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UPSTREAM OIL AND GAS SECTOR AND ECONOMIC GROWTH IN NIGERIA (1981 – 2020)

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Abstract

This paper examined the impact of upstream oil gas sector on economic growth in Nigeria relative to other key sectors like agriculture, manufacturing and trade. The Secondary data on Real GDP, Petroleum and Natural gas, manufacturing, agriculture and trade (Dependent and Independent variables) are obtained from the CBN statistical bulletin and National Bureau of Statistics. The econometrics method of OLS, co-integration and Error Correction Mechanism were used for the analysis. The OLS result showed that a unit increase in any of the explanatory variables accounted for about 99.9 percentage variation in economic growth. The F statistics revealed a joint significant of all the variables in the model. Though, the existence of negative auto correlation renders the OLS result to be spurious and therefore it could not be used for policy prescription. The result of the unit root test however showed that all the variables (Real GDP, Petroleum & natural gas, agriculture and Trade) were stationary at first difference. This prompted the study to conduct a cointegration test to ascertain a long run equilibrium relationship among the variables model. It was discovered that there are four integrating equations which justifies the existence of long run equilibrium relationship among the variables in the model. The study further determines the direction of causality among the variables in the model using Engel Granger causality test. The result revealed a unidirectional causality from Agriculture to Petroleum and Natural Gas, Manufacturing while a bi-directional causality exists between manufacturing to output growth. The study therefore recommends that the government should invest the proceeds from oil and natural gas on other sectors of the economy most especially agricultural and manufacturing sectors. The government should also redirect its focus on proper management of its re venue and effective control of unnecessary expenditure.

Keywords: Upstream oil and gas, Economic growth, Manufacturing sector, Agricultural Sector, Co-integration Test.

1.0 Introduction

The discovery of crude oil in 1956 and the gluts of the 1970s and early 1980s played significant role in Nigerian economic structure and its growth trajectory in the past four decades. Prior to the discovery of oil at Oloibiri area of Bayelsa State, agricultural sector was the main stay of Nigerian economy, contributing about 95% to her foreign exchange earnings, generating over 60% of her employment capacity and approximately 56% to her gross domestic earnings (World Bank, 2013).

The boom in oil receipts over the years led to Nigeria's neglect of its strong agricultural sector in favour of an unwholesome dependence on crude oil. The oil and gas industry in Nigeria became the largest sector in terms of revenue generation to the national economy. In 2020, oil and gas exports accounted for more than 95% of export earnings and about 83% of federal government revenue but contributed less than 10% to GDP. In fact, the petrodollar from the oil booms has made the Nigerian economy to become a mono product economy and hence vulnerable to intranational oil politics and its repercussions. However, its contribution to the growth rate of Gross domestic product (GDP) of the Nigerian economy has remained tepid. With Nigeria's economic growth currently becoming flat to declining on the back of volatile oil prices, there have been series of discussion on the topic of what can be done to achieve strong economic growth regardless of the development in the global oil market. It is because of the volatility in oil prices and Nigeria's dependence on oil that many economists raise concern about the future of the economy. As alternative fuels become more popular and oil importing countries continue to discover oil deposits, there is a need for the Nigerian economy to look to other, more manageable sources of foreign exchange and government revenue to spur economic growth (Igberaese, 2013).

Though, quite a number of studies have been conducted on the role of upstream oil and gas sector on Nigerian economy. The impact of oil and gas sector on the economic growth and development of many oil producing countries including Nigeria has remained one of the focal concerns of policy makers and researchers for decades. A number of literatures abound on the role of oil revenue to the economic life of the oil producing countries at large. However, there is conflicting results on the nature of the relationship between the two concepts, with some indicating reverse causality and others resulting in insignificant parameters, leading to the need for more in-depth research on the subject.

Ben, Abayomi and David (2016) examined how the crude oil price volatility affected the Nigeria's macroeconomic performance. The study revealed that change in the price of oil affects the real exchange, interest rate, and GDP in Nigeria more significantly than one may expect with the use of an unrestricted Vector Autoregressive model. The study advises the Federal government of Nigeria to diversify away from oil and gas.

Abdulkareem and Abdulkareem (2015) studied the impacts of shocks in crude oil prices on Nigeria's macroeconomic performance. Using the Generalized Autoregressive Conditional Heteroskedastic (GARCH) model and its variations, the study showed that the asymmetric models outperformed the symmetric models. In order to lessen the effect of oil price uncertainty on macroeconomic volatility, the study suggested that Nigeria's economy be diversified by upgrading other areas, such as the agricultural sector and the industrial sector.

Odularu (2008) examined the relationship between the crude oil sector and the Nigerian economic performance. Using the Ordinary Least Square regression (OLS) method, the study revealed that crude oil consumption and export contributed to the improvement of the Nigerian economy. The study recommends that government should implement policies that would encourage the private sector to participate actively in the crude oil sector.

On her part, Ibeh (2013) investigated the impact of the oil industry on the economic growth performance of Nigeria. Using OLS regression technique, she regressed Gross Domestic Product (GDP), against oil Revenue and time appeared as repressors. A two-tailed test of 5% significant levels were conducted indicating that the two explanatory variables did not have any significant impact on growth performance of the Nigerian economy within the same period. The researcher recommends that government should formulate appropriate policy mix that would motivate the firm in the oil sector to enhance improved performance and contribution of the sector. Her findings contradict the findings of Odularu (2008), who find a positive relationship between oil sector and Nigeria economic performance.

Akinlo (2012) assessed the importance of oil in the development of the Nigerian economy in a multivariate VAR model over the period 1960-2009. He modelled oil sector against other four sectors i.e., manufacturing, agriculture, trade & service and building & construction. Empirical evidence shows that the five subsectors are cointegrated and that the oil can cause other non-oil sectors to grow. However, oil had adverse effect on the manufacturing sector.

Granger causality test finds bidirectional causality between oil and manufacturing, oil and building & construction, manufacturing and building & construction, manufacturing and trade & services, and agriculture and building & construction. It also confirms unidirectional causality from manufacturing to agriculture and trade & services to oil. No causality was found between agriculture and oil, likewise between trade & services and building & construction. The paper recommends appropriate regulatory and pricing reforms in the oil sector to integrate it into the economy and reverse the negative impact of oil on the manufacturing sub sector.

The findings of Ibeh and Akinlo exposed that petroleum industry have not significantly contributed to Nigeria economy due to the fact that Nigerian government have not used her revenue generated from the sector efficiently. The industry has faced enormous challenges such as lack of infrastructures, lack of proper turn around maintenance in the oil and gas industries, high rate of corruption, militant insurgences, the recent Boko haram, bunkering, and all sorts of criminal activities.

Nwezeaku (2010) posited that the economy has been befuddled by perennial underdevelopment, poverty, increasing debt burden due to multiple problems such as poor energy supply and power outages, systematic collapsing of industries and infrastructures, lack of proper turn around maintenance in the oil and gas industries, high are of corruption, militant insurgences, criminal activities etc. The country is faced with poor human developmental and economic indices as evidenced by high rate of perennial and persistent inflation, low per capital income, poor income distribution, GDP and sustained impoverishment, mismanagement of abundant natural, human and material resources,

insatiability greed and loss for excessive wealth. Corruption practices at all levels and political banditry have been the bane of the Nigeria economy.

Shihab (2001) have linked abundant natural resources to show economic collapse, civil conflict and socio-economic collapse. They further state that, all natural resources, oil has been found to have the highest risk of civil conflict because of the large rents it offers. There abound fore Nigeria needs to be careful about the way it manages her petroleum to avoid socio-economic collapse.

Ibaba (2005) posits that the Nigeria economy has been facing developmental crisis such as high level of poverty, declining economic growth, collapse of local economics and social infrastructure. There has been corruption, financial indiscipline, lack of proper accountability of oil revenue, co-existence of abundant foreign reserves has become the order of the day (Shihab, 2001; Ibeh, 2013).

The works of Nwezeaku (2010), Shihab (2001) and Ibaba (2005) provided evidence to contradict the facts that abundance of natural resources does not really spur economic growth but rather leads to several ethnic crisis and civil unrest. At the same vein Sachs and Warner (1997) provide empirical evidence to explain the slow growth in Sub Saharan Africa from 1965-1990.

They hypothesize that factors such as geography, economic policy, demography and initial conditions all explain the growth in Africa in recent decades (Sachs and Warner, 1997). Therefore, they run regressions using a variety of variables as determinants of growth and estimate a variety of factors which were shown to influence growth in Africa. Natural resource endowments were found to correlate with slower growth as the work from Sachs and Warner (1995) also showed. The regression showed that as natural resource exports increased GDP by .1, growth was projected to decrease by .33 percentage points annually (Sachs and Warner, 1997).

However, more recent studies on the impact of the upstream oil and gas industry include Adekunle, Omowunmi, and Bamidele (2019). These studies particularly focused on the technical efficiency index of upstream operators in Nigeria from 2010 – 2016 using a data envelopment approach which was premised on constant return to scale whose results suggest that a 19 percent of the operators performs better along efficient production frontier.

Also, the study by Yusuf, John and Joshua (2018) on the factors which shaped technology and innovative capability in Nigeria indigenous firms in the upstream petroleum sector using primary data from (200) indigenous oil firms by employing logit regression method but came out with the conclusion that in-house research and development fund allocation accounted for a 10 percent level of significance. The weakness of these studies however was that it is sector specific because macroeconomic impact were not captured. Another related study conducted by Stefan and Ajayi (2020) on the algorithm graphic process limit to determine oil and gas reserves in the upstream sector in Nigeria. The study however used raw well logged data from the Kansas Geological Society from 1999 to 2018. The result of the study showed

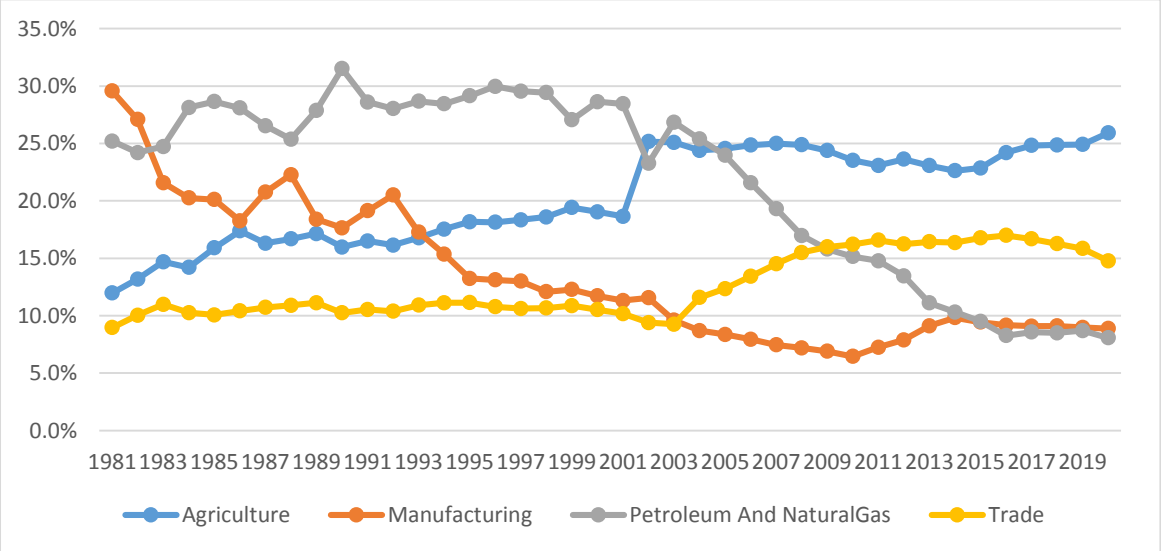
that technical efficiency would increase the area of shale and rock formation as well as oil and gas reserves.

Subject to the drawback of the existing studies, the current research focused on filling the vacuum created by past studies by determining macroeconomic impact of upstream oil and gas industry in Nigeria during the period of consideration.

Against this background, this paper therefore seeks to investigate the contribution of the upstream oil and gas sector onNigeria's economic growth on the back of the various shocks that characterize the global oil market and regular domestic disruptions to crude oil production.

Trend Analysis of Relationship Between Crude Oil Petroleum & Natural Gas, Manufacturing, Agriculture, Trade and Economic Growth from 1981 - 2020

Figure 2.1



The figure 2.1 above depicts the contributions of the Petroleum & Natural Gas, Agriculture, Manufacturing and Trade (dependent variables to the real GDP (independent variable) over the period under review. The crude petroleum & Natural gas sector has been witnessing steady sharp decline in terms of contributions since 2001 making it less relevant to the Nigeria's economic growth trajectory. This could be attributed to the volatility in oil prices in the international market coupled with the domestic oil disruptions in the Niger Delta area. The positive growth in terms of contribution to real GDP by the Agricultural sector could be traced to the deliberate efforts by the government to diversify the economy by promoting the sector. However, the Trade and and Manufacturing sectors share of the GDP have been relatively flat recording a marginal growth in the past five years.

Figure 2.2

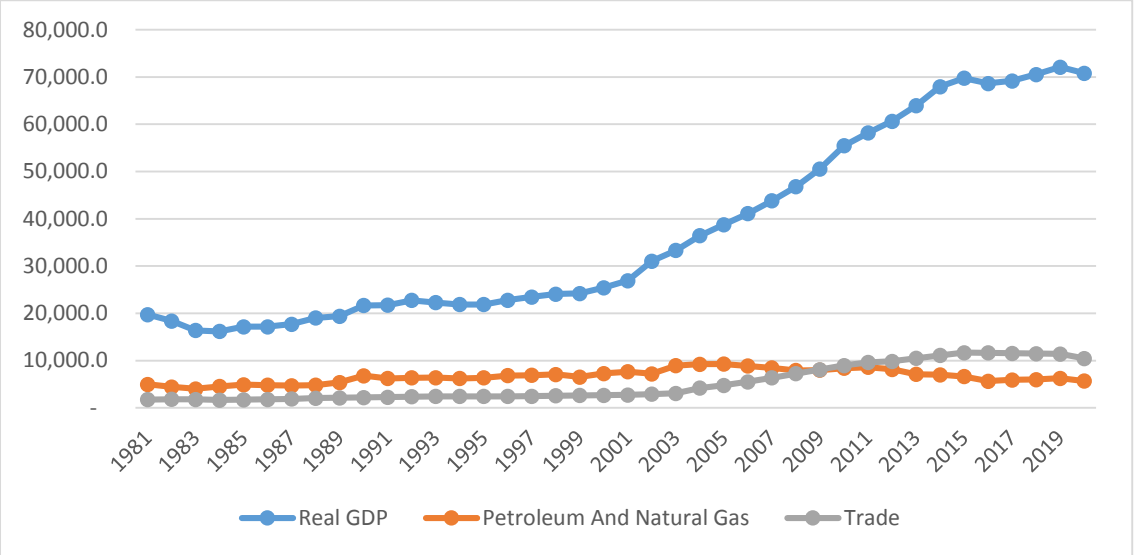
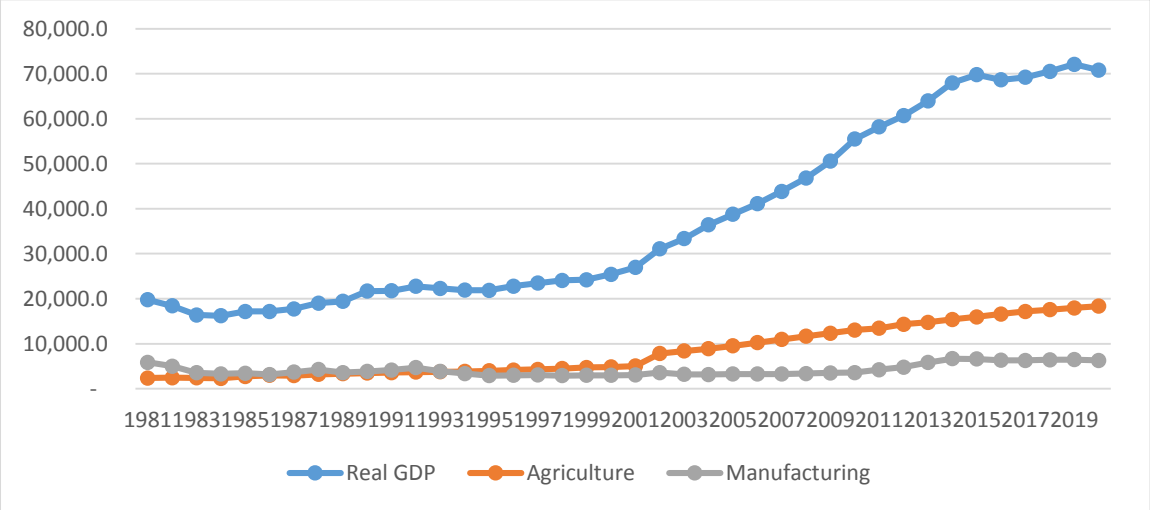


Figure 2.3



The figures 3.2 and 3.3 trended the value of Real GDP versus value of petroleum & natural gas; manufacturing; agriculture and trade over the period 1981 – 2020. A noticeable trend is the sustained decline in the value of petroleum & natural gas since 2007 to 2020. Other sectors covered in the study were positively trending in line with the value of the real GDP. The decline in the petroleum & natural gas could be attributed to the volatility in oil prices as well the restiveness in the Niger Delta region that significantly affected crude oil production. At a point in 2015, Nigeria's daily oil production fell to 750,000 barrels per day as against the country's OPEC quota of 1.6 million barrels per day. What this means is that for government to maximize earnings from crude oil sales, efforts should be made to placate the people of the Niger Delta region to ensure regular crude oil production.

3. Methodology

The study used time series data from 1980 to 2020. The data was sourced from Central Bank of Nigeria statistical bulletin and National Bureau of Statistics website. Data were tested using

Augmented Dickey-Fuller (ADF) unit root test, Johansen's co-integration test and Parsimonious Error Correction Mechanism.

3.1 Theoretical Framework

Economic growth refers to an increase in the value of goods and services produced by a country over a period and can be used to gauge the size of a country. According to Dwivedi(2004), economic growth is a sustained increase in per capita national output or net national product over an extended period. It implies that the rate of increase in total output must be higher than the rate of population growth, thereby resulting in improvement or an increase in the standard of living of the citizens. Real GDP has been regularly used as good measure of economic growth because it accounts for the change in the price level of goods and services produced within the nation at a particular period.

Since the oil price shocks of the 1970s, there has been a shift of attention to the relationship between oil prices and global GDP growth. Casual observation suggests that the changes in oil prices in the 1970s and 1980s impacted the economic growth in the OECD. There are good economic reasons to expect this inverse relationship. Higher oil prices shifted income from the OECD to the OPEC countries. The OECD countries had a higher propensity to consume compared to the OPEC countries, which in this period lacked the institutional capacity to spend fully their revenue windfall. A large proportion of this windfall was simply left in Western financial institutions. Thus, global aggregate demand fell, generating economic recession.

The higher prices seen from 2004 to 2014 in all natural resources have brought the issue of ***'resource curse'*** back into the policy debate (Stevens et al. 2015). Linked to the debate on resource curse has also been a revitalized interest in economic diversification in those countries highly dependent upon oil and gas revenues. The key point here is that oil revenue is not income. Rather, it simply represents the re-shuffling of the nation's portfolio of assets. Figure 2.1 typifies the production profile of an oil producer.

At the initial stages, production provides financial resources, which is expected to be used to promote economic development. Production then reaches a peak. In the transition phase, it is crucial that the financial resources released by producing the oil are used to create an alternative income-producing asset. Eventually, production will decline because of natural depletion or because of a lack of demand. For export earnings, this process is accelerated as domestic consumption rises. In this stage—'dependence unsustainable' —it is no longer feasible to rely on oil revenues to support the rest of the economy. Therefore, oil-dominated economies should aim, from the very early stage of production, to diversify away from dependence on oil revenues. The success or otherwise of this strategy can be measured by the non-hydrocarbon fiscal deficit.

The future of oil and gas markets looks very different from the experiences of the last fifteen years—many oil and gas producers, especially in the developing world, thus need to adjust their expectations and adapt their policy options. Expectations of great wealth at the top of the commodity super-cycle are no longer realistic. There are many reasons to think that oil and gas may not necessarily be produced at the levels expected by many low- and middle-

income countries and that, even if production does not disappoint, the consequent revenues to their governments may well prove illusory. At the very least this will require them to re-think how to manage the expectations of their peoples, which had been inflated to unrealistic levels.

3.2 Model Specification

The econometric model adopted is stated below:

$GDP = a0 + a1PT + a2\ MG + a3AG + a4TR + Ut$ (1.1)

On the *a priori*, it is expected that;

$a1 > 0$, $a2 > 0$, $a3 > 0$ and $a4 > 0$

Also, the study employs the co-integration/ECM methods to ascertain the long-run dynamics of the estimated model. The equation for the ADF unit root test precedes the co-integration and ECM tests. The unit root test is presented thus:

$\Delta GDPt = \delta 0 + \delta 1 \Delta GDPt\text{-}1 + \delta 2 \Delta COt + \delta 3 \Delta AGt + \delta 4 \Delta AGt + \delta 5 \Delta MSt + Ut$ (1.2)

Where;

$\delta 0$ = constant term/parameter intercept

$\delta 1$, $\delta 2$, $\delta 3$, $\delta 4$ and $\delta 5$, = coefficients of the parameters estimate.

Ut = Error Term.

$\delta 1$, $\delta 2$, and $\delta 3$, > 0

3.3 Results and Discussion

The research examined the impact of upstream oil and gas on economic growth in Nigeria during the period 1981 to 2020. An econometric model was constructed for the Nigerian economy. The constructed model has crude oil and gas, manufacturing, agriculture and trade (Independent variables) and GDP as the dependent variable. All the variables mentioned above are in million Naira (N'm) see appendix.

Table 3.1

Variable	Coefficient	t-ratio	P-value
Constant	65.43791	0.056286	0.9554
AG	1.783767	15.84373	0.0000
PE	0.752505	5.991128	0.0000
MG	1.378597	7.766885	0.0000
TR	2.271033	13.99344	0.0000

R-square = 0.998939	F = 8239.5999 (0.00000)	DW = 0.627939

The Economic growth models were estimated through Ordinary Least Squares (OLS). The result as depicted in table 4.1 above shows that economic growth (GDP) in the long run is positively associated with all the observed dependent variables. However, the value of petroleum and gas has the weakest linkage with coefficient of 0.752505.

A mere observation of the individual parameters reveals that all the variables were significant since their p-value is greater than 5% level of significance, except government expenditure which was not significant given the 5% level of significance and its P-value. The a priori expectation of the oil revenue is expected to be positive, which mean that the higher the level of revenue generated from oil, the higher the economic growth. The regression result showed that the coefficient is positive but not as significant as it was with the other variables such as agriculture, manufacturing and trade.

Table 3.2 Unit Root Stationarity Test (ADF)

Variable	ADF Test	5% Critical Value	Probability	Order of Integration
GDP	-2.772182	-2.941145	0.0718	Order one
CO	-5.736438	-2.941145	0.0000	Order one
MG	-4.311863	-2.941145	0.0015	Order one
AG	-4.897050	-2.941145	0.0003	Order one
TR	-1.336539	-2.941145	0.6025	Order one

The stationarity test presented in the table 1 above showed that at 5% levels of significance, the variable was stationary. From GDP, Petroleum and Natural Gas, Manufacturing, Agriculture and Trade were integrated of order one (first difference). Hence, the entire variables in this study are stationary. This therefore means that the best regression results will be obtained when the above variables are used to estimate the model. The reason for this is that using the OLS regression techniques at levels in estimating the model would lead to spurious regression results since some of the variables were not stationary.

Table3.3: Test of Co-integration

Eigen Value**	Trace Statistics*	5% Critical Value	Probability	Hypothesis of CE
0.593339	76.13412	69.81889	0.0143	None
0.370327	41.94264	47.85613	0.1603	At most 1
0.324767	24.36556	29.79707	0.1854	At most 2
0.163743	9.443073	15.49471	0.3260	At most 3
0.067311	2.647952	3.841465	0.1037	At most 4

**Trace test indicates 1 cointegrating eqn(s) at the 0.05 level*
***Max-eigen value test indicates 1 cointegrating eqn(s) at the 0.05 level*

From table 3.3 above, there are four co-integrating equations at 5% level of significance. This is because the Trace Statistics is greater than critical value at 5%. This is strong evidence from the unit root test conducted, where all the variables were stationary at order one. Therefore, there exists a long-run relationship or equilibrium among the variables. Given that there are four co-integrating equations, the requirement for fitting in an error correction model is satisfied.

Table 3.4: Granger Causality Tests

Variable	F-Statistic	P-value	Remarks
Agriculture to Real GDP	3.00209	0.0634	Neutrality
Real GDP to Agriculture	1.37010	0.2682	
Petroleum& Natural Gas to Real GDP	2.60946	0.0887	Neutrality
Real GDP to Petroleum & Natural Gas	2.35745	0.1104	
Manufacturing to Real GDP	8.54318	0.0010	Bi-directional
Real GDP to Manufacturing	6.55626	0.0040	Causality
Trade to Real GDP	0.49121	0.6163	Neutrality
Real GDP to Trade	1.48389	0.2415	
Petroleum & Natural Gas to Agriculture	2.79683	0.0755	Uni-directional
Agriculture to Petroleum & Natural Gas	7.18958	0.0034	Causality
Manufacturing to Agriculture	2.33782	0.1123	Uni-directional
Agriculture to Manufacturing	6.76769	0.0034	Causality
Trade to Agriculture	1.23544	0.3038	Neutrality
Agriculture to Trade	1.55290	0.2267	
Manufacturing to Petroleum & Natural Gas	2.22965	0.1235	Neutrality
Petroleum & Natural Gas to Manufacturing	0.56718	0.5726	
Trade to Petroleum & Natural Gas	1.40815	0.2589	Neutrality
Petroleum & Natural Gas to Trade	3.04225	0.0613	
Trade to Manufacturing	8.67839	0.0009	Uni-directional
Manufacturing to Trade	2.12615	0.1353	Causality

Granger causality test finds bi-directional causality between manufacturing and real GDP. It also confirms uni-directional causality from petroleum & natural gas to agriculture, manufacture to agriculture and trade to manufacturing. No causality was found between manufacturing and petroleum & gas, likewise between trade &petroleum.

4. Conclusion

The upstream oil and gas sector have the potential to contribute significantly to the economic growth of Nigeria. The results from this study showed that petroleum and gas sector have positive relationship with economic growth. The implication is that if revenue generated from oil is used effectively and efficiently in Nigeria, the impact on economic growth will be much higher than what is presently being experienced. Misappropriation of funds and reckless spending of revenue generated from oil has remained one of the major problems of Nigeria economy. Nigeria needs to improve on her trade with the rest of the world, the revenue generated from oil should be used judiciously to develop other sector of the economy most especially the agricultural sector and the manufacturing sector at large.

The Nigerian government should invest proceeds from petroleum & natural gas more on other sectors that has significant and direct bearing on the economy in order to improve country's economic growth. Government should give training on quality systems, technology development and directly acquire foreign technology for use to check crude oil thefts. Government should focus not only on petroleum revenue generation but should also re-direct

its attention to proper management of the revenue and effective control of necessary expenditure.

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