Journal of Social and Economic Statistics

Vol. 6, No. 1, Summer 2017

THE IMPACT OF OIL SHOCK ON NIGERIA ECONOMY: ASYMMETRY EFFECT ANALYSIS

AGYA ATABANI ADI[a], UDOH FRIDAY[b]

Abstract

The paper examined impacts of oil shock on Nigerian economy using quarterly time series data spanning from 1985:1 to 2016:2. Asymmetry GARCH methods were employed. GJR-GARCH and APARCH revealed leverage effect on the economy, which influences the economy negatively due to negative oil price shock and this, exerts more impact on the economy than positive shock of the same magnitude. There was symmetry effect on agricultural sector while leverage effect on manufacturing and service sectors in APACH and EGARCH implied negative shock has more impact than positive shock. We recommends that government should save windfall revenue earn when oil price is high and invest same in sovereign wealth fund to draw from when price fall. Government should take concrete steps by committing funds to petroleum downstream sub-sector to add value and move the nation away from commodity trading to finished products. Oil companies and government should increase investment in downstream sub-sector while government should develop gradual and sustainable tax regime to improve its tax receipt.

Keywords: Oil Dependency, Price shock and Nigeria Economy, Asymmetry effects and Way Forward.

JEL Classification: **Q, Q4, Q43**

Author's/Authors' Affiliation

[a] - School of Economics, Capital University of Economics and Business, Beijing, China, E-mail: atabaniadi@yahoo.com

[b] - Energy Economics, Policy and Management, Emerald Energy Institute, University of Port Harcourt, Nigeria

1. Introduction

Oil price swing intrigue ably has economic implications on both exporting and importing nations its consequence on the economy varies depending on the structure of the economy. Nigerian economy is not immune owing to the absence of resilience programs initiated by government to guide against unforeseeable shocks hitting the economy. Nigeria is the largest African country and the 6th largest producer of oil in the World. Her unguarded position made it vulnerable to oil glut, sophistication in technology and increase acceptability of green energy as environmentally friendly energy**.** This has edged the country gradually out of the once centre of peace and global energy market in recent times; depending on the magnitudes of action among key players in international oil market with its monolithic economy. This action, made the economy susceptible to forces in global oil and energy market. Nigeria economy is highly dependent on oil export as mainstay of the economy account for about 15% of GDP and 80% of government revenue, oil price shocks has diverse effect on the economy and sectoral output. For example a period characterized by upward swing tends to economic boom and oil price plunge tends to significant drop in economic activities. Persistent decrease in oil price has numerous consequence**s** on Nigerian government which includes decline in tax revenue payable by oil major in Nigeria. About 80% of government revenue comes from oil (Agbaeze, et al, 2014). A fall in oil price will inextricably link to a widening the gap between government revenue and expenditure, thus, increase borrowing and cost of debt servicing. For instance, debt service gulfed about 15% of aggregate government revenue in 2015 budget and is projected to gulf 30% of government projected revenue in 2016 fiscal year. This inhibits government ability to provide the much needed infrastructures to set the economy on sustainable growth path. Following the continuous decline in oil price, Nigeria foreign reserve that was $53.6 billion in 2008 declined to $29.5 billion as at December 15th 2015 and as at September 29th 2016 it's stood at $24.74 billion. The decline in foreign exchange reserve is linked to the shift in foreign exchange policy from narrow pegged exchange rate to flexible exchange rates (FX) policy. Owing to the fact that CBN cannot continue to defend the local currency, hence, the recent exchange rate depreciation from the pegged N197/$ in late May 2016 to N309.7/$ as at August 2016 monthly moving average reveals. The local currency has lost about 57.5% of its value and inflation has sour from single digit 9.6% in January 2016 to 17.69% in August 2016 almost 100% increase price adjustment within 8 month**s** and expected to be on upward trajectory in the coming days.

Bjornland (2009) outlined two transference channels in which oil prices for macroeconomic depicts the way in which oil exporting countries argued. That for oil producing countries, higher oil prices may influence the wealth in two ways:

(1) Through favorable income and fortune upshots, higher oil prices constitute swift transfer of wealth from oil importers to oil exporters and;

(2) Through unfavorable trade upshots, the oil importing trading associates will allow oil persuasive downturn, they will request less export of local goods and services from oil exporting countries which might have unfavorable upshot on the oil exporting countries.

The net upshot of these two channels, favorable wealth upshot and unfavorable trade upshot, is ambiguous. Brown and Yücel (2002) outline six channels in which oil price swing transmits impact to the economy; the supply side shock effect focused on the unfavorable influence on gross domestic product resulting from increase marginal production costs, caused by positive oil price shock which have negative impact on employment also resonance wealth transfer, indicating the transfer of wealth from oil importing countries to oil exporting countries, resulting in deteriorating terms of trade for oil importing country. Real balance effect occurs when there is an increase in oil prices. This, will lead to increase in money demand, where monetary authorities fail to increase money supply to meet growing money demand, there would be rise in interest rate and then retards economic growth vis-a-vis inflationary effect. Where inflation is caused by oil price increase, a contractionary monetary policy can deteriorate long term output by increasing interest rate and decreasing private investment. Sector adjustment affects labour cost via effect of oil price shocks from international market by changing relative production costs in some industries of course with unexpected impact. Udoh and Agya (2016) attests to this fact while commenting on government boldness in adopting a more flexible (or floating) foreign exchange regime, caution government that exchange rate adjustments alone may only provide temporary relief particularly if monetary and fiscal policies are not complementary and aim at inflation reduction. Udoh and Agya (2016) added that if government does not address the structural problems underlying the deterioration in balance of payment through enhanced production and productivity to reduce high dependence on importation, the economy is bound to be affected negatively.

This paper aimed at empirically investigating the effect of oil price shock on sectoral output in Nigeria, in order to ascertain the nature of oil price effect on sectoral output and determine whether favorable and unfavorable oil price thunderbolt has the same effects on aggregate economic activities in Nigeria.

The remainder of this article is organized thus: **s**ection II provides literature review in brief, section III present oil price shock measure and econometric methodology employed, Session IV present empirical results and discussion and section V concludes the paper and policy recommendations.

2. Literature Review

Akpan (2009) examines the dynamic association between oil price thunderbolt and major macroeconomic inconsistencies in Nigeria by applying VAR approach which indicates that favorable and unfavorable oil price thunderbolt notably intensify inflation and also straightaway increase the actual domestic income through higher export returns confirming that there is strong favorable association between favorable oil price switches and real government disbursement. Mgbame, Donwa and Onyeokweni (2015) also identify significant (positive) relationship between oil price volatility and Nigeria economic growth. Oil price change determines government expenditure level, rate of inflation, level of unemployment. This in turn, determines the growth of the economy. Olomola and Adejumo (2006) observe the upshots of oil price thunderbolt on gross domestic product, inflationary, money supply and actual exchange rate in Nigeria. He uses quarterly data from 1970 to 2003 and concludes that oil price thunderbolt do not have any considerable upshot on gross domestic product and inflationary rate. Oil price shocks determine real exchange rate and money supply in the long run. They agree that this may compress the tradable sector, as a result of rise in Dutch Disease. Nezir and Sabit (2015) used structural vector auto regression (SVAR) model by means of scaled. They found unfavorable oil price thunderbolt have a huge significance impact on Kazakhstan economic. Alley, et al (2014) suggest that oil price shocks insignificantly retards economic growth while an improved oil price market induces significant positive growth, especially to oil producing economies. Charles and Michael (2010) developed skeletal VAR prototype in which the unbalanced effect of oil shock on gross domestic product and price is analysed in a fusing prototype. They indicate that effect of oil price thunderbolt on gross domestic product and prices is unbalanced in nature. And further shows that, with the effect of oil price decreases remarkably greater than oil price surge, the price change plays significant role in determining variation in output and prices.

Park and Ratti (2007) states oil price surges have a considerable (or remarkable) impact on the economy than a decline in oil price. Aliyu (2009b) assessed the experiential upshots of oil price thunderbolt on the actual macroeconomic performance in Nigeria. In line with the procedures used in the literature, that is, ordering oil price as uneven and net oil price specifications. Granger causality tests and multivariate VAR analysis were carried out using both linear and non-linear specifications. Inter alia, the latter category includes two procedures used in the literature, namely, the uneven and net oil price specifications. The article evidences both linear and non-linear effect of oil price thunderbolt on the actual GDP. In particular, uneven oil price increases in the non-linear models are found to have favorable effect on the actual GDP growth of a larger enormity than uneven oil price decreases adversely alters real GDP. The non linear evaluation records remarkable result above the linear evaluation than the one reported earlier by Aliyu (2009a). Further utilized the Wald

and the Granger multivariate and bivariate causality tests results from the latter indicate that, linear price change and all the other oil price alterations are remarkable for the system as a whole. The Wald test indicates that oil price coefficients in linear and uneven identifications were statistically significant. Chen and Chen (2007) observed the effect of oil price thunderbolt on money supply and all-share index is unbalanced; it raises all-share index and money supply immediately. Thunderbolts on oil price (increase in oil price) contribute between 22.2- 32.2% to money supply, oil price decrease adds 18.1-86.5% of money supply and that oil price increase accounts for an average of 15.5% variation in real gross domestic product between 6 and 24 months horizon, while oil price decrease account for 93.2 on average the variation in actual gross domestic product. Hodo**,** et al (2013) attests to the fact that public investments, private investments and industrial production have unfavorable answer to oil price thunderbolt. He discloses that, government disbursement has swift answer favorably to oil price thunderbolt. This reaffirms the reality of Dutch disease in Nigeria and in short run government disbursement, exchange rate and indigenous investment will be affected by oil thunderbolt.

Mehrara (2008) studied asymmetric impacts of oil revenues on gross domestic product growth in 13 oil exporting economies: Colombia, Ecuador, Qatar, Algeria, Indonesia, Mexico, Libya, Kuwait, Iran, United Arab Emirates, Saudi Arabia, Nigeria and Venezuela using annual data from 1965 to 2004. He used two measures of oil thunderbolts dynamic panel analysis. Posit that, unfavorable oil thunderbolt has more effect than favorable oil thunderbolts. The adverse impacts of oil bust on economic growth were more long lasting while oil boom play limited role in invigorating economic growth. Monesa and Laila (unpublished) explore impacts of oil price thunderbolt on economic growth of six oil exporting countries, oil price shocks on GDP growth, inflation, investment and exchange rate. These were his findings; statistically, there are remarkable unfavorable effect of oil thunderbolt on GDP growth of Algeria, favorable effect of oil price thunderbolt on GDP growth of Venezuela, favorable effect of oil thunderbolt on inflation rate of Iran and unfavorable effect of oil thunderbolt on inflation rate of Venezuela while other variables and countries were statistically insignificant. Kutan and Wyzan (2005) examine the vulnerability of Kazakhstan to Dutch disease by evaluating the actual exchange rate equation that subsumes oil prices. Their results indicate that changes in oil prices have remarkable impacts on movements in the actual exchange rate, notably oil price increase leads to appreciation of actual exchange rate. They posit that an increase in the price of oil, which improves oil exporting country's terms of trade, would imply an increase in export revenues. This leads to an increased spending on all goods, which increases indigenous prices relative to foreign prices causing an increase in RER. Ayadi (2005) attest to this fact that, relationship between oil price changes and economic development via industrial production using vector auto regression model found in oil price changes, affect actual exchange rates and in turn affects

industrial production. The indirect impact of oil prices on industrial production is statistically insignificant. He concludes that an increase in oil prices does not lead to an increase in industrial production in Nigeria.

There has been research on oil price impact on Nigeria economic and other exporting countries on aggregate level and other macroeconomic variable in these countries however, none of these paper took micro dimension by analysing oil price effects on sectoral output of the economy also there wasn't research that applied asymmetry GARCH method to determined how positive and negative oil price shocks impact on the economy at micro and macro level particularly in Nigeria.

3. Methodology and Measure of Oil Shock

3.1. Oil shock measure

There are three method of measuring oil price shock in literatures developed by Mork (1989), Lee, et al. (1995) and Hamilton (2003) due to the advantage of Lee, et al (1995), the method allows differentiation of different signs and objective of determining how positive and negative oil price shocks affect sectoral and aggregate output. Thus, this methodology is employed using asymmetry GARCH model to estimate the impact of oil shocks on the aggregate and sectoral out.

This model focuses on identifying non-linear unexpected changes in oil prices and its effect on aggregate and sectoral output in Nigeria.

Lee, et al. (1995):

$0_t^{\pm}$ is a measure of adjusted volatility increase in the real oil price.

$$\mathrm{O}_t^{\pm} = \begin{cases} \mathrm{O} if \ \dfrac{\mathrm{O}_t^R}{\sqrt{h_t}} \le \mathrm{O} \\ \dfrac{\mathrm{O}_t^R}{\sqrt{h_t}} if \ \dfrac{\mathrm{O}_t^R}{\sqrt{h_t}} > \mathrm{O} \end{cases}$$

where 0_t^R is the real price of oil; $\sqrt{h_t}$ is estimated from GARCH (1,1);

$$0_t^R = \beta_0 + \beta_1 0_{t-1}^R + \beta_2 0_{t-2}^R + \beta_3 0_{t-3}^R + \beta_4 0_{t-4}^R + e_t \qquad (1)$$

$$e_t = \sqrt{h_t} v_t \quad with \quad v_t \square N(0,1) h_t$$

$$h_t = C_0 + \gamma e_{t-1}^2 + \mu h_{t-1}$$

The change in real price of oil 0_t^R =0_t- Δ 1n P_t. 0_t is percentage change in nominal price of oil and Δ ln p_t is change in inflation rate. Akaike information criteria is use to determine the appropriate lags length.

3.2. Estimate of Oil shocks' effects on the Nigeria Economy

To estimate the measure of oil shocks, the measure of shocks should capture the unexpected swings in oil prices. Using the propose oil price shock measure by Lee *et al*. (1995). We use the real price of oil as a starting variable and estimate the following model:

$$0_t^Q = \beta_0 + \beta_1 0_{t-1}^Q + \beta_2 0_{t-2}^Q + \beta_3 0_{t-3}^Q + \beta_4 0_{t-4}^Q + e_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 2$$

where 0_t^Q is the real price of crude oil; $\sqrt{h_t}$ is estimated through GARCH (1,1):

$$h_t = C_0 + \gamma e_{t-1}^2 + \mu h_{t-1}$$

$$e_t = \sqrt{h_t} v_t \quad with \quad v_t \square N(0,1) h_t$$

The measure of oil-shock is defined as $0_t^{shock} = \frac{e_t}{\sqrt{h_t}}$, the normalized residual from equation (2).

3.3. Data description and source

Y_t is quarterly real total GDP, Agricultural sector output, manufacturing sector output and service sector output for the period 1985:1 to 2016:2 were in nominal terms measure in millions of Naira and deflated by GDP deflator and sourced from Central bank of Nigeria (www.cenbank.gov.ng) and oil price measured in US Dollar per barrel obtained from United Nation Conference on Trade and Development (www.unctad.org).

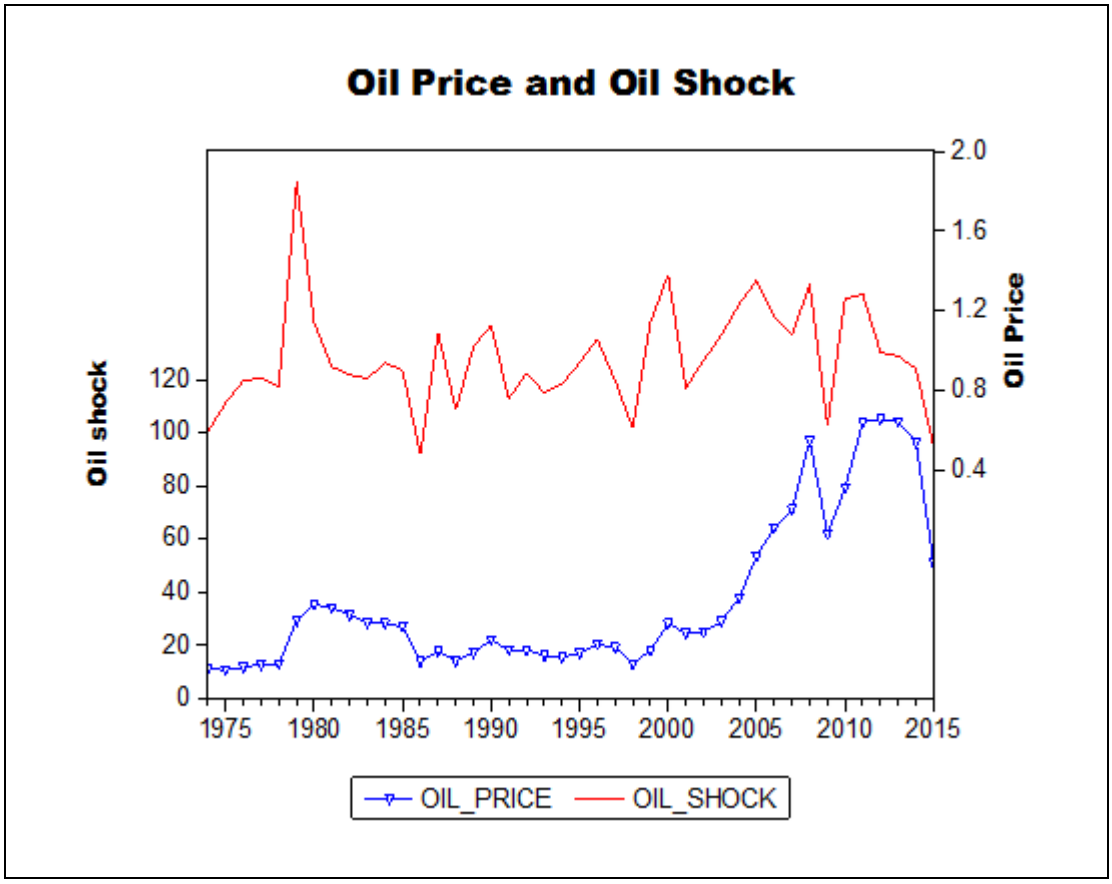

Figure 1.

Source: Author's computation.

Figure 1 shows Crude petroleum, average of UK Brent (Light), Dubai (Medium) and Texas (heavy), equally weighted ($/barrel) as well as measure of oil shocks. Oil price has been unstable during the sample period, the trough was in 1998 and peaked in 2013, Figure 1 shows the Crude petroleum, average of UK Brent (Light), Dubai (Medium) and Texas (heavy), equally weighted ($/barrel) as well as measure of oil shocks. Oil price has been unstable during the sample period, the trough was in 1998 and peaked in 2013, these represent Asian financial crisis and crisis in Russian financial system that leads the world market into turmoil and disruption in oil production in Middle East as a result of civil war in some countries in this region and the rebounding of world economy after the financial crisis in 2009.

4. Result and Discussion

Table 1 shows descriptive statistics of GDP, Agricultural, Manufacturing, Service and Oil price with GDP having the highest mean value measure in millions of Naira while oil price was the least measure in US dollar per barrel, the standard deviation of these variables from their means and a measure of volatility shows GDP was the most volatile and oil price least

volatile of all the variables. The skewness were all positive implied the distribution are positive skew relative to normal distribution of 0 for normal distribution and kurtosis for GDP and agriculture are larger than normal distribution of 3. The Jarque-Bera normality test reject the null hypothesis of normality for all the variable indicating that the variables were not normally distributed as all the test are significant at 5 percent significance level.

Table 1. Descriptive statistics.

	GDP	AGRIC	MAN	SER	OIL_PRICE
Mean	2803774.	926876.7	11170.23	2722.74	49.43
Median	1175148.	433339.3	8287.10	1353.71	30.21
Maximum	11532122	4455931.	29435.71	8946.87	156.50
Minimum	23982.43	8045.67	3145.82	582.84	10.70
Std. Dev.	3314480.	1117799.	7120.26	2303.84	39.11
Skewness	1.20	1.36	1.10	0.97	1.06
Kurtosis	3.18	3.93	2.95	2.58	2.70
Jarque-Bera	28.04	39.95	23.74	19.05	22.41
Probability	0.000	0.000	0.000	0.000	0.000
Observations	116	116	116	116	116

Source: Author's computation with e-views.

Table 2. Unit Root Test.

Level	**ADF**		**PP**		
Variables	**Test Statistics**	**5% Critical Value**	**Test Statistics**	**5% Critical Value**	**Result**
Oil Price	-2.425 (0.365)	-3.446	1.612 (0.473)	-3.449	I(1)
GDP	1.005 (0.999)	-3.446	0.798 (0.999)	-3.449	I(1)
AGRIC	4,955 (1.000)	-3.446	-1.582 (0.794)	-3.449	I(1)
MAN	-1.816 (0.689)	-3.446	-2.226 (0.198)	-3.449	I(1)
SERVICE	-1.354 (0.868)	-3.446	-2.316 (0.422)	-3.449	I(1)
1st Difference					
Oil Price	-9.717 (0.000)	-1.943	-9.843 (0.000)	-1.943	I(0)
GDP	-3.940 (0.013)	-1.943	-9.152 (0.000)	-1.943	I(0)
AGRIC	-6.283 (0.000)	-1.943	-11.238 (0.000)	-1.943	I(0)
MAN	-3.904 (0.000)	-1.943	-19.879 (0.000)	-1.943	I(0)
SERVICE	-3.704 (0.000)	-1.943	-13681 (0.000)	-1.943	I(0)

Note: figure in parentheses Mackinnon (1999) one sided p-value

Source: Author's computation with e-views.

Table 2, showed unit root test result for the variables, the variable are not stationary at level and became stationary at first difference, this imply that all variable are order one I(1) series.

Table 4. Result of Asymmetry and Leverage Effect.

Coefficients	Real GDP			Agric Sector			Manufacturing Sector			Service Sector		
Mean Eq.	**GJB-GARCH**	**EGARCH**	**APARCH**	**GJB-GARCH**	**EGARCH**	**APARCH**	**GJB-GARCH**	**EGARCH**	**APARCH**	**GJB-GARCH**	**EGARCH**	**APARCH**
Constant	0.99 (0.01)	-46 (19)	-45 (14)	0.99 (0.01)	-25 (62)	-25 (51)	0.99 (0.01)	31 (19)	48 (26)	0.98 (0.01)	69 (11)	73 (99)
Oil Shock		33 (17)	33 (13)		12 (59)	12 (47)		45 (19)	63 (25)		41 (11)	19 (94)
Variance Equation												
ϖ	0.02 (0.02)	27.79 (6.63)	1.06 (1.19)	0.00 (0.00)	25 (6.06)	1.20 (1.11)	0.02 (0.02)	9.19 (1.80)	49 (1.25)	0.02 (0.007)	1.25 (1.37)	51 (1.98)
α	0.15 (0.23)	0.89 (0.72)	0.49 (0.8)	0.08 (0.13)	0.86 (0.62)	0.33 (0.42)	0.14 (0.23)	0.89 (0.34)	0.33 (1.17)	0.13 (0.10)	1.57 (0.73)	0.86 (1.23)
β	0.08 (0.91)	0.04 (0.21)	0.59 (0.37)	0.55 (0.43)	0.05 (0.20)	0.73 (0.41)	0.07 (0.81)	0.39 (0.11)	-0.5 (0.33)	-0.004 (0.25)	0.79 (0.11)	0.17 (0.77)
γ	**0.02* (0.01)**	**-0.48 (0.49)**	**0.12* (0.03)**	**0.00 (0.01)**	**0.50 (0.46)**	**-0.15* (0.07)**	**0.04* (0.01)**	**-0.78* (0.26)**	**0.84* (0.41)**	**0.03 (0.03)**	**-0.41* (0.02)**	**0.64* (0.28)**
δ			2.39 (8.42)			2.44 (7.66)			2.09 (3.03)			2.37 (5.63)
LL	50.914	-18875.9	-1862.0	46.97	-1748.7	-1734.7	50.35	-1133.6	-1166.7	45.66	-9.38.9	-136.69
Persistence	0.23	0.93	1.08	0.63	0.91	1.06	0.21	1.28	-0.17	0.126	2.36	1.03
AIC	-0.774	32.46	32.24	-073	30.27	30.05	-0.76	19.66	20.25	-070	16.31	18.01
SC	-0.631	32.46	32.43	-0.59	30.43	30.23	-0.62	19.83	20.44	-0.58	16.47	18.20
HQC	-0.716	32.63	32.31	-0.67	30.33	30.12	-0.71	19.73	20.33	-0.65	16.37	18.08
N	116	166	116	116	116	116	116	116	116	116	116	116

Table 4 shows the coefficients of γ, that the asymmetry and leverage effects are positive and statistically significant at 5% level in the GJR-GARCH and APARCH models but negative and insignificant in the EGARCH model for Real GDP. However, leverage effect will only exist if $\gamma > 0$ in the GJR-GARCH and APARCH models and $\gamma < 0$ in the EGARCH. In view of the insignificant γ in EGARCH, we cannot reject the null hypothesis of leverage effect in GJR-GARCH and APARCH. However, we will reject leverage effect in EGARCH and accept the symmetry effect in EGARH. Implying, there is a leverage effect on the economy, negative shocks of oil price having more impact than positive shock of the same magnitude. Consistent with finding of Omar and David (2010) reveals. For Agric sector the GJR-GARCH and EGARCH are positive and statistically insignificant implying the rejection of both symmetry and leverage effect while APARCH is negative and significant we reject leverage effect and accept the hypothesis of symmetry effect in Agric sector. This result is not surprising as the agricultural sector is in subsistent state in Nigeria.

For manufacturing sector, GJR-GARCH and APARCH are positive. They are statistically significant while EGARCH is negative and significant. We accepting the hypothesis of leverage effect in the manufacturing sector implied that a negative price shock has more impact on manufacturing sector than a positive shock of the same magnitude all this being equal. For service sector GJR-GARCH is positive and insignificant while APARCH is positive and significant hence we accept symmetry and reject leverage effect for GJR-GARCH. Accepting that the leverage effect for APARCH and EGACH is negative and significant, we accept the hypothesis of leverage effect.

4.1. Diagnostic Test

Table 5 shows diagnostic test result for all models, Ljung-Box Q^2-statistics of the squared standardized residuals are insignificant at 5% level for all lags, for GJR-GARCH and APARCH models implying absence of ARCH in variance equation for GJR and APARCH model. The ARCH-LM test statistics for GJR-GARCH and APARCH models further confirmed that standardized residuals did not have ARCH effect any longer. This shows that the variance equations are well specified in these models while EGARCH model and associated lags, the ARCH-LM test are significant implying the present of ARCH in this model. The Jarque-Bera statistics shows that standardized residuals for all models are not normally distributed validated the used of students in our estimation process for all models. In summary, only GJR-GARCH and APARCH models are adequate for forecasting.

Table 5. Autocorrelation of Squared Standardized Residuals and ARCH LM test.

Model	LJung Q^2 Statistics			LM-ARCH		
GDP	$Q^2(6)$	$Q^2(12)$	$Q^2(20)$	F-ST	$N*R^2$	JB
GJR-GARCH	1.555 (0.956)	2.403 (0.998)	9.037 (0.982)	0.051 (0.820)	0.052 (0.818)	73.883 (0.000)
E GARCH	134.30 (0.000)	199.15 (0.000)	219.11 (0.000)	13.547 (0.000)	12.311 (0.000)	10.807 (0.004)
AP ARCH	4.4300 (0.619)	8.4997 (0.745)	17.765 (0.603)	0.038 (0.844)	0.039 (0.842)	9.904 (0.007)
AGRICULTURE						
GJR-GARCH	1.389 (0.966)	2.201 (0.999)	5.217 (1.000)	0.121 (0.728)	0.123 (0.725)	142.730 (0.000)
E GARCH	139.71 (0.000)	199.38 (0.000)	214.59 (0.000)	16.757 (0.000)	14.852 (0.000)	15.419 (0.000)
AP ARCH	6.401 (0.380)	12.445 (0.411)	25.914 (0.169)	0.053 (.817)	0.0544 (0.815)	11.552 (0.000)
MANUFACTURING						
GJR-GARCH	10.157 (0.118)	20.158 (0.064)	30.613 (0.061)	0.001 (0.965)	0.002 (0.965	32.229 (0.000)
E GARCH	29.160 (0.000)	32.545 (0.001)	36.250 (0.014)	0.000 (0.991)	0.000 (0.991)	0.834 (0.658)
AP ARCH	16.930 (0.010)	20.196 (0.063)	25.267 (0.191)	1.595 (0.209)	1.602 (0.205)	8.006 (0.018)
SERVICE						
GJR-GARCH	1.101 (0.981)	1.4646 (1.000)	6.4888 (0.998)	0.030 (0.862)	0.031 (0.861)	33.084 (0.000)
E GARCH	17.434 (0.008)	32.370 (0.001)	36.687 (0.013)	0.255 (0.614)	0.255 (0.610)	11.468 (0.003
AP ARCH	6.0062 (0.422)	10.366 (0.584)	21.147 (0.389)	1.611 (0.206)	1.617 (0.204)	11.550 (0,003)

Note: figure in parentheses are p-value.

5. Conclusion and recommendations

The paper examines the impact of oil shock on Nigeria economy using quarterly data, spanning period 1985:1-2016:2. We employed both ADF and PP unit root test, the variables were integrated of order one I(1) and asymmetry GARCH models were employed.

The test for asymmetry or leverage effect, there was leverage effect in GJR-GARCH and APARCH and rejects leverage effect in EGARCH and accept symmetry effect in EGARCH. Implying, there is leverage effect on the economy. Negative shock of oil price has more impact than positive shock of the same magnitude. In fact, this result is consistent with findings for exporting countries e.g. [Omar and David (2010) for Venezuela; Mehrara (2008) for 13th Oil exporting country]. For Agricultural sector the GJR-GARCH and EGARCH are positive and statistically insignificant both symmetry and leverage effect were rejected. APARCH is negative and significant, reject leverage effect and accept symmetry effect in Agric sector. For manufacturing sector GJR-GARCH and APARCH has positive statistically significant while EGARCH is negative and significant, leverage effect exists in

manufacturing sector. For service sector GJR-GARCH is positive insignificant while APARCH is positive significant hence, we accept symmetry and reject leverage effect for GJR-GARCH and accept leverage effect for APARCH and EGARCH has negative significant and accept null of leverage effect. We recommend that government should save windfall revenue derived, when oil price is high and invest same in sovereign wealth fund to be drawn from when oil price falls, government should move from rhetoric go beyond talking by taking concrete steps by committing funds to petroleum downstream sub-sector to add value and move the nation from a mere commodity trading to finished products that is aim at diversifying the economy away from mono economy and oil dependence and oil companies and government should increase revenue source by investing in downstream sub-sector while government should develop gradual yet sustainable tax regime to improve its tax receipt.

References

Agbaeze, E., Udeh, S. and Onwuka, I. (2015). Resolving Nigeria's dependency on oil the derivation m model. [Online]. (URL http://www.academicjournals.org/). *Research Journal of African, Studies and Developmen*t, **7**(1). (Accessed 12 September 2016).

Akpan, E. (2009). Oil price shocks and Nigeria's macro-economy. *A Paper Presented at the Annual Conference of CSAE Conference, economic development in Africa,* Oxford, May 23-24 2009. Oxford: St. Catherine's College.

Aliyu, S (2009a). Impact of Oil price shock and exchange rate volatility on economic growth in Nigeria: An empirical investigation. *Research Journal of International studies,* **11**, pp 4-15.

Aliyu, S. (2009b). Oil Price Shocks and the macro-economy of Nigeria: A Non-linear Approach. [Online]. (URL http://mpra.ub.uni-muenchen.de/18726). Unpublished (Accessed 24 July 2016).

Alley, L., Asekomeh, A., Mobolaji, H. and Adeniran, Y. (2014). Oil price shocks and Nigerian economic growth. *European Scientific Journal*, **10**(19), pp. 1857-7881.

Ayadi, O. F. (2005). Oil price fluctuations and the Nigerian economy. [Online]. (URL https://www.researchgate.net/publication/4778688). *OPEC Review*, 29(3). (Accessed 19 August 2016).

Bjornland, H. (2009). Oil price shocks and stock market booms in an Oil exporting country. *Scottish Journal of Political Economy*, **56**(2), pp. 232-254.

Brown, S. and Yücel, K. (2002). Energy prices and aggregate economic activity: an interpretative survey. *Quarterly review of economics and finance*, **42**, pp.193–208.

Charles, N. and Michael, A. (2010). The asymmetric effects of Oil price shocks on output and prices in Nigeria using a structural VAR Model. *Central Bank of Nigeria Economic and Financial Review*, **4**(1), pp.1-32.

Chen, H. and Chen, C. (2007). Oil prices and real exchange rate. *Energy Economics,* **29**, pp. 390-404.

Cunado, J. and de Gracia, F. P. (2003). Do Oil price shocks matter? Evidence for some European countries. *Energy Economics,* **25**(2), pp. 137-15.

Hamilton, J. (2003). What is an Oil shock?. *Journal of Econometrics,* **113**, pp. 363-398.

Hodo, B., Akpan, E. and Amenawo, I. (2013). Asymmetric effect of Oil price shocks on exchange rate volatility and domestic investment in Nigeria. [Online]. (URL www.sciencedomain.org). *British Journal of Economics, Management and Trade,* **3**(4). (Accessed 15 September 2016).

Jimenez-Rodriguez, R. and Sanchez, M. (2005). Oil price shocks and real GDP growth: empirical evidence for some OECD countries. *Applied Economics*, **32**(2), pp. 201-228.

Kutan, A. and Wyzan, M. (2005). Explaining the real exchange rate in Kazakhstan 1996-2003: is Kazakhstan vulnerable to the Dutch disease?. *Economic Systems*, **29**, pp. 242-255.

Lee, K., Shawn, N. and Ratti, R. (1995). Oil Shocks and the macro-economy: The Role of Price Variability. [Online]. (URL http://mpra.ub.uni-muenchen.de/18726) *Energy Journal*, **16**. (Accessed 16 August 2016).

Mgbame, C., Donwa, P. and Onyeokweni, O. (2015). Impact of oil price volatility on economic growth: Conceptual perspective. [Online]. (URL www.allsubjectjournal.com) *International Journal of multidisciplinary research and development*, 2(9). (Accessed 15 July 2016).

Monesa, and Laila, T. (unpublished). The effects of Oil price shocks on economic growth of Oil exporting countries: A case of six OPEC economies, [Online]. (URL googlescholar.com). (Accessed 26 July 2016).

Mork, K. (1989). Oil and the macro-economy when prices go up and down: An extension of Hamilton's Results. *Journal of political economy*, **97**, pp. 740-744.

Nezir, K. and Sabit, B. (2015). The Asymmetric impact of Oil price shocks on Kazakhstan macroeconomic dynamics: A structural vector autoregression approach. *International Journal of Energy Economics and Policy*, **5**(4), pp. 1058-1064.

Olomola, P. and Adejumo, A. (2006). Oil prices and macro-economic activities in Nigeria. *International Research Journal of Finance and Economics*, **3**, pp. 28-34.

Omar, M. and David, V. (2010). The asymmetric effects of Oil shocks on an Oil-exporting Economy. *Cuadernos De Economía*, **47**, pp. 3-13.

Udoh, F. and Agya, A., A. (2016). FX floating regime: Economists ask FG to strengthen productive sector, *Business Day Newspaper*, Lagos, Friday 24 June 2016, Business South-South/South East column

www.cenbank.gov.ng

www.unctad.org.com