DYNAMIC EFFECT OF OIL PRICE SHOCKS, INFLATION RATE AND EXCHANGE RATE ON ECONOMIC GROWTH IN NIGERIA FROM (1980 - 2014)

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Abstract

This research work examined the dynamic effect of oil price shocks, inflation rate and exchange rate on economic growth in Nigeria from 1980 to 2016. Several tests such as descriptive statistics, autoregressive conditional heteroskedasticity (ARCH) test, unit-root test and co-integration was performed to examine the data characteristics. The tests were done to see whether estimation technique of generalized autoregressive conditional heteroskedasticity (GARCH) will be appropriate. The variance equation of the GARCH model was done to capture the oil price shock and volatility of the exchange rate volatility. The results revealed that a one percentage point increase of Brent decreases gross domestic product by -0.005617% points and it shows that Brent oil shock has a very weak but negative impact on gross domestic product. An increase in Brent oil shock will cause a very small decrease in gross domestic product. Also, a one percentage point increase of West Texas Intermediate decreases gross domestic product by -0.055037% points and it implied that West Texas Intermediate has a very weak but negative impact on gross domestic product. An increase in currency volatility will cause a very small increase in gross domestic product. Furthermore, a one percentage point increase of exchange rate volatility decreases gross domestic product by -0.000149% and it showed that currency volatility has a very weak but negative impact on gross domestic product. An increase in currency volatility will cause a very small increase in gross domestic product. The position of this study is that if oil price shock and volatility of the exchange rate volatility increase within the period covered in this study, gross domestic product also decreases and vice versa. Thus, increase in gross domestic product can occur by stability in oil price and exchange rate in Nigeria. Therefore, the followings recommendation were given: (1) there should be a proper management of macroeconomic goal especially the stability of the exchange rate in other the control the oil price shock in the country so that there will be an increase in the growth of the GDP in the county. (2) Higher revenue gotten from increases in oil prices should be invested into different areas of the economy as the exchange rate of a country is influenced by prevalent economic conditions. (3) Since Nigeria remains oil dependent economy and the consequences of oil price shocks and volatility of the exchange rate on the economy are real since oil remains the major foreign exchange earner for the country. Nigeria government should therefore look for new ways to diversify the economy into, from dependence on oil and explore other sectors like manufacturing sector and agricultural sector and other productive sector to reduce the effect of uncertainties in the economy and (4) If Nigeria wants to achieve sustainable growth in the short run, it should give paramount importance to oil price and exchange rate management policies. Hence, if exchange rate policy is to succeed, the government must fashion out the right policies conducive for the growth of the economy.

Keywords: Brent, West Texas Intermediate, Inflation Rate, Exchange Rate and Economic Growth

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1.1 Introduction

Since the dramatic oil price spikes of the 1970s' and the consequent global recession, economists have analyzed oil price fluctuations in order to understand their economic impact [1]. Following a slump in oil prices in 2009 which caused a large contraction in the value of Nigeria's exports to US$28.2 billion, from US$76.3 billion in 2008, the CBN embarked on "emergency" measures to bolster the liquidity of the system by easing the monetary policy rate from 9.75% to 8 percent. It has cut the cash reserve requirement for banks by half, from 2% to one percent and banks' minimum liquidity ratios by 5% to 25 percent. These emergency measures are aimed at improving liquidity conditions in the domestic economy as well as responding to the complex mix of external and domestic financial developments affecting Nigeria. However, higher oil prices have diverse effects across country groups.

However, several theories have been review which include, the linear/symmetric relationship theory of growth which was propounded by [3], [12], postulated that changes in economic growth is driven by oil price volatility. They hinged their theory on the happenings in the oil market and its impact on the economies of oil-exporting and importing countries respectively. Furthermore, the asymmetry-in-effects theory of economic growth in their submission posits that the correlation between crude oil price decreases and economic activities in an economy is significantly different and perhaps zero [9]. Members of this school of thought such as [13] in a study of some African countries confirmed the asymmetry in effect of oil price volatility on economic growth. Lastly is the exhaustible resources theory which was propounded by Hotelling in 1931. He advocated the need to price oil and other fossil resources in a way that recognizes the temporariness of their availability. According to this theory, the price becomes a user cost or depletion charges which compensate for the fact that future generation are denied access to the commodity. This price may or may not be consistent with the equilibrium outcome of demand and supply.

For instance, in the case of an oil importing country, higher oil price is a negative shock as it contracts output and increases inflation in the economy and also affect exchange rate. For an oil exporting country, a rise in oil prices is a positive shock which boosts the domestic economy, but in general leads to higher inflation [15]

Perhaps, in Nigeria from 1974 to 1978 crude oil prices were relatively stable ranging from $12 to $14 per barrel. Then between 1979 and 1980 during the Iranian revolution and Iraq war, the world oil production fell by 10 percent and caused the rise of crude oil price from $14 to $35 per barrel. Increasing oil prices forced leading consumers and firms to adopt a more conserve energy, people purchased cars that could manage fuel and organizations purchased machine that were more fuel efficient. Increased oil price also enlarged search and production by nations that were not members of OPEC. Beginning from 1982 to 1985 OPEC wanted to stabilize the price of oil through production of quotas, but safeguarding efforts, global economic meltdown and wrongful quotas produced by OPEC participant countries contributed to the plunging of oil prices beneath $10 per barrel. From the Mid-1980s the fluctuations in the price of oil has occurred more frequent than the past. OPEC has continually been trying to influence oil price to ensure its stability through allocation of production quotas to its member countries but has been unable to stabilize it; as OPEC share of the world oil production has fallen from 55 percent in 1976 to 42 percent today. Oil prices matter in the economy in various ways; changes in oil price directly affect transportation costs, heating bills and the prices of goods made with petroleum products. Oil price spikes induce greater uncertainty about the future, which affects households and firms spending and investments decisions. Also changes in oil prices leads to reallocations of labour and capital between energy intensive sectors of the economy and those that are non-energy intensive sector [22]. Therefore, this study is set to investigate the dynamic effect of oil price shocks, inflation rate and exchange rate on economic growth in Nigeria from (1980 - 2014) by using generalized autoregressive conditional heteroskedasticity(GARCH) estimation technique.

The study is organized into five sections. Section one covers the introduction and section two covers the empirical review. Section three focuses on theoretical framework and methodology while section four deals with empirical analysis. Finally, section five deals with summary and conclusion.

2 Empirical Review

[21] emphasized that a considerable body of economic literature shows the adverse economic impacts of oil-price shocks for the developed economies. However, there has been a lack of similar empirical study on China and other developing countries. The paper attempts to fill the gap by answering how and to what extent oil-price shocks impact China's economy, emphasizing on the price transmission mechanisms. To that end, the study developed a structural vector auto-regressive model. The study results showed that an oil-price increase negatively affects output and investment, but positively affects inflation rate and interest rate. However, with price control policies in China, the impact on real economy, represented by real output and real investment, lasts much longer than that to price/monetary variables. The study decomposition results also showed that the short-term impact, namely output decrease induced by the cut in capacity–utilization rate, is greater in the first 6 periods (namely half a year), but the portion of the long-term impact, defined as the impact realized through an investment change, increases steadily and exceeds that of short-term impact in the 7th period. Afterwards, the long-term impact dominates, and maintains for quite some time.

[17] emphasized that High Oil price fluctuations have been a common feature in Nigeria and these have considerably constituted a major source of fiscal policy disturbance to the Nigerian economy as well as the economies of other oil producing countries of the world. The over-reliance on oil production for income generation combined with local undiversified revenue and export bases is an issue for concern. This has policy implications for economic policy and in particular fiscal policy management. The motivation for the study is to examine the effect of oil price shock on fiscal policy in the country. Using structural vector auto-regression (SVAR) methodology, the effects of crude oil price fluctuations on two major key fiscal policy variables (government expenditure (GEXP) and government revenue (GREV)), money supply (MS2) and GDP were examined. The

results showed that oil prices have significant effect on fiscal policy in Nigeria within the study period of 1980:1 to 2009:4. The study also revealed that oil price shock affects GREV and GDP first before reflecting on fiscal expenditure.

[8] examined the macroeconomic implications of symmetric and asymmetric oil price and oil revenue shocks in Nigeria, using the vector autoregressive (var) estimation technique. The paper found that both positive and negative oil price shocks influence real government expenditure only in the long run rather than in the short run, while examining positive and negative shocks to external reserves revealed stronger implications for expenditure in the long run, with positive rather than negative oil price shocks having stronger short and long run effects on real GDP, and therefore triggering inflationary pressure and domestic currency depreciation as importation rises. This implies that the country exhibits the Dutch disease syndrome in the short and long run. However, results obtained show that oil revenue shocks are capable of impeding economic growth only in the long run while raising general price levels marginally in the short run after the initial shocks, with evidence of serious threat to interest rate and the domestic currency in the short and medium term, as the volume of imports increases significantly along with the external reserves. Findings on the asymmetric effects of oil revenue shocks revealed that positive shocks to oil revenue stimulate expansionary fiscal posture in the Nigerian economy in the short run in line with theory, thereby creating inflationary pressure and domestic currency depreciation.

[4] adopted a structural co-integrated VAR model has been considered for Nigeria in order to study the direct effects of oil price shocks on the economy and the reaction of monetary variables to external shocks using a times series data from 1970 - 2010.Empirical analysis indicates that there is a long run relationship involving oil prices, inflation rate, treasury bill rate, exchange rate, interest rate and money supply in Nigeria. The study found that an unexpected oil price shock is followed by an increase in inflation rate and a decline in exchange rate and interest rate in Nigeria.

[9] employed the general methods of moment (GMM) to examine the impact of oil price shocks on the Nigerian economy, using data from 1981 to 2012. After appropriate robustness checks, the study found out that oil price shocks insignificantly retards economic growth while oil price itself significantly improves it. The significant positive effect of oil price on economic growth confirms the conventional wisdom that oil price increase is beneficial to oil-exporting country like Nigeria. Shocks however create uncertainty and undermine effective fiscal management of crude oil revenue; hence the negative effect of oil price shocks.

[1] assessed the impact of oil price fluctuations on the UK economy. The study used an empirical strategy which allows us to decompose oil price changes from the underlying source of the shock. The results show that, since the mid-1970s, oil price movements have been mainly associated with shocks to oil demand rather than oil supply. The study also found that the consequences of oil price changes on UK macroeconomic aggregates depend on the different types of oil shocks. While increases in global real economic activity do not depress the UK economy in the short run, shortfalls in crude oil supply cause an immediate fall in GDP growth. In addition, since monetary policy depends on the nature of the shock hitting the oil market, domestic inflation increases following a rise in the real oil price. Finally, the study results also show that in response to oil price increases, the government deficit decreases.

[13] investigated the impact of crude oil price volatility on economic growth in Nigeria from 1970 to 2014. The study aims at extending the frontier of knowledge by estimating the impact of the oil price volatility on the Nigerian economic growth using aggregate demand framework that theoretically connect analytical variables, rather than just explaining output behaviour by oil price and host of arbitrarily variables as done by earlier studies. The study adopted Engel-Granger co-integration test and Granger Representation theorem in testing the long run and short run relationships between crude oil volatility and economic growth respectively. The study found that, oil price volatility (OPV) has negative impact on the economic growth while other variables such as crude oil price, oil revenue and oil reserves have positive impact on the Nigerian economy.

[19] examined the effect of oil price movements on USD-Naira exchange rate pair using 420 observations from monthly time series data for the period January 2008 to December 2014. An ordinary least squares (OLS) model and a vector autoregression (VAR) model were estimated for analyzing respectively, the impact of oil price movements on exchange rate and the nature of causal link between them. Empirical results show that oil prices on a relative basis significantly affect exchange rate compared to imports. Also, there is evidence of unidirectional Granger causality from oil prices to exchange rate and from oil prices to foreign reserves.

[14] evaluated different channels of oil price pass through into inflation for the countries Azerbaijan, Kazakhstan and Russia. The study proposed a methodology to disentangle the effects of different channels after an oil price shock hits international markets. The study measure the relative importance of the two distinct channels through which oil price shocks are transmitted into inflation in these economies. For that, the study employed an approach which is in the spirit of the methodology proposed by Sims and Zha (1995). The empirical evidence showed that the level of inflation in these oil-exporting countries responds significantly to oil price shocks. The fiscal and cost channels are major amplifiers of the effects of oil price shocks on

inflation. By providing new evidence from emerging oil-exporting countries, the paper also has important policy implications on the maintenance of price stability by central banks.

[6] examined the effect of oil price movements on USD-Naira exchange rate pair using 420 observations from monthly time series data for the period January 2008 to December 2014. An ordinary least squares (OLS) model and a vector auto-regression (VAR) model were estimated for analyzing respectively, the impact of oil price movements on exchange rate and the nature of causal link between them. Empirical results show that oil prices on a relative basis significantly affect exchange rate compared to imports. Also, there is evidence of unidirectional Granger causality from oil prices to exchange rate and from oil prices to foreign reserves.

3. Theoretical Framework and Methodology

The theoretical framework for this study is based on linear/symmetric relationship theory of growth which opined that change in economic growth is driven by oil price volatility. This study will be different from the past study divided the price of oil into two which are Brent and West Texas Intermediate and also other shock like inflation rate and exchange rate will be consider on gross domestic product.

3.1 Model Specification

Three macroeconomic variables are used as regressors to estimate the dynamic effect of oil price shocks, inflation rate and exchange rate on economic growth in Nigeria.

NGDP = f(BRENT, WTI, INFR & EXCHR) - …….…….…… (3.1)

Where

NGDP = Nominal Gross Domestic Product
BRENT = Brent
WTI = West Texas Intermediate
INFR = Inflation Rate
EXCHR = Exchange Rate

The linear regression of the model is given in equation (3.2) below

NGDP= a_0 + a_1BRENT + a_2+ a_3WTI + a_4INFR + a_5EXCHR + u …… (3.2)

Econometrically, equation (3.2) will be transformed into an econometric log linear form thus:

LOG(NGDP)= a_0 + a_1LOG(BRENT) + a_2LOG(WTI) + a_3INFR + a_4EXCHR + u …… (3.3)

Therefore, the coefficients in the models a_1 – a_4 define elasticity's of the logged variables.

- a_0 tells us the expected value of NGDP when all the explanatory variables have zero effect.
- a_1 is the effect of a change in BRENT on the GDP while holding all explanatory variables constant.
- a_2 is the effect of a change in WTI on GDP while holding all explanatory variables constant.
- a_3 is the effect of a change in INFR on the GDP while holding all explanatory variables constant.
- a_4 is the effect of a change in EXCHR on the GDPwhile holding all explanatory variables constant.
- u is the stochastic or error term with all the standard attributes. It captures the effect of other variables that could affect the exchange rate but which are not included in the model.

3.2 Methodology

This subsection is on methodology which includes estimation issues and techniques, variables measurements and data and data sources.

3.2.1 Estimation Issues and Techniques

Different diagnostic test will be carry out which include descriptive statistics, autoregressive conditional heteroscedesticity (ARCH), unit root test, co-integration analysis and general autoregressive conditional heteroscedesticity (GARCH). Descriptive statistics are used to examine if the explanatory variables and the dependent variable exhibit time varying volatility and leptokurtosis characteristics. To guard against spurious regression and correlation result, the study will check the properties of the variables via the Augmented Dickey Fuller (ADF) unit root test. From the unit root test results, if all the variables of the model are stable at first difference. In line with this, co-integration test will be carried out to establish the existence of a long-run association between the variables. This willbe done to make sure that the estimation technique generalized autoregressive conditional heteroskedasticity(GARCH) is appropriate.

3.2.2 Variables Measurements and Data Sources

For the purpose of this research work, nominal gross domestic product, will be measure in (₦"million),Brent and WTI will be measure in US$ per barrel, inflation rate will be measure using consumer price index (CPI) while exchange rate will be measure using nominal exchange rate measure in percentage. Data will be collected from the World Development Indicator (WDI, 2015) and CBN Statistical Bulletin (2014).

4. Empirical Analysis

This section deals with estimation results via diagnostic test. Different diagnostic test will be carried out which include descriptive statistics, autoregressive conditional heteroscedesticity (ARCH), unit root test, and general autoregressive conditional heteroscedesticity (GARCH).

4.1 Descriptive Statistics Result

Descriptive statistics were performed to examine if the explanatory variables and the dependent variable exhibit time varying volatility and leptokurtosis characteristics. The variables of the study are examined because these variables determine the estimation technique for the study. The

statistics of the variables series are displayed in Table 4.1 below.

Table 4.1: Descriptive Statistics Result

	LOG(NGDP)	LOG(BRENT)	LOG(WTI)	INFR	EXCHR
Mean	14.67799	5.993404	3.394993	38.21494	65.92612
Median	15.20985	5.815622	3.069912	23.81774	21.99600
Maximum	17.51790	7.085818	4.601865	145.7960	158.5526
Minimum	11.45450	5.152713	2.668616	0.408730	0.546781
Std. Dev.	2.149850	0.623493	0.679222	43.71309	63.76809
Skewness	-0.227244	0.561618	0.739750	1.053275	0.269775
Kurtosis	1.583788	1.944694	1.928204	2.951382	1.268043
Jarque-Bera	3.226146	3.464025	4.867434	6.474877	4.799068
Probability	0.199274	0.176928	0.087710	0.039264	0.090760
Sum	513.7295	209.7692	118.8248	1337.523	2307.414
Sum Sq. Dev.	157.1431	13.21729	15.68563	64968.37	138256.6
Observations	36	36	36	36	36

Source: Author's Computation from E-view 7

The statistics above shows that the mean of nominal gross domestic product is 14.67799 with the minimum and maximum value of 11.45450 and 17.51790 with a negative skewness coefficient of -0.227244 and a kurtosis value of 1.583788. The mean value of Brent is 5.993404 with the minimum value of 5.152713 and maximum value of 7.085818 with a positive skewness coefficient of 0.561618 and a kurtosis value of 1.944694. The mean value of West Texas Intermediate is 3.394993 with the minimum value of 2.668616 and maximum value of 4.601865 with a positive skewness coefficient of 0.739750 and a kurtosis value of 1.928204. The mean of inflation rate is 38.21494 with the minimum and maximum values of 0.408730 and 145.7960 with a positive skewness coefficient of 1.053275 and a kurtosis value of 2.951382. The mean value of exchange rate is 65.92612 with the minimum and maximum value of 0.546781 and 158.5526 with a positive skewness coefficient value of 0.269775 and a kurtosis value of 1.268043. The coefficients of kurtosis of all the series are less than three. The variables demonstrate significant platykurtic. A distribution with a coefficient larger than 3 is said to be leptokurtic and one with a coefficient smaller than 3 is platykurtic. The means of all the series exhibit positive average values and exchange rate has the highest yearly mean value of 65.92612 while West Texas Intermediatehas the lowest yearly mean value of 3.394993.

4.2 Autoregressive Conditional Heteroskedasticity (ARCH) Test Result

Brooks (2008) argues that it is worthwhile first to compute the ARCH test to make sure that this class of models(GARCH) is appropriate for the data. In this regard, the ARCH test was used to test for ARCH effects on the residuals. The results are presented by table 4.2 below. Table 4.2 shows that the statistic labelled "Obs*R-squared" is the ARCH test of autocorrelation in the squared residuals.The p-value (0.0000) indicates that the study should reject null hypothesis of no heteroscedasticity in the residuals. In other words, the zero probability value strongly shows there is no presence of heteroscedasticity in the residuals.

Table 4.2: Autoregressive Conditional Heteroskedasticity (ARCH) Test

Heteroscedasticity Test: ARCH
F-statistic 110.744 Prob.F 0.00000
Obs*R-squared 0.928957 Prob. Chi-Square(2) 0.00000

Source: Author's Computation from E-view 7

4.3 Unit Root Test

To guard against spurious regression and correlation result, this study took caution by checking the properties of the variables via the ADF test. The result is presented below and carried out

Without Constant and Trend

$$\Delta Y = \delta Y_{t-1} + u_t \quad \text{.....(4.1)}$$

The hypothesis is:

$H_0: \delta = 0$

$H_1; \delta \neq 0$

Decision rule:

If t* > ADF critical value, ==> do not reject null hypothesis, i.e., unit root exists.

If t* < ADF critical value, ==> reject null hypothesis, i.e., unit root does not exist.

A non-stationary time series can be converted into a stationary time series by differencing. The table reports that none of the time series data of gross domestic product, Brent, West Texas Intermediate, inflation rate and exchange rate have t-values greater ADF that is t* > ADF statistics indicating unit root and hence the application of the differencing technique. During the differencing, gross domestic product, Brent, West Texas Intermediate and exchange rate became stationary at 1st difference as their t* < ADF statistics except inflation rate which was differentiated twice and hence the generation of difference data for the analysis. Given that the ADF test statistic of the variables at difference < critical values at5%, we conclude that there is no

unit root with the time series. Therefore, the time series are stationary.

Table 4.3: Augmented Dickey Fuller (ADF) Unit Root Test Result

Variable	Level		Status	Difference	
	t*	ADF Critical Value		t*	ADF Critical value
LOG(NGDP)	-2.951125	-0.941808	I(1)	-2.954021	-4.080236
LOG(BRENT)	-2.951125	-0.430947	I(1)	-2.954021	-6.310165
LOG(WTI)	-2.951125	-0.225613	I(1)	-2.954021	-6.492844
INFR	-2.954021	2.579663	I(2)	-2.957110	-6.469580
EXCHR	-2.951125	-0.132088	I(1)	-2.954021	-5.454275

Source: Author's Estimation from E-view 7.

4.4 Co-integration Analysis

From the unit root test results, it is shown that all variables of the model are stable at first and second difference. Consequently, there arise the question of whether these variables could be combined together to make prediction or not. In line with this, co-integration test was carried out to establish the existence of a long-run association between the variables. The test result which was obtained using the Johansen co-integration technique is reported in the tables 4.4a and 4.4b below.

The test results indicate that the unrestricted trace rank test suggest existence of no co-integrating vectors in the model and unrestricted co-integration rank test (maximum Eigen-value) suggest that there is also existence of no co-integrating vectors in the model. This is because the trace statistics values and maximum Eigen-value were lesser than the critical values. This is also corroborated by the p-values which are greater than 0.05 i.e. the implication of the result is that there is no long-run relationship among the variables.

Table 4.4a: Unrestricted Co-integration Rank Test (Trace)

Unrestricted Co-integration Rank Test (Trace)				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None	0.584598	61.70713	69.81889	0.1867
At most 1	0.371071	32.71632	47.85613	0.5725
At most 2	0.261411	17.41298	29.79707	0.6095
At most 3	0.192717	7.413546	15.49471	0.5301
At most 4	0.010516	0.348867	3.841466	0.5548
Trace test indicates no co-integration at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

Source: Author's Computation from E-view 7

Table 4.4b: Unrestricted Co integration Rank Test (Maximum Eigen value)

Unrestricted Co-integration Rank Test (Maximum Eigenvalue)				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None	0.584598	28.99082	33.87687	0.1715
At most 1	0.371071	15.30334	27.58434	0.7239
At most 2	0.261411	9.999433	21.13162	0.7447
At most 3	0.192717	7.064678	14.26460	0.4815
At most 4	0.010516	0.348867	3.841466	0.5548
Max-eigenvalue test indicates no co-integration at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

Source: Author's Computation from E-view 7

4.5 Results from the GARCH (1.1) Model

The hypothesis of interest is the extent to which changes in the conditional mean of the variables are associated with changes in the gross domestic product. Table 4.5 presents the results from the estimated normal GARCH (1.1) model.

The sign of the Brent is positive; a one percentage point increase of Brent increases gross domestic product by 3.555181% points. Results indicated that there is a positive relationship Brent and gross domestic product. The coefficient of West Texas Intermediate is negative and statistically significant indicating that increases in West Texas Intermediate decreases gross domestic product. In other words, an increase in West Texas Intermediate will lead to a fall of 2.898993% in gross domestic product. The coefficient of inflation rate is positive and statistically insignificant indicating that increases in inflation rate increases gross domestic product. Increase in inflation rate leads to 0.270496% increase in gross domestic product. A one percentage point increase in Nigeria-dollar exchange rate will increases gross domestic product by 0.848025% point. The value of the Nigeria Nigeria-dollar exchange rate is positive; meaning that an increase in Nigeria-dollar exchange rate will lead to a rise in gross domestic product. The result of GARCH indicates that the model seems to be good as it satisfies the diagnostic test and also has an adjusted R-Squared (R^2) value of 0.922082, which indicate that only about 92.21% of the total systematic variation in gross domestic product in Nigeria is accounted for by the explanatory variables all taken together. The Durbin Watson (DW) statistics value of 2.480577 shows that

there is no serious problem of serial correlation and heteroskedasticity. The error term is also found to be normally distributed.

The variance equation represents the GARCH model and it is in this equation that the oil price shock and volatility of the exchange rate volatility are captured. The interpretation is as follows; results showed that a one percentage point increase of Brent decreases gross domestic product by -0.005617% points. This shows that Brent oil shock has a very weak but negative impact on gross domestic product. An increase in Brent oil shock will cause a very small decrease in gross domestic product. Also, results showed that a one percentage point increase of West Texas Intermediate decreases gross domestic product by -0.055037% points. This shows that West Texas Intermediate has a very weak but negative impact on gross domestic product. An increase in currency volatility will cause a very small increase in gross domestic product. Lastly, results showed that a one percentage point increase of exchange rate volatility decreases gross domestic product by -0.000149%. This shows that currency volatility has a very weak but negative impact on gross domestic product. An increase in currency volatility will cause a very small increase in gross domestic product.

Table 4.5: Results from the GARCH (1.1) Model

Dependent Variable: LOG(NGDP)				
Method: ML - ARCH (Marquardt) - Normal distribution				
Variable	Coefficient	Std. Error	z-Statistic	Prob.
LOG(BRENT)	3.555181	0.125646	28.29514	0.0000
LOG(WTI)	-2.898993	0.227750	-12.72881	0.0000
LOG(INFR)	0.270496	0.194186	1.392975	0.1636
LOG(EXCHR)	0.848025	0.195725	4.332733	0.0000
Variance Equation				
C	0.294434	0.183115	1.607924	0.1079
RESID(-1)^2	0.578768	0.493775	1.172130	0.2411
GARCH(-1)	0.029321	0.270324	0.108465	0.9136
LOG(BRENT)	-0.005617	0.003587	-1.566050	0.1173
LOG(WTI)	-0.055037	0.007602	-7.239500	0.0000
LOG(EXCHR)	-0.000149	0.028598	-0.005217	0.9958
R-squared	0.928957	Mean dependent var		14.67799
Adjusted R-squared	0.922082	S.D. dependent var		2.149850
S.E. of regression	0.600106	Akaike info criterion		1.242654
Sum squared resid	11.16395	Schwarz criterion		1.687039
Log likelihood	-11.74645	Hannan-Quinn criter.		1.396056
Durbin-Watson stat	2.480577			

Source: Author's Computation from E-view 7

5. Summary, Conclusion and Policy Recommendations

This research work examined the dynamic effect of oil price shocks, inflation rate and exchange rate on economic growth in Nigeria from 1980 to 2016. Several tests such as descriptive statistics, autoregressive conditional heteroskedasticity (ARCH) test, unit-root test and co-integration was performed to examine the data characteristics. The tests were done to see whether estimation technique of generalized autoregressive conditional heteroskedasticity(GARCH) will be appropriate. The variance equation of the GARCH model was done to capture the oil price shock and volatility of the exchange rate volatility. The results revealed that a one percentage point increase of Brent decreases gross domestic product by -0.005617% points and it shows that Brent oil shock has a very weak but negative impact on gross domestic product. An increase in Brent oil shock will cause a very small decrease in gross domestic product. Also, a one percentage point increase of West Texas Intermediate decreases gross domestic product by -0.055037% points and it implied that West Texas Intermediate has a very weak but negative impact on gross domestic product. An increase in currency volatility will cause a very small increase in gross domestic product. Furthermore, a one percentage point increase of exchange rate volatility decreases gross domestic product by -0.000149% and it showed that currency volatility has a very weak but negative impact on gross domestic product. An increase in currency volatility will cause a very small increase in gross domestic product. The position of this study is that if oil price shock and volatility of the exchange rate volatility increase within the period covered in this study, gross domestic product also decreases and vice versa. Thus, increase in gross domestic product can occur by stability in oil price and exchange rate in Nigeria.

The followings recommendations are given:

(1) There should be a proper management of macroeconomic goal especially the stability of the exchange rate in other the control the oil price shock in the country so that there will be an increase in the growth of the GDP in the county.

(2) Higher revenue gotten from increases in oil prices should be invested into different areas of the economy as the exchange rate of a country is influenced by prevalent economic conditions.

(3) Since Nigeria remains oil dependent economy and the consequences of oil price shocks and volatility of the exchange rate on the economy are real since oil remains the major foreign exchange earner for the country. Nigeria government should therefore look for new ways to diversify the economy into, from dependence on oil and explore other sectors like manufacturing sector and agricultural sector and other productive sector to reduce the effect of uncertainties in the economy.

(4) If Nigeria wants to achieve sustainable growth in the short run, it should give paramount importance to oil price and exchange rate management policies. Hence,

if exchange rate policy is to succeed, the government must fashion out the right policies conducive for the growth of the economy.

Limitations of this study are that there is still need for further research to be conducted along this line, especially by using another model aside the one used in this study. Also, the study has been mainly aggregative; a disaggregated analysis will be more informative. The use of a more robust co-integration approach like the auto-regressive distributed lag (ARDL) model will also be more insightful.

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