimension)	
Panel PP- statistic	-9.482840***(0.0000)
Panel ADF- statistic	-4.305645***(0.0000)
Group mean panel co-integration statistic (between dimension)	
Group PP-statistic	-13.37736***(0.0000)
Group ADF- statistic	-4.503332***(0.0000)

Note: The number of lag truncations used in the calculation of the seven Pedroni statistics is 1. Probability values are in parenthesis.

4.3 Johansen Fisher panel co-integration test results

After demonstrates the result from Pedroni (2004) test, we proceed to second method in determine whether there is exist of a long run relationship

among the series. Therefore, Johansen's Fisher panel co-integration test is employed to establish the multivariate long run co-integration relationship. There are two types of Johansen's Fisher test result which is combined by indicated from Trace test statistics and Max-Eigen test statistics. The objective is to determine the numbers of co-integration vectors. In the Johansen's Fisher Panel co-integration test, we choose the lag order to be one.

According to the result reported in the Table 4.3, in the trace statistics test for the null hypothesis shows there is no correlation (r = 0) between the five variables against the alternative one co-integrating vector (r > 0) reject the null hypothesis at 1% significance level. Next, the null hypothesis of r < 1, and alternative hypothesis of r > 2 also tend to reject the null hypothesis at 1% significance level. Then, the null hypothesis of r < 2, and alternative hypothesis of r > 3 also tend to reject the null hypothesis at 5% significance level, this means that the alternative hypothesis is supporting the existence of co-integration was accepted at the 1% significance level. And finally, the null hypothesis of r < 3, and alternative hypothesis of r > 4 cannot be rejected at a standard significance level. Therefore, from the trace statistic results imply that there is presence of three co-integration vector at 1% and 5% significance level.

In addition, Table 4.3 also implies the result obtained from Max-Eigen test statistics. The null hypothesis shows there is no correlation (r = 0) between the five variables and the alternative hypothesis (r = 1) is tend to be reject the null hypothesis at 1% significance level. Next, the null hypothesis of r = 1, and alternative hypothesis of r = 2 also tend to reject the null hypothesis at 1% significance level. Conversely, the following null hypothesis of r = 2, r = 3 and alternative hypothesis of r = 3, r = 4 cannot be rejected at a standard significance level. Therefore, from the Max-Eigen statistic results imply that there is presence of two co-integration vector at 1% significance level.

From the results obtain in Max-Eigen test and Trace test, we can conclude that there are two long run relationships exist among the five variables. In other words means the economic growth, oil price, inflation, export and import are move together in the long run and they have a stable long run relationship between each others.

Table 4.3: Johansen Fisher panel co-integration

Unrestricted co-integration Rank Test (Trace and Maximum Eigen value)

Hypothesized number of long run relationship	Fisher statistics* (from Trace statistic)	Probability	Fisher statistics* (from Max-Eigen test)	Probability
None	139.0***	0.0000	83.41***	0.0000
At most 1	70.82***	0.0000	55.49***	0.0000
At most 2	30.75	0.0586	26.08	0.1633
At most 3	18.43	0.5589	18.94	0.5259
At most 4	16.58	0.6797	16.58	0.6797

Note: Asterisk (*) shows that the probabilities are computed using asymptotic Chi- square distribution.

4.4 Autoregressive Distribution Lag (ARDL) results

Before we proceed to the ARDL test, we verify that our unit root test results is convince us to proceed to the ARDL test, this is because there is a mixture of $I(0)$ and $I(1)$ of the underlying regressors in the our model. It indicates there is a co-integration relationship exists between the economic growth, oil price, inflation, export and import. In the Table 4.4, GDP in first difference form is measure as a dependent variable and the remaining variables such as oil price, inflation, export, and import are measure as an explanatory variable in our model.

Besides, we also examine the model by using the "general to specific approach" in selecting the numbers of lags in order to get the parsimonious specification. In the co-integration analysis, an important step need to take note is to establish the optimal lag length to be used in the analysis. Therefore, we set the maximum lag length until lag 4, then, we eliminate the variables which are insignificant except for the level variables and the intercept. From the Table 4.4.1 shows that all the models that we employed have high R^2 and adjusted R^2 because this indicates that all the models are fit for the data. Further it also shown that all the individual coefficients in oil price, export and GDP is statistic significantly at least at 10% significance level through country by country.

In order to get precise results, we proceed to the diagnostic checking test. According to the Table 4.5, Jargua Bera, LM test, ARCH test, and Ramsey RESET test are being examine, and we obtain all the model are pass the diagnostic tests at least at 10% significance level. Moreover, all the diagnostic checking results also show the four main models (normality test, autocorrelation test, heteroscedasticity test and Model specification test) have the correct functional form such as their residuals serially uncorrelated, homoscedastic and normally distributed.

Table 4.4: ARDL result

Country	Test statistics			
	OP	INF	EX	IM
Botswana	0.123084	-0.782221	0.97296	0.039575
	(0.0046)***	(0.0008)***	(0.0001)***	(0.6280)
Democratic Republic of Congo	0.156472	-0.000101	1.426135	-1.042935
	(0.0001)***	(0.0382)**	(0.0000)***	(0.0000)***
Cote d'Ivoire	0.353204	0.554247	0.190148	-1.273455
	(0.0025)***	(0.0006)***	(0.0097)***	(0.0015)***
Kenya	-0.128814	-0.501268	0.487065	1.177136
	(0.0719)*	(0.0130)**	(0.0569)*	(0.0329)**
Gabon	0.28941	-0.048095	0.562797	1.880744
	(0.0003)***	(0.5224)	(0.0166)**	(0.0021)***
Senegal	-0.377773	0.449568	1.432636	-0.140509
	(0.0721)*	(0.0211)**	(0.0632)*	(0.7493)
South Africa	0.385556	-1.61347	2.328714	-4.381999
	(0.0352)**	(0.0156)**	(0.0189)**	(0.0305)**
Sudan	0.495292	0.022744	1.261744	-1.509422
	(0.0164)**	(0.4978)	(0.0288)**	(0.0152)**
Swaziland	0.420107	0.064752	0.462374	-0.102385
	(0.0051)***	(0.5900)	(0.0179)**	(0.3080)
Zambia	0.137676	-0.122746	0.69883	1.700343
	(0.0786)*	(0.0005)***	(0.0070)***	(0.0011)***

Note: The number of lag truncations used in the least square result is 1. The values in parentheses are p- values. * indicates that the p- value is significant at 10%,

** indicates that the p- value is significant at 5% and*** indicates that the p- value is significant at 1%.

Table 4.4.1

Goodness of Fit

	Botswana	Congo	Cote d'Ivoire	Kenya	Gabon
R^2	0.957251	0.998535	0.960261	0.931917	0.963611
Adjusted R^2	0.897402	0.994383	0.817202	0.739015	0.890834

Note: The number of lag truncations used in the least square result is 1. The values in parentheses are p- values. * *indicates that the p- value is significant at 10%,*

** *indicates that the p- value is significant at 5% and*** *indicates that the p- value is significant at 1%.*

Table 4.4.1

Goodness of Fit

	Senegal	South Africa	Sudan	Swaziland	Zambia
R^2	0.970491	0.916982	0.940566	0.913598	0.981261
Adjusted R^2	0.864257	0.715366	0.804717	0.740794	0.928165

Note: The number of lag truncations used in the least square result is 1. The values in parentheses are p- values. * *indicates that the p- value is significant at 10%,*

** *indicates that the p- value is significant at 5% and*** *indicates that the p- value is significant at 1%.*

Table 4.5: Diagnostic Checking

	Botswana	Congo	Cote d'Ivoire	Kenya	Gabon
Normality - Jarque-Bera					
JB:	0.054528	3.183743	4.664757	0.646684	0.807177
	(0.973104)	(0.203544)	(0.097065)	(0.723726)	(0.667919)
Autocorrelation - BG-LM Test					
AR(1)	1.764694	0.428328	0.175006	0.784139	8.31E-05
	(0.2167)	(0.5417)	(0.6972)	(0.4164)	(0.9930)
AR(2)	3.56581	0.42757	0.260868	4.127287	0.019923
	(0.0781)	(0.6788)	(0.7862)	(0.1065)	(0.9803)
Heteroscedasticity – ARCH Test					
ARCH(1)	1.485865	2.566043	1.103567	0.236039	0.016998
	(0.2358)	(0.1241)	(0.3054)	(0.6321)	(0.8975)
Model Specification – Ramsey RESET Test					
F-Statistics:	1.034156	1.786411	0.200146	1.317014	0.846825
(1 fitted term)	(0.3357)	(0.239)	(0.6778)	(0.3031)	(0.3881)

Numbers in parentheses refer to the respective p-values

Table 4.5: Diagnostic Checking

	Senegal	South Africa	Sudan	Swaziland	Zambia
Normality - Jarque-Bera					
JB:	0.636433	0.641551	6.286271	1.149213	2.305575
	(0.727445)	(0.725586)	(0.043147)	(0.562926)	(0.315755)
Autocorrelation - BG-LM Test					
AR(1)	0.26235	0.160471	1.578717	4.936092	0.004989
	(0.6355)	(0.7026)	(0.2556)	(0.0617)	(0.9464)
AR(2)	4.704859	0.752917	2.717057	2.296069	0.700318
	(0.1189)	(0.5178)	(0.159)	(0.1818)	(0.5486)
Heteroscedasticity – ARCH Test					
ARCH(1)	2.565109	0.41591	0.134363	0.263351	0.185424
	(0.1242)	(0.5257)	(0.7176)	(0.6129)	(0.6711)
Model Specification – Ramsey RESET Test					
F-Statistics:	1.034156	1.786411	0.200146	1.317014	0.846825
(1 fitted term)	(0.3357)	(0.239)	(0.6778)	(0.3031)	(0.3881)

Numbers in parentheses refer to the respective p-values

4.5 Discussion result based on relationship

The empirical results in the long run model are signifying that all the variables such as oil price, inflation, export and import have the correct sign as suggested by the past literatures and theories.

4.5.1 An explanation of the implications of the relationship of oil price on GDP

From the result in ARDL test we obtain, we noticed that all the selected country in our studies indicate there is a positive relationship for the economic growth and the oil price, except for the Kenya and Senegal country. Positive relationship signify that an increase in oil prices will leads to an increase in real GDP in the eight SSA countries (Botswana, Cote d'Ivoire, Democratic Republic of Congo, Gabon, South Africa, Sudan, Swaziland and Zambia). For example, on the estimation year of 2007, South Africa country exports oil around 128,500 barrels per day to foreign country (Central Intelligence Agency). Exporting oil to foreign country will earns the foreign currency especially when there is rise in oil prices. Earning the foreign currency can help to boost the economic growth. Next, the economic growth in Cote d'Ivoire is increasing due to the impact of rise in oil price. This can be prove from the Bureau of African Affairs (2011), during the year of 2007, Cote d'Ivoire country exports 115,700 barrels of oil per day to foreign country, until nowadays oil becomes one of the top revenue earners in the country (The World Factbook, 2011).

In addition, Gabon country earns the four times per capita income in most Sub- Saharan African nation (The World Factbook, 2011). According to Bureau of

African Affairs (2011) and The World Factbook (2011), oil revenue is the main sources of income to the nation and this country exports 227,300 barrels of oil per day on the estimation on the year of 2007. Moreover, Sudan also exports 303,800 barrels of oil per day (The World Factbook, 2011). Even though Sudan main income is mainly depends on agricultural exports, yet, this oil exporting helps to reduce the country's outflow of foreign exchange for imported petroleum products. According to The World Factbook (2011), the oil production, increase in oil price and foreign direct investment had help the economy to boom until second half of year 2008. So, oil price has a positive relationship with economic growth in Sudan country. Democratic Republic of Congo (DRC) income mainly comes from the exporting in mineral and natural resources such as diamonds, gold and coffee (Bureau of African Affairs, 2011). Yet, they also exports oil by 20,090 barrel per day due to the estimation on year 2007 (The World Factbook, 2011). Exporting oil also carry a part of DRC's income, this leads the country into a good economic performance. In chapter 1, figure 5, our research found that after the year 2002 DRC is experiences a sharp positive growth until it becomes stable in the year of 2004.

However, in our study, we found out there is an unexpected result, where three non-oil exporting countries have the positive impact of oil prices on economic growth such as Botswana, Swaziland and Zambia. According to Rebeca and Marcelo (2004), they also found the similar result as our study, positive impact on oil price on economic growth in Japan, they explained on this possibly happens is mainly due to the special circumstances undergone by the Japanese economy. However, African Development Bank and the African Union (2009) found that it is not surprising to get this result because high oil price problems can be offset through foreign aid or through government subsidies on the high oil price. Subsidiaries given by government help to reduce the burden of poor people so that nation still can buy products at cheaper price. Besides, through subsidiaries,

the production cost remains low, this creates the chance to attract more foreigners to invest in the local. Therefore, we conclude that increase in oil prices in oil importing countries has positive impact on economic growth.

On the other hand, increase in oil price affects the economy growth through the demand and supply side (Jayaraman & Choong, 2009). For example, demand-side effects are fall into investment. When oil price increase, investor will invest more in the oil exporting country to earn the rate of return in investment and this will lead to an increase the investment fund in Africa's oil exporting country. This oil windfall create the opportunity to increase the government revenue in oil exporting country, thus boost the economic growth in the Africa's exporting country (UNCTAD, 2006). On the other hand, Guo (2008) also obtain the positive relationship between oil price and economic growth in the oil exporting country such as Russia country.

Conversely, we also observe that the estimated coefficients of oil price have the negative sign because Kenya and Senegal as non-oil exporting SSA countries are rich with primary product such as gold, forest product and agricultural product. Besides, this also can be explained by the economic structure in the Kenya country. As stated in chapter 1, Kenya is a non-oil exporting countries with a large deficit and it did not bring expansion to the country's productivity. Therefore, the fluctuation of oil price did not bring much effect to the economic growth in Kenya. In addition, the oil export in Senegal country is 5653 bbl per day compare to the oil import is 42, 850 bbl per day during the year of 2007 (World Factbook, 2011). Therefore, from the given data, Senegal country didn't produce any oil production but highly import the oil from others country, this prove that when there is a huge fluctuation of oil price, it will brings a negative effects to the Senegal's economic growth especially because Senegal hugely import the oil into country. Our research result is consistent with the result

obtain from Olomala (2006), Wakeford (2006), Ismael, Margarat and Ramos (2009), Gallo (2010), stated that increase in oil price will significantly increases the cost of production and hence increases the price of the trading partners and gives negative effects to the export and economic growth.

4.5.2 An explanation of the implications of the relationship of inflation on GDP

In addition, in our study, we found that there is a negative relationship between inflation and economic growth in six countries such as Botswana, Kenya, Zambia, Democratic Republic of Congo, Gabon and South Africa. This negative effect brings deterioration on economic growth. According to our result we obtains, there is a negative relationship between the economic growth and inflation due to the reason of an increase in inflation may lead to depreciation of local currency, therefore, lead to decrease in consumer purchasing power and investments and even unemployment and finally it lead to decrease in GDP. As a conclusion, inflation seems like a bad macroeconomics variable to boost GDP in particular countries. According to Shitundu and Luvanda (2000) who investigated the relationship between inflation and economic growth in Tanzania country, they observed a negative relationship between inflation and economic growth; they conclude that inflation brings greater harmful to economic growth in Tanzania. Odusola & Akinlo (2001) also came out the same conclusion that there is exist of negative relationship between inflation and economic growth. However, there are 4 countries have positive relationship between inflation and GDP such as Cote d'Ivoire, Senegal, Swaziland, and Sudan. According to Malik and Chowdhury (2001), low inflation may tend to have positive relationship to the economic growth and vice versa.

4.5.3 An explanation of the implications of the relationship of import and export on GDP

Besides, the export variable has a positive coefficient across the ten countries. It indicating that export brings revenue to the country. Samad (2011) found that export help to promote economic growth, employment in certain industries and income. Additionally, many researchers conducted the same result as our study such as Jun (2007); Jun (2007) and Wong (2007); Chen (2009); Azgun & Sevinc (2010) examine that there is a positive relationship between export and economic growth because export causes the foreign currency inflow into the exporting country. Inflow of foreign currency will increase the wealth in the exporting country. Onafowora and Owoye (1998) also conducted a research in investigate the changes of economic growth in trade policies, exports, and investment in 12 sub-Saharan African (SSA) countries; they conclude that export are significant to the economic growth. So, we can conclude that increase in export will increase in the economic growth.

In theoretical, import will lead to a negative relationship with economic growth. In our study, four countries such as Democratic Republic of Congo, Cote d'Ivoire, Senegal, South Africa, Sudan, and Swaziland are having the negative relationship with the economic growth. This is because, hugely import the foreigner product into local country will outflow the local currency, therefore, will depreciate the value of local currency causes an increase in the unemployment rate and finally the economic growth is in downturn. However, we also found that the import variable shows a positive relationship in the several countries such as Botswana, Kenya, Gabon, and Zambia. This violate the definition of GDP which is Gross Domestic Product equal to total consumption, investment and government spending plus the exports and minus the values of imports. However, according to Chen (2009) stated that a certain amount of imports will improves

the productivity and technological skills in the nation, therefore, researcher noted that there is negative effects of the imports to the economy will be offset through the positive effects from household consumption either wholly or partially.

CHAPTER 5: CONCLUSION AND IMPLICATIONS

5.0 Introduction

This section will discuss some major findings and policy implications which play an important role to boost the economic growth on selected ten SSA countries. In addition, there are some limitations occur in this research. So, in order to improve for further research, some recommendations are provided.

5.1 Summary and Conclusion.

Nowadays, the available of natural resources getting lesser and lesser especially oil, while the demand for oil are increasing due to the increase of population in globe. According to our result, we believe that fluctuation of oil price holds an important role in our daily life. Oil can be consider as a macroeconomic variable which highly influencing the economic growth especially in oil exporting countries. Besides, many researchers have been conducted to examine the impact of oil price on economic growth. But, there is very limited research in study the relationship between oil price movement and economics growth in SSA countries. Thus, our research has been filling up the gaps.

In our study, we had applied the panel unit root test. The purpose to apply this test is to avoid the possibilities of spurious regressions. Therefore, LLC and IPS test has been applied. Hence, through our empirical result, we found out there is a stationary series in the first difference. Therefore, we proceed to next step, which the pedroni cointegration test applied to examine whether there is a

cointegration relationship exists between each variable. According to our empirical result, we found that five variables (GDP, OP, INF, EX and IM) are cointegrated and support the long run relationship between each others in the multi-country panel setting. After we obtain there is a cointegration between all the variables, we proceed to the Johansen Fisher panel cointegration test. This test is determined whether there is exist of a long run relationship among the series. We found that, there are two long run relationships exist among the five variables. In other words means the economic growth, oil price, inflation, export and import are move together in the long run and they have a stable long run relationship between each others. Moreover, we also applied the ARDL test in examine for the relationship between the five variables through country by country. The empirical results in ARDL shows that in the long run model are signifying that all the variables such as oil price, inflation, export and import have the correct sign as suggested by the past literatures and theories.

In conclusion, our studies signify that oil price movement have a positive impact on economic growth for 8 selected SSA countries not only for oil exporting countries (Democratic Republic of Congo, Cote d'Ivoire, Gabon, South Africa and Sudan) but also non-oil exporting countries (Botswana, Swaziland and Zambia) in long run through panel co-integration test. However, we also found that the estimated coefficients of oil price have the negative sign with economic growth because Kenya and Senegal as non-oil exporting SSA countries are rich with primary product such as gold, forest product and agricultural product but not oil.

A brief summary are discussing for our empirical result in our research. In our study, we found there is a positive relationship between export and economics growth for all 10 selected SSA countries. This indicates that exports and imports of goods and services are important in affecting the overall performance of

economic growth. In our study, we categorized the ten selected SSA countries into two categories, which are oil exporting countries and non-oil exporting countries. This is because, in chapter 4, we found that oil exporting and oil importing countries affected the economic growth when there is an increase in oil price. In order to support our result, we found that Mehrara (2007); Jayaraman and Choong (2009) are observe the similar results.

Furthermore, our empirical result shows an adverse relationship between inflation and economic growth for oil exporting countries (Democratic Republic of Congo, Gabon and South Africa) and non-oil exporting countries (Botswana, Kenya and Zambia), in the presences of oil price. According to Cologni and Manera (2008) observe higher oil prices tend to slowdown economic growth but cause inflation increase. Hence, we can conclude that, inflation act as a poor macroeconomics variable in boost the economic growth in the selected SSA countries.

5.2 Implication of the study

According to our empirical result, we signify that oil price act as an important variable to boost economic growth especially in oil exporting countries. Thus, the role of oil price should be given a greater concern. According to Hamilton (2011) a review of oil history from Suez Crisis during 1956-57 until oil crisis during 2007-08, is indicate that oil price plays an important role in the affecting the economic growth, as well the researcher believe that oil price will continue act as an important variable in boost the economic growth in oil exporting countries. Besides, McKillop (2004) also mentions that increase in oil price will leads to increase the "real resource" prices, also name as "the revenue effect", where there are increase in oil price will increase in cost of production.

This will tends to increase the price of final goods which people need more money to purchase a goods, central bank will increase the money supply. This effect will react fast toward to international trade and leads to a higher world economic growth in term of liquidity. Thus, higher oil price do not hurt economic growth in oil exporting countries but not oil importing countries. However, in order to avoid downturn of economic growth due to high oil prices, government can give subsidiaries to help to reduce the burden of poor people, so that nation still can buy products at cheaper price. Besides, through subsidiaries, the production cost remains low, this creates the chance to attract more foreigners to invest in the local, and to earn the foreign currency to boost the economic growth. However, foreign aid also can help African oil importing countries handle with the high prices. According to the researcher found that foreign aid in African countries represents more than 5 percent of the GDP (African Development Bank & African Union, 2009). So, foreign aid can help the debt burden African countries to diminish the adverse effects of high oil prices.

In addition, export plays an important role in boost the economic growth in country. Our empirical found that it is significant with the theory where there is a positive relationship between export and economic growth. In order to boost the economic growth, government can implement of Export-oriented policy (EOI). EOI is the export oil-related manufacturing goods rather than only export primary product. So, it is suitable to apply to promote economic growth. This is because there is a huge population on ten selected SSA countries. Therefore, these 10 selected SSA countries can be considered as labor abundant countries. Besides, the economies of scale are large in ten selected SSA countries. Thus, it has the attractive sources to enhance EOI through the inflows of FDI to their countries. According to Hsiao and Hsiao (2006) FDI has unidirectional effects on GDP directly and also indirectly through exports while also found that bidirectional causality between exports and GDP exists. Once successful implement the EOI,

government of selected ten SSA countries should be focus more on level of education, quality of transportation and lower the export tax in order to give a helping hand for infant industry and also can maintain the competitive environment for international trade to increase the investment rate in the country.

There is a negative relationship between inflation and economic growth. As McKinley (2008) stated that inflation target does not likely efficient tools to reduce inflation rate but it able to control the price stability as for Ghana and South Africa. According to Mendonca and Guimaraes (2011), inflation target is an efficient monetary tool to reduce inflation levels and inflation volatility especially for developing countries. Besides, Fujiki and Uchida (2010) indicate that government should set an inflation target when implement the fiscal policy because it will affect the level of government bonds. Thus, when having inflations, government not only can implement monetary policy but also fiscal policy in order to gains benefit for the welfare of residents in selected ten SSA countries.

5.3 Limitations of Study

There are some limitations to be proposed for further studies. Based on our research, we are using the annual data from the year in 1980 until 2008 in the ten selected SSA countries. This limits our sample size, because our sample size is only being counted as 29 observations. So, the sample size in our research is considered as a small sample size data. In order to get an accurate statistical analysis, sample size needed to be increase. This is because, larger sample size increase the accuracy of the statistical analysis. So, a larger numbers of sample size are preferred. Beside, our study only focuses on the long run relationship.

On the other hands, according to Hamilton (2011), the behavior of oil price

volatility become fluctuation after the world war II and establish of OPEC, the price of oil increase higher and higher even more toward to stochastic and unpredictable. As our result also identify the important of oil price towards economic growth even through oil prices considered as commodity product but the behavior of oil price volatility should be taking into account. As Zhang (2008) indicate that relationship between the behavior of oil price and economic growth is important and able to cause macroeconomic fluctuation and returns on oil markets stocks for international stock market as observed by Apergis and Miller (2009). So, the impact on the behavior of oil price volatility will be stochastic and unpredictable. Hence, the behavior of oil price volatility should be given concern.

5.4 Recommendations for future research

There are some recommendations can be suggested in our study. As there was oil price crisis occurs on 1973-74 regardless Hamilton (2011), our study suggest that further research can be taking into account from early 1970s in order to increase the sample size, to look at the response of economic growth. Besides, there is also lack of research to be conduct in other region such as East Asian countries, ASEAN countries and OECD countries. Since our result shows significant positive relationship between oil price and economic growth. Hence, other region should be included to increase the number of countries.

Besides, further research can use others methodology rather panel co integration and ARDL test in order to capture the volatility and long run relationship of the oil price, for example, VECM can be take into consideration in order to examine the long run and short run effects of oil price and the economic growth. Besides, according to Masih, Peters and Mello (2011), they indicate that there is a directly oil price volatility on real stock returns and it have a greater

effect on firms over a time. So, our study suggest using ARCH and GARCH to indicate the symmetrical risk and asymmetrical risk occur that will give impact for oil price volatility and economic growth for non-oil exporting and oil exporting ten selected SSA countries.

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Appendix

Country	Coefficient				
	GDP (-1)	OP (-1)	INF (-1)	EX(-1)	IM (-1)
Botswana	-2.374507	0.051835602	-0.329424592	0.409752424	0.016666618
Democratic Republic of Congo	-0.18354	0.852522611	-0.000550289	7.770159093	-5.682330827
Cote dIvoire	-0.619648	0.570007488	0.894454594	0.306864542	-2.05512646
Kenya	-0.263189	-0.489435349	-1.904593277	1.850628256	4.47258814
Gabon	-0.589007	0.491352395	-0.081654378	0.955501378	3.193075804
Senegal	-3.163883	-0.119401697	0.14209375	0.452809412	-0.044410302
South Africa	0.701447	-0.549658064	2.300202296	-3.319871637	6.247084954
Sudan	-1.998235	0.247864741	0.011382045	0.631429236	-0.755377621
Swaziland	-0.75879	0.553653844	0.085335864	0.609357003	-0.134931931
Zambia	-2.452661	0.056133318	-0.050046052	0.284927269	0.693264581

Note: All coefficients were taken from the least square result. Author's calculation.