

## Economic Growth in OPEC Member States: Oil Export Earnings Versus Non- Oil Export Earnings

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### Abstract

The study looked at the economic growth measured by the Gross Domestic Product in current market prices of OPEC member states and the attendant contributions of oil export earnings and non-oil export earnings. The statement of research problem was the difficult of coping with oil price volatility among OPEC member nations especially in the light of challenging realities in growing research into alternative energy options, policy disagreements among OPEC states, and over dependence on oil by these OPEC members. The literature reviewed contained the conceptual framework, theoretical framework and empirical framework. The methodology of study adopted regression approach using E-views. Stata statistical program was utilized in the summary of statistics on tables 1 to 13. The Least Squares Dummy Variable Corrected (LSDVC) model was a useful model applied in this research to correct bias having heterogeneity among subjects which allowed each entity to have its own intercept value. Graphical illustrations for each variable for the OPEC states was shown using Excel. The findings indicated that the GDP at market prices, current account balances, oil- export earnings and non-oil export earnings varied from country to country. Countries like Saudi Arabia, Iran and Nigeria showed the highest potential for economic growth than Gabon, Ecuador and Libya. In current account balances Saudi Arabia, UAE and Qatar were among the countries with the highest potentials which indicates their ability to trade and a robust balance means that their currency will be stronger than those whose balance were in deficit like Venezuela, Gabon and Algeria. In the oil and non-oil exports category Saudi Arabia and United Arab Emirate showed oil export earning capacity and non – oil export capacity respectively. Countries like Gabon and Libya reported lower earnings for the period but Iraq had the least earnings from non-oil export earnings thereby demonstrating the lowest drive towards diversification away from oil. In conclusion, it is evident from the e-view analysis that the oil exports earned in the five year period under consideration has a high impact in economic growth than the non-oil exports earned. This means that generally oil producing exporting countries rely more on oil income to replenish their reserves and grow their economy. It is highly recommended that OPEC countries should foster more inclusive growth by growing their private sector to drive their economy. The non-oil private sector in many of these countries remains relative small contributor to the GDP. Countries such as Algeria, Venezuela, Libya and Ecuador with the lowest current account balances among OPEC countries should source for ways to grow their foreign exchange reserves. This can only be achieved by very appropriate measures of debt management and reduction in government expenditure and increased earnings from exports. According to Amah and Onoh (2013) countries that liberalized their oil sector fare better in growing their current account balances. A stronger current account indicates stronger foreign exchange ability for the country concerned. Over-reliance on oil also exacerbates macroeconomic volatility, and for OPEC countries like Gabon, Ecuador and Libya having the lowest earnings from oil exports and of course being subject to OPEC quota realize that they don't wield enormous influence in decisions taken at OPEC the way Saudi Arabia would because of the wide gap in oil earnings capacity. There is the need to insulate their individual economies from the impact of oil price volatility by laying a sound foundation for economic diversification. Not diversifying the economy away from oil is dangerous given that in addition to being an exhaustible resource, oil has a volatile price pattern.

**Keywords:** China insurance industry, Foreign fund, Challenge

### 1.0 Introduction

It is important for a clarification to be made concerning the term 'dependency' as seen in the topic. Petroleum product dependency may be on oil for economic activities such as for local consumption involving transportation and power generation. The other form of petroleum product dependency could be seen in the producing country's reliance on export earnings, the latter is the context in which the research focuses its attention. Although both perspectives are interconnected, since many OPEC countries like Saudi Arabia for instance are concerned about domestic petroleum consumption growth since it reduces the quantity available for export and its earned hard currency which the OPEC countries are highly dependent for government spending and employment. For several years now there has been a growing concern among OPEC members as to challenges posed by international markets and technology to their ability to control prices through agreed outputs. Something they have done with greater ease in the first few decades of their existence. In the first quarter of

2017 alone OECD commercial oil stocks was reported to have risen by 44 million barrels, much higher than the seasonal average of 36 million barrels. This was attributed to the increased refinery maintenance globally in the quarter (OPEC Bulletin 8-9/17). Recently, it was reported that OECD countries now reveal 195 million barrels above the five-year average which leaves market players in no doubt as the role of the United States in destocking especially given rising production in the first quarter of 2017. The most significant part of the global destocking process lies in the high conformity levels of participating OPEC and non-OPEC producing states with the objective of rebalancing the oil market. Had these nations not taken this action the market would have experienced a far greater chaos in the last year. The expected rising demand of oil during the summer was attributable to the United States due to increased transportation, of course this increase in demand was rightfully predicted to be responsible for the reduction in commercial oil inventories. Experts agree that the measures taken by the OPEC members and other non-OPEC members in the short run are a step in the right direction, but caution that patience and perseverance is required in the long run. The difficult process of rebalancing the oil market is not expected to happen in a linear fashion but would require a concerted effort by a wide range of the oil industry's stakeholders. At the 4<sup>th</sup> Joint Ministerial Monitoring Committee (JMMC) between OPEC and non-OPEC states held at St Petersburg, Russia on July 24<sup>th</sup>, 2017, there was a general consensus as to the outlook of the market in the coming months. The JMMC concluded that the oil market was making steady and significant process towards rebalancing. They were of the opinion that continued strengthening of the global recovery is underway and with stability in the oil market as the focus.

In matters of supply growth moderation, the JMMC reviewed the presentations made by Libya and Nigeria on their production recovery plans, prospects and challenges while acknowledging the upside limitations of both countries to go beyond their current production levels. Nigeria voluntarily offered to implement the appropriate production adjustment as soon as its recovery reaches a sustainable production volume of 1.8m b/d. In declining global inventories, the OECD countries crude oil inventories were up in excess of the five year average while the United States has fallen. Despite the positive indicators mentioned, the market remains bearish as some countries continue to lag. Since exports are a key metric for financial markets there should be ways to improve on empirical methods in reconciling credible export data with production data and the monitoring mechanism, this is why this study is essentially fundamental to scholars.

### **1.1 Statement of research problem**

Studies have proven that the oil shocks affect oil producing countries more than oil importing countries especially in cases of heavy over dependence of oil by the affected exporting country. OPEC as a cartel has been largely successful in influencing oil price and international politics over the years. However in recent years the emergence of the Russian federation as oil producing power, policy disagreements among member nations over production levels, increased costs of production and distribution caused by currency problems and increased funding of alternative energy sources and improved technology by the countries that buy the most of the oil has become a source of worry to member nations. This is especially so given the danger of OPEC countries not diversifying their export earnings away from oil. Volatility of oil prices affects components of aggregate demand and for countries with greater oil and technology dependence the future of oil as a major source of revenue to fund household, government expenditure and businesses looks certainly bleak.

### **1.2 Objectives of research**

- To find out the direction and magnitude of dependence of the economy on earnings from petroleum products and non-petroleum products of OPEC countries for the period in question

### **1.3 Research hypotheses**

- H<sub>1</sub> That the earnings from petroleum product exports have a significant impact on the GDP of member nations
- H<sub>2</sub> That the earnings from non-petroleum product exports have a significant impact on the GDP of member nations
- H<sub>3</sub> That the earnings from petroleum product exports have a significant impact on the current account balances of member nations
- H<sub>4</sub> That the earnings from non-petroleum product exports have a significant impact on the current account balances of member nations

## **2.0 Review of related literature**

### **Conceptual framework**

Organization of the Petroleum Exporting Countries (OPEC) was founded at Baghdad, Iraq in 1960, headquartered in Vienna, Austria the first five member states of the cartel were Iran, Iraq, Kuwait, Saudi Arabia and Venezuela. The membership has since increased to fourteen and collectively, they account for 44 percent of global oil production and 73 percent of the world's proven oil reserves. This gave OPEC a major control on the

direction of oil price that were previously largely determined by American – dominated multinational oil companies. OPEC’s stated mission is “to coordinate and unify the petroleum policies of its member countries and ensure the stabilization of oil prices in order to secure an efficient economic and regular supply of petroleum to consumers, a steady income to producers and a fair return on capital for those investing in the petroleum industry. A significant amount of information about the international oil market has been known to be provided by the organization which has been especially useful for policy and research purposes.

Many writers such as Motadel (2015), Razavi (1989) and Painter (2012) believed that the emergence of OPEC marked a turning point towards national sovereignty over natural resources playing a prominent role in the global oil market and international relations. The effects can be particularly felt in times of wars and civil disorders leading to extended interruptions in supply. In the 1970s, restrictions in oil production led to a dramatic rise in oil prices and OPEC’s revenue and wealth, and of course had attendant consequences for the global economy. By the 1980s, OPEC started setting production targets for its member nations. In doing this, OPEC has often caused increases in oil price by adjusting production at certain levels. OPEC has over the years succeeded in reducing market competition but in recent years the ability of the cartel to do this has been challenged by the expansion of non-OPEC energy sources and by the reoccurring temptation for individual OPEC countries to exceed production ceilings and pursue conflicting self interests.

The OPEC Conference is the supreme authority of the organization, the body consists of delegations headed by the oil ministers of member countries, the chief executive of the organization being the OPEC Secretary General. Weil (2007) and Learsy (2012) observed that though each member state has one vote and pays equal membership fee into the annual budget, Saudi Arabia is the OPEC’s de facto leader. This is so because the Saudis are by far the largest and most profitable oil exporter in the world and has the capacity to function as the traditional swing producer to balance the global market. Painter (2012) observed in his study that despite the fact that the objectives, actions and principles of the World Trade Organization (WTO) OPEC has never been involved in a dispute involving the former. This he attributed to the Foreign Sovereign Immunities Act which protects consultations made by bodies not unlike OPEC.

Denning (2016) in his study “How OPEC won the battle and lost the war” acknowledged that there were conflicts among member OPEC states so agreeing with writers like Citino (2002) and Ross (2015) that attributes difficulties in agreeing at policy decisions by member states because of different views on oil export capacities, production costs and reserves. This disputes cause instability in policy implementation and affects the cohesion and effectiveness of OPEC as a whole. Oil-exporting economies are heavily dependent on oil. Among the OPEC members, economic activity, fiscal revenue, export earnings and foreign exchange are directly and indirectly dependent on oil production. Hydrocarbon and government activities heavily funded by oil revenues account for majority of the total GDP in a good number of the oil producing nations. Although some oil producing nations are making headway towards diversification of their economy, most economic indicators of economic complexity, diversity, and export quality are lower in oil-exporting gulf states than in many emerging market economies.

Economic diversification can be defined and measured in various ways. They include the following

1. **Economic Complexity Index:** This index measures the number of products made by an economy and controls the likelihood that the same product is also made by others. Countries that procure goods and services that are not made elsewhere receive higher complexity scores than countries whose products are widely manufactured. Germany and Japan for instance has high scores because they manufacture a wide range of products that very few countries can make. Like the IMF indices, Economic Complexity Index relies on international trade data. Since it is based on the assumption that countries will export most high quality products trade data will reflect the overall production within the economy.

**IMF Export Diversification Index:** This is calculated using trade data and is a combined measure of the extensive and intensive dimensions of diversification. Extensive export diversification reflects an increase in the number of export products or trading partners. Intensive export diversification considers the shares of export volumes across active products or trading partners. A country is less diversified when export revenues are driven by only a few sectors, trading partners, and/or total market share is low. Countries with a large number of exports and trading partners improve their extensive diversification, which in turn provides resilience to market or trading-partner shocks. Claiming greater market share (by product or country) increases intensive diversification, which confers greater pricing power and integration into supply-chains. The Theil index, a measure of inequality, is calculated for the intensive and extensive components of each country/year pair and summed to create a synthetic indicator.

**IMF Export Quality Index:** This index describes the average quality within any product category. The baseline methodology (see Henn et al., (2013) for more details) estimates quality based on trade price, which is calculated in turn based on three factors: product unit value relative to market prices; exporter income per capita (as a proxy for differences in production technologies); and the distance between importer and exporter.

**Manufacturing Value-Added Gini:** This is a Gini index constructed on the relative value-added of different

manufacturing industries within an economy. The data come from the 2015 UNIDO INDSTAT4 Industrial Statistics Database, which provides manufacturing data disaggregated at the ISIC 3-digit level, including the total value added of each industry classified. A score of 0 indicates complete equality between industries' value-added within an economy, while a score of 1 indicates the complete dominance of only one industry.

### **Theoretical framework**

Arman and Moradi (2015) in their research on Procyclical fiscal policy on OPEC opined that fiscal policy in developing countries are largely procyclical and contrary in theory to what the neo-classical and Keynesian theories postulate on the cyclical behavior of fiscal policy in the G-8 countries. They studied the cyclicity of fiscal behavior of fiscal policy in 12 developing OPEC nations between 1990 and 2009. By testing for fiscal measure on government expenditure and adjusting for the reverse causality between non-oil output and fiscal variables, their results indicated an overwhelming evidence of strong procyclical characteristics even when bureaucratic and political factors are low.

Gavin and Perotti (1997) were the first to call attention to the fact that fiscal policy in Latin America appeared to be pro-cyclical. Talvi and Végh (2005) then claimed that, far from being a Latin-American phenomenon, pro-cyclical fiscal policy seemed to be the rule in all of the developing world. In fact, in Talvi and Végh's (2005) study, the correlation between the cyclical component of government consumption and GDP is positive for each of the 36 developing countries in their sample (with an average of 0.53). In sharp contrast, the average correlation for G7 countries is zero. By now, a large number of authors have reached similar conclusions to the point that the pro-cyclicity of fiscal policy in developing countries has become part of the conventional wisdom.

Salahmanesh and Moradi (2014) in studying the relationship between country size, trade openness and OPEC's volatility, investigated mechanisms through which output volatility was affected by country size and trade openness using panel dataset of OPEC for a period of 43 years. They concluded that more fluctuation accompanied smaller country size that trade openness increases economic growth. Economic outcomes are resultant effects of macroeconomic volatility, consequent to which many studies were geared towards finding out the main determinants of macroeconomic volatility. Some of those includes research by Pallage and Robe (2003), Barlevy (2004), Di Giovanni and Levchenko (2008).

Despite all the efforts by researchers in this area, there is yet no consensus empirically or theoretically on the nature of the relationship between trade openness and macroeconomic volatility. Noguera and Pecchecchino (2007) stated that OPEC was designed to achieve the twin objectives of minimizing volatility of oil markets and promotion of economic development of member nations. Because oil shocks have a stagflation effect on the economy of an oil importing country the role of minimizing market price volatility seems to be more important experts agree. This is because of the negative effect on the growth rate and output levels of the importing country and of course the earning of the OPEC members will decline in sympathy to the reduced ability of the importing nation to pay. OPEC Bulletin (3-4/2017) recognizes that OPEC countries are more sensitive to oil price shocks than importing countries. Also studies by economists support this view as many such as Gavin and Perotti (1997) support the theory that world turmoil affects OPEC activity and causes a significant higher correlation between real activity and oil prices. In 1973, Gulf states members of OPEC imposed an embargo against the United States as a retaliatory measure on the latter's decision to re-supply the Israeli military and to gain leverage in the post-war peace negotiations. The nature of the embargo included cut in production and a halt in exports causing prices to soar above initially projected levels. Also the Iranian revolution in 1979 caused another oil price shock.

### **Empirical framework**

In studying the mechanisms by which growth volatility can occur as a result of trade openness Haddad et al (2012) applying a multi set of export variables observed that there was an important role for export diversification in conditioning the impact of trade openness on growth volatility. Mujahid and Alam (2014) applied the JJ cointegration method for long run relationship and vector error correction for establishing the nature of trade openness and growth volatility in Pakistan. Calculation of volatiles in many studies applied standard deviation of economic growth. In so doing growth volatility output measures standard deviation of GDP per capita growth within the period under study.

In understanding of economic volatility many studies include government expenditure to play a role in stabilizing aggregate demand and so output. Mohanty and Zampolli (2009) justified government expenditure has a higher share of provision of public goods and services and a large part of the work force in most countries. For instance the impact of government expenditure may be less felt in a period after privatization had taken place than in a period before privatization. Government expenditure in addition to being more stable than other components of aggregate demand it reduces the overall volatility of aggregate income. Fatas and Mihov (2001) studied twenty OECD countries from 1960 to 1997 and found a strong robust negative correlation between measures of government size and the volatility of output. Another explanatory variable is democracy, democracy

have been proven to be correlated with volatility. Salahmanesh and Moradi (2014) using GLS technique established that country size exerts a negative and significant effect on the fluctuations of GDP growth and trade openness as a share of exports plus imports in GDP show positive and significant effect on economic volatility. Salahmanesh and Moradi (2014) concluded further that there is not much economic policy can do to change the size of the economy in the short run for most countries but these policies do not limit on openness and that OPEC members must pay more attention to the detrimental effects of openness and know that trade barriers and trade liberalization are not easy to blend. Alesina and Tabellini (2005) studied the fiscal policies of certain countries insisted that investors are sensitive to creditworthiness and further financing could disappear if the government refuses to reform. When an economy faces financial constraints in borrowing, increasing government expenditure may crowd out private investment and hence may be contractionary.

Caballero and Krishnamurthy (2004) cautioned that contractionary effects of expansionary fiscal policy can be exacerbated if these policies lead to a deterioration of the nation's asset quality. Agiar et al (2005) explains the presence of procyclicality of fiscal policies in emerging markets and he provides a method the effect of fiscal policy can be felt in the business cycle. He believed that many emerging economies are characterized by limited access to financial markets and limited commitment to fiscal policy. This presents a problem when modeling, as it presents a small open economy model where lack of access to financial markets despite maximizing the utility of a working population will leave the economy of the country vulnerable to endowment shocks. Procyclical taxes on capital income are as a result of the government's insurance motive and it's fiscal policy can be distortionary. Taxing capital in the future during recession becomes inevitable thereby reducing capital investment and extending the economic downturn. Tornell and Lane (1999) in explaining the overspending of transitory increases in fiscal revenues maintained that a positive shock to income leads to more than proportional increase in public spending, even if the shock is expected to be temporary. This is attributed to weak institutional framework and the presence of powerful groups in the fiscal process. Hau (2002) attributed the degree of trade openness to the presence of trade volatility of the effective real exchange rate, he explained this theoretically using an inter-temporal monetary model with nominal labor (factor) market rigidities. In similar studies Garrett and Mitchell (2001), Schiff (1997) and Katzenstein (1985) showed that the non-linear (or inverse) relationship between the import share of an economy and the volatility of its real exchange rate are caused by monetary and aggregate supply shocks. A large part of the cross-country variation in the effective real exchange rate volatility was linked to difference in trade openness in an empirical study of 54 countries by Hau (2002).

Using a dynamic panel model that controls for the endogeneity of openness and the impact of both exchange rate regime and average inflation, Cavallo (2007) was able to establish empirical evidence suggesting that net effect of trade openness affected output volatility in 77 countries (including 21 OECD countries). Furceri and Karras (2007) used a panel data set to study 167 countries from 1960 to 2000. They examined the empirical relationship between country size study and business cycle volatility. They concluded that volatility business cycles are more persistent in smaller countries than large countries, which means that country size data is more pronounced not just in the size of the country under consideration but in terms of cyclical fluctuations. Di Giovanni and Levchenko (2008) studied openness and volatility using industry-level data, they concluded that higher trade is associated with higher volatility and that more trade means less correlation between the sector and the rest of the economy.

### **3.0 Research Methodology**

#### **Nature and Sources of Data**

The data used for this research is secondary data got from the OPEC statistical bulletin. The data is entirely appropriate and wholly adequate to draw conclusions and answer the question or solve the problem, it is cheaper to collect and is reliable as information needed to achieve the research objectives.

#### **Model Development**

In the process of developing of the model the first step is to identify the correlation model that allows the inclusion

of the variables (both independent and dependent) and the coefficient weights. The two dimensions of the coefficients weights are direction and magnitude. The directions indicates whether variations in the dependent variable are caused by changes in the independent variable.

#### **Model Specification**

The following empirical model specification, which is widely used in the literature (Gavin and Perotti (1997), Alesina and Tabellini (2005) and Lledo, *et al.*, (2009)) has been chosen. The model for this study was expressed in line with the hypotheses stated as follows

H<sub>1</sub> That the earnings from petroleum product exports have a significant impact on the GDP of member nations

H<sub>2</sub> That the earnings from non-petroleum product exports have a significant impact on the GDP of member

nations

H<sub>3</sub> That the earnings from petroleum product exports have a significant impact on the current account balances of member nations

H<sub>4</sub> That the earnings from non-petroleum product exports have a significant impact on the current account balances of member nations

A second order linear differential equation is an equation which can be written in the form

$$Y + p(x)y + q(x)y = f(x) \dots\dots\dots (1)$$

where p, q, and f are continuous functions on some interval I and Y is the dependent variable and X is the independent variable.

In the E-view statistics the linear equation is re-stated as  $Y=C (1) +C (2)*X$

$$\text{LogGDP}=C(1)+C(2)*\text{LogoilExp}$$

$$\text{LogGDP}=C(1)+C(2)*\text{Lognon-OilExp}$$

$$C.A=C(1)+C(2)*\text{LogoilExp}$$

$$C.A=C(1)+C(2)*\text{Lognon-oilExp}$$

$\Delta(\log(GDP))$  represents the log of GDP, the first dependent variable.

$\Delta(\log(CAB))$  represents the log of current account balances as the second dependent variable

The independent variables on the right-hand side are;

*(log(Oil EXPit))* represents the log of oil export

*(log(non-oil EXPit))* represents the log of non-oil exports

*i* and *t* denotes the country and the time period

*uit* represents shocks that have effects on policy variables not captured specifically in the equation

### Least Squares Dummy Variable Corrected (LSDVC) estimation

Based on Monte Carlo experiments, Bruno (2005) suggests that LSDVC estimator can lead to relatively more reliable results when the number of cross-sectional units is small and the panels are unbalanced. For the purpose of this research, the panel comprises 13 countries at different stages of development. This methodology comprises of a dynamic panel estimate and then relies on a recursive correction of the bias of the fixed effects estimator. The bias correction is obtained using Anderson and Hsiao (1982) approach. The least squares dummy variable corrected (LSDVC) model allows for heterogeneity among subjects by allowing each entity to have its own intercept value, such as;

$$C_{it} = \beta_{1i} + \beta_2 Q_{it} + \beta_3 P_{it} + \beta_4 LF_{it} + u_{it}$$

### Model Assumptions

- Linearity - the relationships between the predictors and the outcome variable should be linear
- Normality - the errors should be normally distributed - technically normality is necessary only for the t-tests to be valid, estimation of the coefficients only requires that the errors be identically and independently distributed
- Homogeneity of variance (homoscedasticity) - the error variance should be constant
- Independence - the errors associated with one observation are not correlated with the errors of any other observation
- Model specification - the model should be properly specified (including all relevant variables, and excluding irrelevant variables)

Additionally, there are issues that can arise during the analysis that, while strictly speaking are not assumptions of regression, are none the less, of great concern to regression analysts.

- Influence - individual observations that exert undue influence on the coefficients

Many graphical methods and numerical tests have been developed over the years for regression diagnostics and E-views makes many of these methods easy to access and use. In this chapter, we will explore these methods and show how to verify regression assumptions and detect potential problems using E-views.

### Model Assumption

The assumptions that were adopted for this research were based on the following assumptions

1. The parameters estimated has to be commensurate with the quantity of data. If the quantity of data is not appropriate then the analysis would be flawed with problems such as those associated with multicollinearity.
2. The model specifications is assumed to be error free having been used as a measure for quantifying data of a secondary nature in previous research of this nature.

## Variables

The variables used in the models are the dependent and independent variables, the former representing the effects while the latter represents the causes. Since the models are statistical the research looked at the dependent variable studied to find out variations as the independent variable varies.

### Dependent Variable

The study adopted the Gross Domestic Product (GDP) at current market prices of the OPEC member states for five years as the dependent variables for testing.

### Independent Variable

The Independent variables adopted are the oil export earnings and non-oil export earnings of the OPEC member states for the same period. Since the study is on oil export and non-export earnings, it is important to see its effects on the said dependent variables

### Techniques of Analysis

The techniques of data analysis used included the use of regression analysis and correlation coefficient of determination using the E- views statistical package.

### Justification for model

No one country has control over the oil price; thus, employing this linear model will provide control for external shocks to the economy. Again, the shocks to the oil price and subsequent earnings by each nation as a result of OPEC policy decisions in the previous year may have lasting effects on the following period, so the lagged dependent variable is included in the specification to allow for long-term mean reversion in the magnitude of oil price change. The business cycle of the oil market is determined by gauging the sign and the size of coefficient  $\beta$ , which measures the elasticity of the variable with respect to oil output growth. Government expenditure, consumption, revenues, and investment should move in the same direction as output. If output increases during booms, the price of oil drops, while the opposite happens in recessions. An estimated  $\beta$  value above 1 implies a more than-proportionate response of the fiscal variable to output fluctuations.

The key explanatory variable is the growth of real GDP which is more relevant to assess the status of economic conditions and the use of the labor factor, as the oil sector is typically an enclave sector, highly capital intensive with limited spillovers to the rest of the economy.

Because the research model adopted is a linear panel framework, the model assumes exogenous variables while employing OLS and dynamic fixed-effect estimations; however, this does not hold for this specification, and they produce biased and inconsistent estimators. Similarly, the instrumental variable estimates are also biased, and the precision of the instrumental variable estimates is lower than that of the OLS estimates. In the presence of weak instruments, the loss of precision will be severe, and the instrumental variable estimates may be no improvement over the OLS (Baum, 2007). However, all sources of endogeneity bias can be addressed by using GMM estimators (Arellano and Bond, 1991), as is commonly used in the literature.

## 4.0 Data Analysis

### Country by country statistical summary

**Table 1 Angola**

Summary statistics

Variables	Observations	Mean	Standard deviation	Minimum	Maximum
GDP at market prices	5	113,162.80	13,536.37	95,821.00	126,777.00
Current Account Balances	5	607.20	1,999.87	-10,273.00	8,145.00
Oil Exports	5	50,344.00	20,205.86	25,935.00	69,954.00
Non-Oil Exports	5	1,181.20	727.85	0.00	1,920.00

**Table 2 Algeria**

Summary statistics

Variables	Observations	Mean	Standard deviation	Minimum	Maximum
GDP at market prices	5	191,826.40	26,309.64	161,104.00	214,120.00
Current Account Balances	5	-9,961.40	3,457.48	-27,476.00	999.00
Oil Exports	5	34,748.20	13,606.03	21,742.00	48,271.00
Non-Oil Exports	5	20,374.40	8,194.30	10,426.00	28,836.00

**Table 3 Ecuador**

Summary statistics

Variables	Observations	Mean	Standard deviation	Minimum	Maximum
GDP at market prices	5	95,875.20	5,017.26	87,925.00	100,917.00
Current Account Balances	5	-558.60	240.85	-2,201.00	1,109.00
Oil Exports	5	10,655.40	4,235.63	5,442.00	14,107.00
Non-Oil Exports	5	11,235.60	942.58	9,973.00	12,456.00

**Table 4 Gabon**

Summary statistics

Variables	Observations	Mean	Standard deviation	Minimum	Maximum
GDP at market prices	5	16,325.80	1,866.17	14,273.00	18,209.00
Current Account Balances	5	713.40	350.51	-1,279.00	1,344.00
Oil Exports	5	6,759.40	2,074.83	4,198.00	8,922.00
Non-Oil Exports	5	1,587.80	109.98	1,409.00	1,673.00

**Table 5 IR Iran**

Summary statistics

Variables	Observations	Mean	Standard deviation	Minimum	Maximum
GDP at market prices	5	465,483.00	81,925.77	393,436.00	587,209.00
Current Account Balances	5	19,677.00	1,428.73	9,019.00	26,523.00
Oil Exports	5	57,094.80	28,046.82	27,308.00	101,468.00
Non-Oil Exports	5	52,673.60	17,544.38	29,837.00	78,639.00

**Table 6 Iraq**

Summary statistics

Variables	Observations	Mean	Standard deviation	Minimum	Maximum
GDP at market prices	5	205,389.60	30,612.92	166,274.00	234,638.00
Current Account Balances	5	15,379.80	2,861.81	-3,134.00	24,428.00
Oil Exports	5	72,150.80	23,748.97	43,753.00	94,090.00
Non-Oil Exports	5	235.80	104.38	137.00	383.00



**Table 7 Kuwait**

Summary statistics

Variables	Observations	Mean	Standard deviation	Minimum	Maximum
GDP at market prices	5	147,118.00	32,126.26	110,572.00	174,179.00
Current Account Balances	5	42,129.00	7,287.60	947.00	70,181.00
Oil Exports	5	80,061.20	32,630.51	41,461.00	108,534.00
Non-Oil Exports	5	5,862.00	686.52	4,800.00	6,550.00

**Table 8 Libya**

Summary statistics

Variables	Observations	Mean	Standard deviation	Minimum	Maximum
GDP at market prices	5	49,770.60	25,789.57	29,763.00	89,242.00
Current Account Balances	5	-2,159.00	3,577.07	-18,373.00	8,895.00
Oil Exports	5	29,055.20	22,352.16	9,313.00	60,188.00
Non-Oil Exports	5	2,284.60	1,048.28	838.00	3,369.00

**Table 9 Nigeria**

Summary statistics

Variables	Observations	Mean	Standard deviation	Minimum	Maximum
GDP at market prices	5	478,301.20	51,249.70	400,571.00	531,217.00
Current Account Balances	5	4,982.20	2,825.11	-15,439.00	19,205.00
Oil Exports	5	66,765.00	30,278.40	41,818.00	95,620.00
Non-Oil Exports	5	4,817.20	2,425.95	1,285.00	7,272.00

**Table 10 Qatar**

Summary statistics

Variables	Observations	Mean	Standard deviation	Minimum	Maximum
GDP at market prices	5	181,372.80	22,501.74	152,509.00	205,660.00
Current Account Balances	5	36,547.40	5,881.95	-2,885.00	60,461.00
Oil Exports	5	47,193.40	19,906.23	22,958.00	65,065.00
Non-Oil Exports	5	70,995.00	14,265.09	49,501.00	82,933.00

**Table 11 Saudi Arabia**

Summary statistics

Variables	Observations	Mean	Standard deviation	Minimum	Maximum
GDP at market prices	5	706,069.20	55,755.68	639,617.00	756,350.00
Current Account Balances	5	59,114.40	19,219.78	-53,478.00	135,442.00
Oil Exports	5	246,221.80	95,863.20	134,373.00	337,480.00
Non-Oil Exports	5	51,742.00	4,666.92	45,202.00	57,875.00

**Table 12 United Arab Emirate**

Summary statistics

Variables	Observations	Mean	Standard deviation	Minimum	Maximum
GDP at market prices	5	381,127.40	13,800.37	370,296.00	401,958.00
Current Account Balances	5	47,391.00	6,318.13	11,546.00	74,118.00
Oil Exports	5	71,981.20	20,589.10	45,559.00	88,855.00
Non-Oil Exports	5	262,616.80	16,257.86	246,660.00	285,388.00

**Table 13 Venezuela**

Summary statistics

Variables	Observations	Mean	Standard deviation	Minimum	Maximum
GDP at market prices	5	264,426.60	46,833.13	215,296.00	331,457.00
Current Account Balances	5	-3,251.20	2,114.67	-20,360.00	4,604.00
Oil Exports	5	62,236.20	30,529.92	25,142.00	93,589.00
Non-Oil Exports	5	2,774.40	1,126.36	1,331.00	4,308.00

**Table 14 Least Squares Dummy Variable Corrected (LSDVC) estimation results**

	(1)	(2)	(3)	(4)	(5)
GDP at market prices	0.347*** (0.000)	0.359*** (0.000)	0.334*** (0.000)	0.346*** (0.000)	0.331*** (0.000)
Current Account Balances	0.393** (0.000)	0.387*** (0.000)	0.385*** (0.000)	0.381*** (0.000)	0.383*** (0.000)
Oil Exports	0.393** (0.000)	0.387*** (0.000)	0.385*** (0.000)	0.381*** (0.000)	0.383*** (0.000)
Non-Oil Exports	0.013** (0.000)	0.017*** (0.000)	0.015*** (0.000)	0.014*** (0.000)	0.015*** (0.000)
Observations	65	65	65	65	65
Arellano Bond Test m1	-7.150** (0.000)	-7.218*** (0.000)	-7.289*** (0.000)	-7.310*** (0.000)	-7.440*** (0.000)
Arellano Bond Test m2	1.400 (0.000)	1.550 (0.000)	1.605 (0.000)	1.689 (0.000)	1.670 (0.000)

**Re-statement of hypothesis 1**

H<sub>1</sub> That the earnings from petroleum product exports have a significant impact on the GDP of member nations

**Regression results of hypothesis 1**

**Figure 1**

Dependent Variable: GDP

Method: Least Squares (Gauss-Newton / Marquardt steps)

Date: 12/27/17 Time: 14:18

Sample: 2012 2016

Included observations: 65

LogGDP=C(1)+C(2)\*LogOilExp

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	5.34E+09	9.55E+09	0.559151	0.5897
C(2)	0.024635	0.004256	5.787871	0.0003
R-squared	0.788233	Mean dependent var		4.80E+10
Adjusted R-squared	0.784703	S.D. dependent var		4.63E+10
S.E. of regression	2.10E+10	Akaike info criterion		49.67191
Sum squared resid	4.17E+21	Schwarz criterion		49.67596
Log likelihood	-255.1639	Hannan-Quinn criter.		49.86301
F-statistic	37.54345	Durbin-Watson stat		2.275289
Prob(F-statistic)	0.000283			

H<sub>2</sub> That the earnings from non-petroleum product exports have a significant impact on the GDP of member

nations

### Regression results of hypothesis 2

**Figure 2**

Dependent Variable: GDP  
 Method: Least Squares (Gauss-Newton / Marquardt steps)  
 Date: 12/27/17 Time: 14:34  
 Sample: 2012 2016  
 Included observations: 65  
 $\text{LogGDP} = C(1) + C(2) * \text{Lognon-OilExp}$

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	3.51E+22	8.64E+09	0.7287476	0.5392
C(2)	0.014482	0.004256	6.295837	0.0004
R-squared	0.469254	Mean dependent var		4.92E+10
Adjusted R-squared	0.468347	S.D. dependent var		4.80E+10
S.E. of regression	2.54E+10	Akaike info criterion		45.28364
Sum squared resid	5.12E+21	Schwarz criterion		45.78657
Log likelihood	-274.1674	Hannan-Quinn criter.		45.86332
F-statistic	39.46779	Durbin-Watson stat		2.142286
Prob(F-statistic)	0.000313			

H<sub>3</sub> That the earnings from petroleum product exports have a significant impact on the current account balances of member nations

### Regression results of hypothesis 3

**Figure 3**

Dependent Variable: CA  
 Method: Least Squares (Gauss-Newton / Marquardt steps)  
 Date: 12/28/17 Time: 11:54  
 Sample: 2012 2016  
 Included observations: 65  
 $\text{LogCA} = C(1) + C(2) * \text{LogOilExp}$

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	3.51E+22	8.64E+09	0.7287476	0.5070
C(2)	0.014482	0.004256	6.295837	0.0005
R-squared	0.927405	Mean dependent var		4.85E+10
Adjusted R-squared	0.927367	S.D. dependent var		4.83E+10
S.E. of regression	2.36E+10	Akaike info criterion		48.67109
Sum squared resid	4.97E+21	Schwarz criterion		48.67609
Log likelihood	-284.2277	Hannan-Quinn criter.		48.87452
F-statistic	37.48649	Durbin-Watson stat		2.294116
Prob(F-statistic)	0.000534			

H<sub>4</sub> That the earnings from non-petroleum product exports have a significant impact on the current account balances of member nations

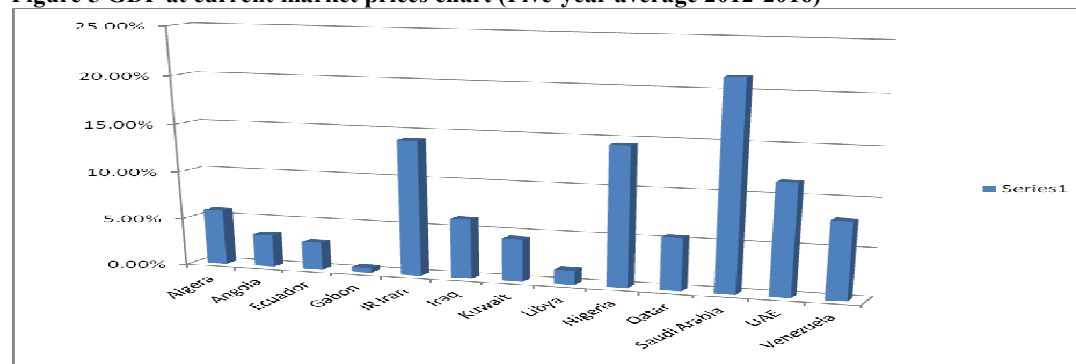
### Regression results of hypothesis 4

**Figure 4**

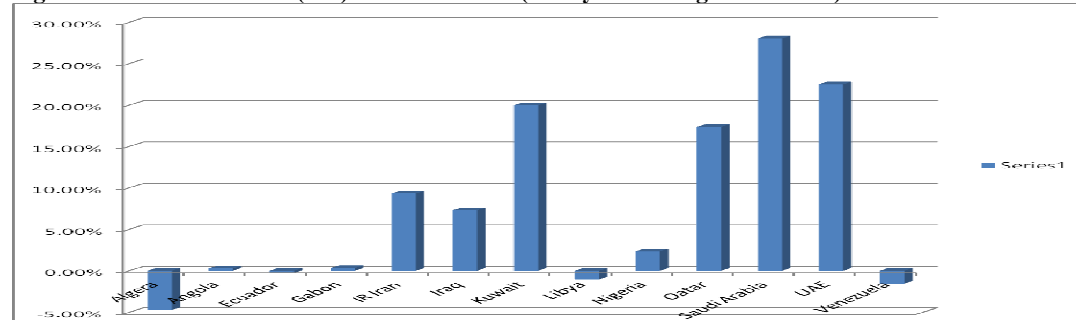
Dependent Variable: CA  
 Method: Least Squares (Gauss-Newton / Marquardt steps)  
 Date: 12/27/17 Time: 14:34  
 Sample: 2012 2016  
 Included observations: 65  
 LogCA=C(1)+C(2)\*Lognon-OilExp

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	3.51E+22	8.64E+09	0.7287476	0.5392
C(2)	0.014482	0.004256	6.295837	0.0004
R-squared	0.469254	Mean dependent var		4.92E+10
Adjusted R-squared	0.468347	S.D. dependent var		4.80E+10
S.E. of regression	2.54E+10	Akaike info criterion		45.28364
Sum squared resid	5.12E+21	Schwarz criterion		45.78657
Log likelihood	-274.1674	Hannan-Quinn criter.		45.86332
F-statistic	39.46779	Durbin-Watson stat		2.142286
Prob(F-statistic)	0.000313			

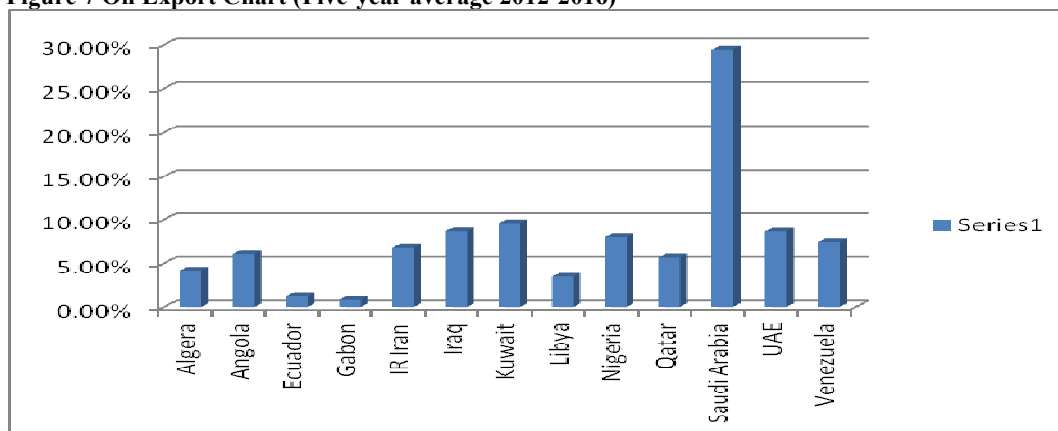
**Figure 5 GDP at current market prices chart (Five-year average 2012-2016)**



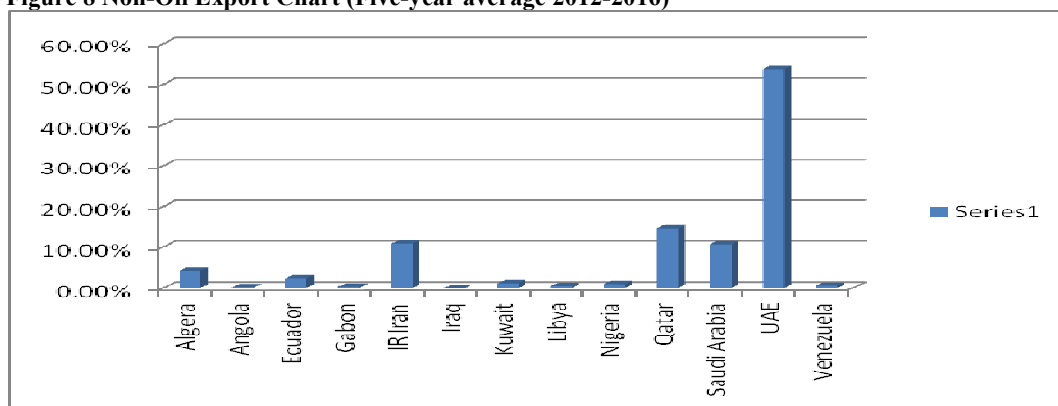
**Figure 6 Current Account (CA) Balances chart (Five-year average 2012-2016)**



**Figure 7 Oil Export Chart (Five-year average 2012-2016)**



**Figure 8 Non-Oil Export Chart (Five-year average 2012-2016)**



### 5.0 Discussion of findings

Apart from the country by country statistical tables seen from table 1 to table 13 and the figures 5,6,7 and 8 showing the individual country to country statistics regarding their individual average performance for each of the variables, the regression analysis tested the results of which is seen on figures 1,2,3 and 4 and the Least Squares Dummy Variable Corrected (LSDVC) estimation technique on table 14 actually measure OPEC aggregately. The findings will be discussed one after the other as follows:

In the country by country statistics the entire GDP at current market prices for OPEC was for the five-year period under study was \$16.5 trillion dollars. Saudi Arabia, Nigeria and IR Iran had the highest contribution at 21.42%, 14.51% and 14.12% respectively. At a total combined percentage of 50.05% these three countries have the most productive capacity to contribute to economic growth among OPEC member states. OPEC member states like Gabon, Libya and Ecuador has the least GDP at current market price contribution at 0.50%, 1.51% and 2.91%.

Among the current account balances of the OPEC member states, the countries with the highest balances include Saudi Arabia, United Arab Emirate, Kuwait and Qatar at 28.07%, 22.50%, 20% and 17.35% respectively, the combined balances being 87.5% or \$921.4 billion. The countries with the lowest current account balances for the period were Algeria, Venezuela, Libya and Ecuador with deficit balances of -4.73%, -1.54%, -1.03% and 0.27% respectively.

The OPEC countries oil export earnings for the period under study totaled \$4.2 trillion dollars. The kingdom of Saudi Arabia has 29.48% alone. The countries with the lowest oil export earnings are Gabon, Ecuador and Libya at 0.81%, 1.28% and 3.48% respectively.

In the non-oil export earnings category and for the period under investigation OPEC countries pooled \$2.4 trillion dollars in non-oil export earnings alone. The United Arab Emirate had the highest earnings of non-oil export among OPEC member states at no less a figure than 53.77%, other countries with a significant margin included Qatar at 14.54%, Iran 10.79%, Saudi Arabia at 10.59%. The remaining nine countries had less than the OPEC average per country in this regard. But the least of them include Venezuela (0.57%), Libya (0.47%) and with the lowest figure coming from Iraq at 0.05%.

In the e-view analysis of the hypothesis 1, it reveals  $R^2$  and adjusted  $R^2$  at 78.8% and 78.4% respectively. It means that the regression line approximates the real data points and so is a good fit and the model sufficient. The coefficient of determination  $R^2$  in this case provides a measure of how well observed outcomes in the analyses are replicated by the model. In other words most of the variations in the economic growth among OPEC states can be explained by changes in earnings from oil exports. . In other words most of the variations in the GDP can be explained by changes in the oil export earnings over the five years under study. It is also import to understand how changes in foreign currency exchange rates and international price of crude exports can alter these variations in GDP, hence overall economic growth. The Durbin Watson statistics reveal that there are positive signs of serial correlation. A close look at the AIC, or Schwarz criterion, shows that the difference between the two is very negligible, an indicator of a near perfect model convergence near zero. The smaller they are the better the fit of your model is (from a statistical perspective) as they reflect a trade-off between the lack of fit and the number of parameters in the model. The decision is to accept the hypothesis H1a which supports the theory that earnings from petroleum product exports have a significant impact on the GDP at current market prices of OPEC member states.

In the hypothesis 2, the Durbin Watson statistics reveal that there are positive signs of serial correlation. A close look at the AIC, or Schwarz criterion, shows that the difference between the two is very negligible, an indicator of a near perfect model convergence near zero. The smaller they are the better the fit of your model is (from a statistical perspective) as they reflect a trade-off between the lack of fit and the number of parameters in the model. The  $R^2$  and adjusted  $R^2$  reveals 46.9% and 46.8% respectively. That the differences between the  $R^2$  and adjusted  $R^2$  are negligible is an indicator that the regression line approximates the real data points and so is a very good fit and also shows how well observed outcomes in the analyses are replicated in the model. However, since it has been observed that variations in the GDP are explained at about 47% of non-oil export earnings, one is compelled to yield to reason of evidence by rejecting the second hypothesis (H0a) which supports that non-petroleum product exports have more significant impact on the GDP of member nations.

In hypothesis three, where the effect of oil exports on current account balances were tested, the analysis revealed that in the Durbin Watson statistics there are positive signs of serial correlation. Looking at the AIC, or Schwarz criterion, there is evidence that the difference between the two is very negligible, an indicator of a near perfect model convergence near zero. The smaller they are the better the fit of your model is (from a statistical perspective) as they reflect a trade-off between the lack of fit and the number of parameters in the model. The  $R^2$  and adjusted  $R^2$  reveals 92.74% and 92.73% respectively. That the differences between the  $R^2$  and adjusted  $R^2$  are negligible is an indicator that the regression line approximates the real data points and so is a very good fit and also shows how well observed outcomes in the analyses are replicated in the model. But given that the observed variations in the current account balances are explained at about 92.7% by oil export earnings, one is compelled to yield to reason of evidence by accepting the third hypothesis (H<sub>3</sub>) which supports that petroleum product exports have more significant impact on the current account balances of member nations.

In analyzing hypothesis 4, the effect of non-oil exports on current account balances were tested, the analysis revealed that in the Durbin Watson statistics there are positive signs of serial correlation. Looking at the AIC, or Schwarz criterion, there is evidence that the difference between the two is very negligible, an indicator of a near perfect model convergence near zero. The smaller they are the better the fit of your model is (from a statistical perspective) as they reflect a trade-off between the lack of fit and the number of parameters in the model. The  $R^2$  and adjusted  $R^2$  reveals 46.9% and 46.8% respectively. That the differences between the  $R^2$  and adjusted  $R^2$  are negligible is an indicator that the regression line approximates the real data points and so is a very good fit and also shows how well observed outcomes in the analyses are replicated in the model. But given that the observed variations in the current account balances are explained at about 47% by non-oil export earnings, one is compelled to yield to reason of evidence by rejecting the fourth hypothesis (H<sub>4</sub>) which supports that petroleum product exports have more significant impact on the current account balances of member nations.

In the LSDVC computations seen on table 14, it is pertinent to understand that significance level at 10%, 5% and 1% is denoted by \*,\*\* and\*\*\* respectively. For instance GDP at market prices for the countries affected and for each of the five years is significant at 1%. Current account balances, oil exports and non-oil exports for OPEC member states are significant at 5% in the first year and 1% in the remaining years. The Arellano Bond Test m1 effect in the first year was significant at 5% in the first year and significant at 1% for the remaining years.

The impact of oil export earnings and non-oil export earnings on the GDP at current market prices and current account balances were positive and statistically significant in table 14 and the empirical results are reasonably robust, this is consistent with the works of Mishra (2014).

## 6.0 Conclusions

It was found out in this study that the Saudi kingdom has the greatest capacity to grow its economy having the highest GDP at current market prices. Secondly, the Saudi kingdom along with UAE, Kuwait and Qatar have the

highest current account balances among the OPEC countries, this also helps them to absolve pressure from international foreign exchange fluctuations better than other members like Algeria, Venezuela, Libya and Equador. In oil export earnings the Saudi kingdom has almost 30% alone compared to countries like Gabon, Equador and Libya at 0.81%, 1.28% and 3.48% respectively. What this means is that Saudi Arabia would be more influential than other oil exporting countries and can lobby more effectively the magnitude and direction of international price through output adjustment. In other words, having the largest exports, they can manipulate production in a way that may threaten non- OPEC members who also export crude oil. The greatest indicator of non-oil exports of OPEC member nations today is the ability to diversify income in the event of a fall in the income of oil exports. In this regards the United Arab Emirate has the highest potential for economic diversification away from oil exports being responsible for earning 53.77% of the non-oil income of OPEC nations. But with the combined percentage total of Venezuela, Libya and Iraq at a little above 1% it means that the diversification potentials for the three countries are extremely low and this leaves their non- oil earnings potential in a chronic position indeed especially as the world's largest buyers of export crude (developed nations) are making breakthroughs in the areas of research for alternative energy sources.

From an aggregate perspective it is evident from the e-view analysis that the oil exports earned in the five year period under consideration has a high impact in economic growth than the non-oil exports earned. This means that generally oil producing exporting countries rely more on oil income to replenish their reserves and grow their economy. Government expenditure, household income, job creation and investments in the OPEC countries rely more on oil income than non-oil income. The non-oil private sector's contribution to economic growth remains relatively small for all the OPEC countries with the exception of the United Arab Emirate with 53.77% of the entire non-export earnings of the OPEC member states combined. OPEC member nations are exposed to macroeconomic volatility when oil price dips. This can even affect the growth in the non-oil sector and strain the sustainability of public employment.

### **7.0 Policy recommendations**

Regardless of diversity in size, demographics and wealth, OPEC member states especially those with very low GDP like Gabon, Libya and Ecuador will most likely face increased problems in job creation, and productivity. Because of the volatile nature of the oil sector OPEC countries should foster more inclusive growth by growing their private sector to drive their economy. The non-oil private sector in many of these countries remains relative small contributor to the GDP.

Countries such as Algeria, Venezuela, Libya and Equador with the lowest current account balances among OPEC countries should source for ways to grow their foreign exchange reserves. This can only be achieved by very appropriate measures of debt management and reduction in government expenditure and increased earnings from exports. According to Amah and Onoh (2013) countries that liberalized their oil sector fare better in growing their current account balances. A stronger current account indicates a stronger foreign exchange ability for the country concerned.

Over-reliance on oil also exacerbates macroeconomic volatility, and for OPEC countries like Gabon, Equador and Libya having the lowest earnings from oil exports and of course being subject to OPEC quota realize that they don't wield enormous influence in decisions taken at OPEC the way Saudi Arabia would because of the wide gap in oil earnings capacity. There is the need to insulate their individual economies from the impact of oil price volatility by laying a sound foundation for economic diversification. The public sector of these countries which rely mostly on funding from these oil exports should complement private sector businesses and not compete with it.

Apart from the United Arab Emirate the rest of the OPEC members have not adequately diversified their earnings away from the oil exports. This is dangerous given that in addition to being an exhaustible resource, oil has a volatile price pattern. There is the need to truly grow a self-sufficient non-oil sector that will sustain growth and employment even when oil resources are depleted. Even countries like Saudi Arabia with a large proven oil reserve should save a large share of their current oil income to promote greater intergenerational equity.

### **References**

- Aghion, P., and Howitt, P. (1997). *Endogenous growth theory*. MIT Press: Cambridge.
- Akhtar, M., and Hilton, R.S. (1984). Effects of exchange rate uncertainty on German and U.S. trade, *Federal Reserve Bank of New York, Quarterly Review*, 9, 7-16.
- Aziz Arman and Mahvash Moradi (2015), Procyclical Fiscal Policy: Is OPEC an exception? *European Journal of Business Management*, ISSN 2222-1905 (Paper) ISSN 2222-2839 (Online), Vol. 7, No.22, 2015
- Baltagi, B.H. (2001). *Econometrics analysis of panel data*. Chichester: Wiley.
- Barlevy, G. (2004). The cost of business cycles under endogenous growth, *American Economic Review*, 94(4), 964–990.
- Barro, R. (1984). *Macroeconomics*, Wiley, New York.

- Bekaert, G., Harvey, C.R., and Lundblad, C. (2006). Growth volatility and financial liberalization, *Journal of International Money and Finance*, 25(3), 370-403.
- Bernanke, B.S. (1983). Irreversibility, uncertainty, and cyclical investment, *Quarterly Journal of Economics*, 98(1), 85-106.
- Bernauer, T., and Achini, C. (2000). From real to virtual states? Integration of the world economy and its effects on government activity, *European Journal of International Relations*, 6(2), 223-276.
- Cavallo, E.A. (2007). Output volatility and openness to trade: A reassessment, Inter-American Development Bank, Working Paper, 4518.
- Cavallo, E.A. (2008). Output volatility and openness to trade: A reassessment, *Journal of LACEA Economia*, 9, 105-138.
- Crucini, M.J. (1997). Country size and economic fluctuations, *Review of International Economics*, 5(2), 204-220.
- di Giovanni, J., and Levchenko, A.A. (2008). Trade openness and volatility, IMF Working Paper, No.08/146.
- Dickey, D.A., and Fuller, W.A. (1979). Distributions of the estimators for autoregressive time series with a unit root, *Journal of the American Statistical Association*, 74(366), 427-431.
- Down, I. (2007). Trade openness, country size and economic volatility: The compensation hypothesis revisited, *Business and Politics*, 9(2), 1-22.
- Gavin, M., and Hausmann, R. (1998). Growth with equity: The volatility connection, in Birdsall, N., Graham, C., and Sabot, R. eds., *Beyond tradeoffs: Market Reforms and Equitable Growth in Latin America*, (Washington, DC: Inter-American Development Bank and the Brookings Institution), 91-109.
- Haddad, M., Lim, J.J., Pancaro, C., and Saborowski, C. (2012). Trade openness reduces growth volatility when countries are well diversified, European Central Bank Working Paper, No. 1491.
- Hau, H. (2002). Real exchange rate volatility and economic openness: Theory and evidence, *Journal of Money, Credit, and Banking*, 34(3), 611-630.
- Head, A.C. (1995). Country size, aggregate fluctuations, and international risk sharing, *Canadian Journal of Economics*, 28(4), 1096-1119.
- Hicks, A.M., and Swank, D.H. (1992). Politics, institutions, and welfare spending in industrialized democracies, 1960-82, *American Political Science Review* 86(3), 658-674.
- IMF (2016). Economic Diversification in Oil-Exporting Arab Countries, Annual Meeting of Arab Ministers of Finance, Manama, Bahrain.
- K.S., Pesaran, M.H., Shin, Y. (2003). Testing for unit roots in heterogeneous panels, *Journal of Econometrics*, 115(1), 53-74.
- Liberati, P. (2006). Trade openness, financial openness and government size. Available from [Http://www.Dauphine.Fr/Globalisation/Liberati.Pdf](http://www.Dauphine.Fr/Globalisation/Liberati.Pdf).
- Lloyd, P.J., and Sundrum, R.M. (1982). Characteristics of small economies, in *Problems and Policies in Small Economies*, ed. by B. Jalan, pp. 17-38. Commonwealth Secretariat and Croom Helm, London.
- Pakistan: Co integration approach for compensation hypothesis, *Asian Economic and Financial Review*, 4(6), Research Journal of Finance and Accounting [www.iiste.org](http://www.iiste.org), ISSN 2222-1697 (Paper) ISSN 2222-2847 (Online) Vol.5, No.23, 2014, 744-754.
- Mustafa, K., and Nishat, M. (2004). Volatility of exchange rate and export growth in Pakistan: The structure and interdependence in regional markets, *The Pakistan Development Review*, 43(4), 813-828.
- Noguera, J., and Pecchechino, R.A. (2007). OPEC and the international oil market: Can a cartel fuel the engine of economic development?, *International Journal of Industrial Organization*, 25(1), 187-199.
- OPEC Annual Statistical Bulletin (2017), Organization of the Petroleum Exporting Countries, 52 edition, [www.prid@opec.org](http://www.prid@opec.org)
- Pallage, S., and Robe, M.A. (2003). On the welfare cost of economic fluctuations in developing countries, *International Economic Review*, 44(2), 677-98.
- Poe, S., and Tate, N. (1994). Repression of human rights to personal integrity in the 1980s: A Global Analysis, *American Political Science Review*, 88(4), 853-872.
- Ramey, G., and Ramey, V.A. (1995). Cross-country evidence on the link between volatility and growth, *American Economic Review*, 85(5), 1138-1151.
- Rodrik, D. (1998). Why do more open economies have bigger governments?, *Journal of Political Economy*, 106(5), 997-1032.
- Rose, A.K. (2006). Size really doesn't matter: In search of a national scale effect, NBER Working Paper, No.12191.
- Salvatore, D. (2001). Defining country size in small countries in a global economy: New challenges and opportunities, ed. by D. Salvatore, M. Svetlicic, and J. P. Damijan, pp. xii, 305, Palgrave, Basingstoke
- Schiff, M. (1997). Small is beautiful: Preferential trade agreements and the impact of country size, market share, efficiency, and trade policy, *Journal of Economic Integration*, 12, 359-387



Sameen Mazhar, Afifa Imran, Aiman Shahzad, Durr-e-shahwar and Sabahat Haider (2017), Assessing the Impact of Demand, Import, Taxes and OPEC on Petrol Prices, *Journal of Energy Technologies and Policy*, ISSN 2224-3232 (Paper), ISSN 2225-0573 (Online), Vol.7, No.2, 2017

White, H. (1980). A heteroskedasticity consistent covariance matrix estimator and a direct test for heteroskedasticity, *Econometrica*, 48(4), 817-838.

### Appendices

#### OPEC Members' GDP at current market prices (m \$)

	2012	2013	2014	2015	2016
Algeria	209,005	209,751	214,120	165,152	161,104
Angola	115,342	124,912	126,777	102,962	95,821
Ecuador	87,925	94,776	100,917	99,068	96,690
Gabon	17,181	17,596	18,209	14,370	14,273
IR Iran	587,209	511,621	425,326	393,436	409,823
Iraq	218,032	234,638	228,491	179,513	166,274
Kuwait	174,066	174,179	162,695	114,078	110,572
Libya	89,242	62,872	33,819	29,763	33,157
Nigeria	461,448	515,134	531,217	483,136	400,571
Qatar	186,322	198,183	205,660	164,190	152,509
Saudi Arabia	735,975	746,647	756,350	651,757	639,617
U.A,E	373,432	388,598	401,958	370,296	371,353
Venezuela	331,457	228,017	215,296	260,089	287,274
<b>OPEC</b>	<b>3,586,635</b>	<b>3,506,924</b>	<b>3,420,836</b>	<b>3,027,811</b>	<b>2,939,039</b>

Source: OPEC Annual Statistical Bulletin 2017

#### OPEC Members' values of exports (m \$)

	2012	2013	2014	2015	2016
Algeria	77,107	69,649	65,227	34,566	29,054
Angola	71,093	68,247	59,170	33,181	25,935
Ecuador	23,765	24,848	25,732	18,366	16,744
Gabon	10,331	9,715	9,346	6,473	5,871
IR Iran	131,305	140,562	102,796	76,793	97,386
Iraq	94,392	89,742	84,506	49,403	43,890
Kuwait	114,515	114,093	100,658	54,089	46,261
Libya	61,026	46,018	23,726	13,943	11,986
Nigeria	96,905	97,818	82,596	45,888	34,704
Qatar	142,485	144,115	139,845	92,038	72,459
Saudi Arabia	388,401	375,873	342,433	203,537	179,575
U.A.E	359,728	371,028	343,085	300,496	298,653
Venezuela	97,877	88,753	74,714	37,236	26,473
<b>OPEC</b>	<b>1,668,929</b>	<b>1,640,459</b>	<b>1,453,833</b>	<b>966,007</b>	<b>888,990</b>

**OPEC Members' values of petroleum exports (m \$)**

	2012	2013	2014	2015	2016
Algeria	48,271	44,462	40,628	21,742	18,638
Angola	69,954	66,652	57,250	31,929	25,935
Ecuador	13,792	14,107	13,276	6,660	5,442
Gabon	8,922	8,044	7,720	4,913	4,198
IR Iran	101,468	61,923	53,652	27,308	41,123
Iraq	94,090	89,359	84,303	49,249	43,753
Kuwait	108,534	107,543	94,324	48,444	41,461
Libya	60,188	44,445	20,357	10,973	9,313
Nigeria	95,620	90,546	78,053	41,818	27,788
Qatar	65,065	62,519	56,912	28,513	22,958
Saudi Arabia	337,480	321,888	284,558	152,910	134,373
U.A.E	86,016	85,640	88,855	53,836	45,559
Venezuela	93,569	85,603	71,731	35,136	25,142
<b>OPEC</b>	<b>1,182,968</b>	<b>1,082,731</b>	<b>951,617</b>	<b>513,430</b>	<b>445,684</b>

**Current account balances in OPEC Members (m \$)**

	2012	2013	2014	2015	2016
Algeria	12,418	999	-9,434	-27,476	-26,314
Angola	13,841	8,145	-3,748	-10,273	-4,929
Ecuador	-165	-968	-568	-2,201	1,109
Gabon	3,040	1,241	1,344	-779	-1,279
IR Iran	23,416	26,523	15,861	9,019	23,566
Iraq	29,542	22,591	24,428	3,672	-3,134
Kuwait	79,137	70,181	54,410	5,970	947
Libya	23,836	8,895	-11,662	-18,373	-13,491
Nigeria	17,516	19,205	907	-15,439	2,722
Qatar	62,000	60,461	49,410	13,751	-2,885
Saudi Arabia	164,764	135,442	73,758	-53,478	-24,914
U.A.E	79,564	74,118	54,462	17,265	11,546
Venezuela	2,586	4,604	3,598	-20,360	-6,684
<b>OPEC</b>	<b>511,496</b>	<b>431,437</b>	<b>252,766</b>	<b>-98,701</b>	<b>-43,740</b>