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EFFECT OF MONEY SUPPLY TO OIL PRICE SHOCKS IN NIGERIA: AN AUTO REGRESSIVE DISTRIBUTED LAG (ARDL) APPROACH

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Abstract

The study examined the effect of monetary policy to oil price shocks in Nigeria spanning the period 1986-2020. Secondary data were used for the estimation and were sourced from Central Bank of Nigerian (CBN) Annual Statistical Bulletin of various years. The study employed ARDL model for estimation. The results of the short-run ARDL revealed that all the variables (real interest rate, real exchange rate, broad money supply and inflation rate) are statistically significant in influencing oil price shocks. The long-run estimation shows that inflation rate was not significant but other variables were statistically significant. The study, therefore, recommends that efficient manipulation of monetary policy rate which control other interest rate for investors to operate, lower exchange to encourage both local and foreign investors and control of inflation to control oil price shocks.

Keywords: Monetary Policy, Oil Price, Shocks, Interest Rate, Exchange Rate

1. Introduction

Nigeria is often referred to as the "Giant of Africa", a nation of well over 182 million inhabitants which makes it the most populous black nation and one of the leading oil producing countries in the world. The country is well endowed with cultivable land, forests, very good climatic and weather condition, livestock, bountiful mineral resources e.g. tin, copper, crude oil and natural gas. The country has great potentials to compete with the most industrialized nations of the west when it comes to economy strength, but unfortunately a lot of these potentials have been barely exploited. Nigeria's economy which has been negatively affected as a result of the fall in oil price has shown clearly the negligence of the government over the years in developing other sectors of the economy. Nevertheless, a window of great opportunity is presently available for these areas to be exploited in the best possible way; this paves way for the economy to be on the path of sincere diversification, sustainable economic growth and well improved living standards.

Nigeria gained an extra US$390 billion in oil-related fiscal revenue over the period 1971 - 2005 (Budina & Wijnbergen, 2008). What has the nation got to show for this? Despite such windfall, Nigeria has an increasing proportion of impoverished population and experienced continued stagnation of the economy (Okonjo-Iweala & Osafo-Kwaako, 2007). The country, like many other oil-rich countries (ORCs) economically underperforms many resource poor countries (Karl, 2004). Her oil wealth has not been tapped to launch her onto economic heights; rather, she suffers from what Robinson, Torvik and Verdier (2006) describe as a resource curse – a paradox of poverty amidst plenty resources.

Oil price shocks are not a new phenomenon: it has been a dominant feature in the oil market during the last two decades (Baumeister & Peerman, 2009). The market has been characterised with erratic movement of oil price since the 1970; moreover, there have been very large and sharp swings in the nominal price of oil since the collapse of oil price in 1986 (Sauter & Awerbuch, 2003). These shocks have been traced to many sources

or origins. Understanding these origins will help in policy making against oil shocks.

Giraud (1995) highlights political and economic decisions in the oil industry as causes of oil price movements. While many writers focus on the economic factors, Mabro (1991a), as reported by Giraud (1995), states that the day-to-day prices of oil may be determined by free market forces, but sharp shifts in price level are essentially motivated by political factors, an example of which is the politically motivated civil strives and unrests in the Middle East from where the bulk of crude oil supply emanate. Hamilton (2009) agrees with Mabro (1991) that supply disruptions are a significant factor of oil price volatility. He points out that politically-induced historical oil shock events such as the Yom Kippur War in 1973, Iranian Revolution in 1978, Iraq's invasion of Iran in 1980, and Iraq's invasion of Kuwait in 1990 have all spiked up oil prices despite increased production from non-OPEC countries to compensate for decline in OPEC's production. For example, the 1980 and 1990 events resulted in jump in oil price by 25% and 75% respectively (Hamilton, 2009). The hikes dissipate after the events, only to emerge with another event, thus creating shocks and disequilibria.

From an economic point of view, Baumeister and Peerman (2009) explain that oil price shocks results from low price elasticity of demand and supply. The result of this is that large price variation is required to clear the market, that is, to restore the market to equilibrium. Hamilton (2008) and Fattouh (2007) agree that crude oil price elasticity is very low especially in the short run. This is due to technology lock-up; that is, it takes some time before energy-consuming appliances/capital stocks are replaced with more energy-efficient substitutes. However, substitution takes place in the long-run and price elasticity is thus much larger. Notwithstanding, price elasticity is yet less than one (Hamilton, 2008). Baumeister and Peerman (2009) further explain that the demand function is recently getting less elastic (probably due to increasing growth in demand from emerging economies, (probably due to increasing growth in demand from emerging economies, relative to availability of substitutes such as bio-fuels and green energies), and this explains higher shocks in oil prices. Similarly, supply of crude oil is price inelastic. This results from time lag between exploration and production activities, making supply less responsive to price changes (Fattouh, 2007).

Bedsides the decreasing elasticity of crude oil demand function, Baumeister and Peerman (2009) further posit that shifts in demand for oil explain some of the price volatility. These shifts result from economic growth in oil-importing countries, but Kilian (2006) notes that the shifts in global oil demand, and consequent surges in oil price, in the past few decades have been mostly due to shocks/changes in inventory/precautionary demand planning (against probable future oil scarcity) by oil importers.

Hamilton (2009) however disagrees with Kilian (2006) that shifts in global oil demand and price is not due to precautionary demand for oil; rather, he argues that precautionary/inventory demand declines in periods of price increases, thus helping to moderate price surges rather than aggravating it. He concludes that positive inventory (a precautionary demand identified by Kilian (2006) occurs after oil price rise has dissipated: firms replenish their stock that had been earlier depleted during period of price rise. Thus, it prevents excessive price plunge and invariably moderates volatility

Oil price volatility in recent year have raised a great concern for policy makers and economist alike all over the world, as theoretical and empirical literature have proven that oil price shocks has adverse effects on the macro economy of affected countries. It creates inflationary pressures, increase budget deficit and balance of payment problem, and thus retarding GDP growth (Malik 2008). It has also been suggested that since the 1940's all but one of the US recession were preceded by oil price shocks (Hamilton, 1983). The dilemma monetary policy authority face is the trade-off between safe guiding price stability and preventing slowdown in output growth (Huntington, 1998)

There is also the need to know how monetary policy responds to oil price shocks in Nigeria, and by extension the effectiveness of monetary policy can be evaluated. As it is argued that recessions that followed oil price shocks in US were caused not by US monetary policy reaction (Bernanke et al 1997) but however, Hamilton and Herera (2001) refuted this claim and

argued that oil price shocks have a bigger effect on the economy and also concluded that the potential of monetary policy to avert the contractionary consequence of an oil price shocks is not as great as suggested by the analysis of Bernanke et al (1997). It is based on this problem and others that this research work will being carried out

2. Literature Review

2.1 Conceptualization

Monetary Policy: The Central Bank of Nigeria in 2006 defined monetary policy as a "specific actions taken by the Central Bank to regulate the value, supply and cost of money in the economy with a view to achieving government's macro-economic objective. For many countries, the objective of monetary policy is explicitly stated in the laws establishing the central bank, while for others they are not. The objective of monetary policy may vary from country to country but there are two main views. The first view calls for monetary policy to achieve price stability, while the second view seeks to achieve price stability and others macro-economic objective. The Central Bank of Nigeria, achieve the monetary policy goal through the amount of money supplied.

Oil Price Shock: Oil price shocks can be defined as a sudden increase or decrease in the price of crude oil. Oil price shock is very important topic of study today because it is a source of crisis and economic fluctuations in both oil exporting and oil importing countries. The effects of oil price shocks on the macro-economy are different for an oil exporting country. An oil price increase has a negative effect in oil-importing countries. Thus the reverse is expected for an oil price decrease. Even though, there are arguments, that oil shocks have an asymmetric effect on the economy. Mork 1989, Hamilton 2003, Mordi and Adebiyi 2010 have explored the asymmetric relationship between oil prices and economic activity in which they give evidence that the correlation between oil price increases and output is significantly different from oil price decreases and output.

2.2 Empirical Review

Kanu and Nwadiubu (2020) studied global oil price shocks and effects on economic growth in Nigeria: an empirical analysis. The study made use of secondary data covering the period from 1990 to 2019. While the Augmented Dickey-Fuller unit root test was used for preliminary analysis; ordinary least square (OLS) regression analysis was used for short-run estimates. A combination of Johansen Co-integration test, Vector Auto Regression analysis, Granger causality test, Variance Decomposition, Impulse Response tests and the ARCH/ GARCH modelling techniques were used for long run estimation All the tests helped to confirm the integrity of our models. The findings of the study indicate that, in the short run, there was sufficient evidence to show that oil price changes have a significant effect on economic growth. For the long run test, the Trace statistics and Max Eigenvalue tests point to a case of non-integration. At a ten-year horizon, 71.31% of the variance in economic growth is explained by shocks; while the balance of 28.69% was accounted for by the changes in the global price of crude oil. In other words, the growth of the Nigerian economy has to do with the economy itself and to some extent, fluctuations or instability associated with the global prices of oil shocks. The ARCH/GARCH analysis indicates that there exists a first-order ARCH effect and that the GARCH in mean term was also significant. Succinctly put, the above results suggest that though erratic, there is evidence of volatility clustering of oil price on economic growth in Nigeria.

Adebayo (2018) examines the effects of oil shocks on government expenditures and government revenues nexus in Nigeria employing data from 1981 to 2014 to investigate the effects of oil shocks (price and revenue) on the dynamic relationship between government revenues and government expenditures in Nigeria and how it transmits effects on major macroeconomic variables using structural VAR (SVAR) on key variables, and also employed unrestricted VAR and Vector Error Correction (VEC) Models on expanded number of variables. The results of SVAR show that oil price shocks could not predict the variation in government expenditure in the short-run, while the predictive power of oil revenue shocks is very strong both in the short-run and in the long-run. The VAR and

VECM also substantiate the results of SVAR and provide further insight which shows that short-run fiscal synchronization hypothesis is evidenced between the oil revenues and total government expenditures, while spend-tax hypothesis exists in the long-run between total expenditures and total revenues. It is also evidenced that oil shocks highly affect policy variables in the short-run and transfer the effects on the other macroeconomic variables in the long run.

Obi, Awujola and Ogwuche (2016) examined the effects of oil price shock on macroeconomic performance in Nigeria using yearly data from the year 1979 to 2014. The theoretical framework of this study is based on unrestricted Vector Auto Regression model by Sims (1980). The models are used to estimate the relationship between oil price changes, inflation rate, Gross Domestic Product and real exchange rate. Unit root tests, Johansen co-integration technique, variance decomposition test, granger casualty test and Vector Auto Regression Mechanism was used to examine the speed of adjustment of the variables from the short run dynamics to the long run. It was observed that a proportionate change in oil price leads to a more than proportionate change in real exchange rate, interest rate and Gross Domestic Product in Nigeria.

Alley, Asekomeh, Mobolaji, and Adeniran, (2014) 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 finds out that oil price shocks insignificantly retard 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.

Plante (2014) examined optimal monetary policy in a new Keynesian model where supply and demand shocks affect the price of oil. The variables used are oil production, kilian measure of economic activities, real GDP, real oil price, core inflation, Federal funds rate he found out that, Nominal interest rates falls in response to the supply shocks and raises in response to the demand shocks.

Simeon and Stephen (2013) examined the macroeconomic implications of symmetric and asymmetric oil price and oil revenue shocks in Nigeria, using the vector autoregressive estimation technique. The paper finds 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.

Adeleke, Monica and Moses (2012) studied Oil price shocks and fiscal policy management: Implications for Nigerian economic planning (1980-2009). The motivation for the study was 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.

2.3 Theoretical Review

Monetary Policy Channel Theory

Monetary policy to some extent can influence how an oil price shock is experienced. If the growth of nominal GDP is held constant by the monetary authorities, the inflation rate will increase at the same rate at which real GDP growth reduce. An accommodative (restrictive) monetary policy will partially offset (intensity) the losses in real GDP while it increases (reduces) inflationary pressure if there is monetary illusion or other market imperfections. However, if there is no market impactions or monetary illusion, monetary policy will feed directly to changes in inflations without any real effects (Brown & Yulel, 2002).

As interest rates are boosted by oil price shock, the velocity of money will rise and the monetary authority will have to decrease the growth rate of the monetary aggregates through further increase in the interest rate to hold the growth rate of nominal GDP constant. If the monetary authorities hold the growth rate of the monetary aggregates constant while its velocity increases, the growth in nominal GDP will accelerate, and inflation will rise by more than GDP growth slows. If the monetary authority acts to hold the real interest rate constant, growth of the monetary aggregates will accelerate, and the rate of inflation will be increased. If the oil price shock does not affect the real interest rate, however, a constant interest rate and uncharged rates of growth in nominal GDP and the monetary aggregates could all be achieved through the same monetary policy.

2.4 Conceptual Framework of the Model

From the literature reviewed, it is important to note that this current study theoretically underpin the working of a theory among those specified above in the investigation of the effect of monetary policy on oil price shocks in Nigeria.

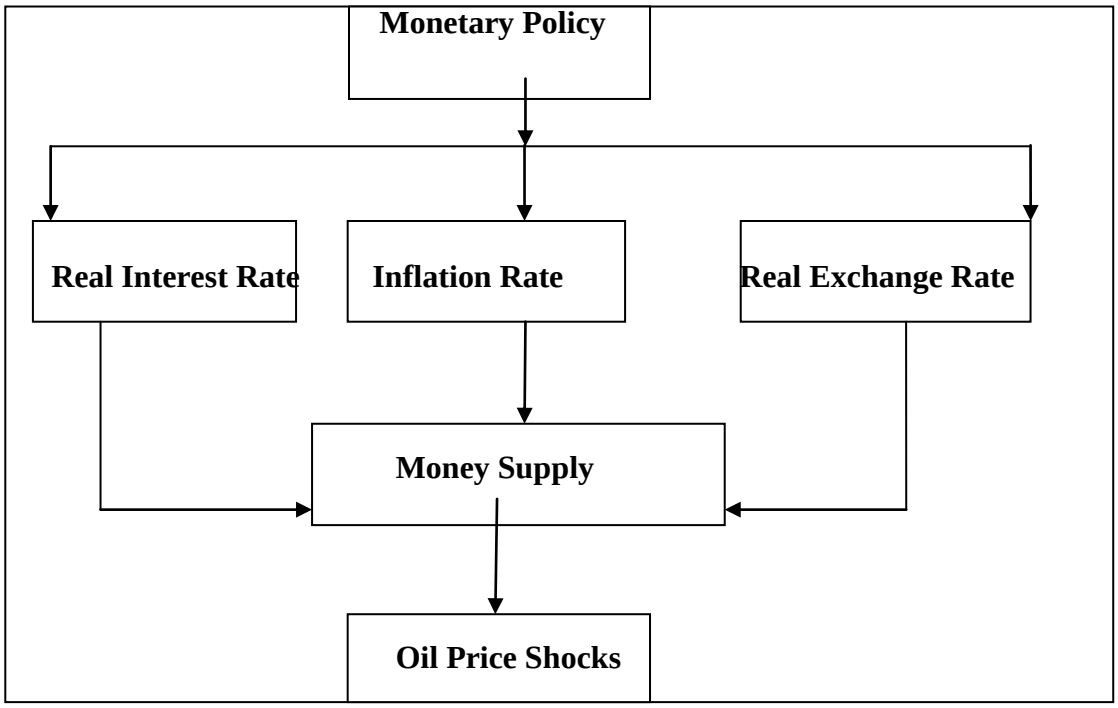

Figure 1: Monetary Policy as its affects oil prices
Source: Author's 2021

Figure 1 show how monetary policy affects oil prices in the country. Monetary policy is the policy adopted by the government through the Central Bank of Nigeria in order to influence the quality or volume of money in circulation. This is done through the monetary policy instruments such as open market operation, liquidity ratio, interest rate, selective credit control among others. The adjustment of these variables (Instruments) would determine the volume of money in circulation in the economy. For example, when interest rate is lower, the cost of borrowing fund for investment will be low. This encourage investors to borrow more funds for investment, thereby expanding production of goods and services, supply automatically will increase as a result of expansion in production, prices of goods including the oil prices will reduce. The quarterly changes in the

real oil prices is the oil price shocks. Since monetary policy decision is taken almost every months, with adjustment of monetary policy variables such as interest rate, prices of oil will also be fluctuate.

3. Methodology

3.1 Sources of Data

This study is a time series study and hence, used the secondary data source obtained from the Central Bank of Nigeria (CBN) statistical bulletin of various years. The study spanning the period 1986-2020

3.2 Model Specification

The Mathematical model of the study is presented below:

OPS=*f* (RIR, RER, BMS, INF)…..... 1

The model is transformed into econometrics form as presented below:

$$OPS = \beta_0 + \beta_1 RIR + \beta_2 RER + \beta_3 BMS + \beta_4 INF + \mu \text{.....2}$$

Where; OPS = oil price shocks; RIR = Real interest rate; RER = Real exchange rate; BMS = Broad money supply; INF = Inflation rate. The a priori expectations for this study are: β_1*(negative),* β_2 (negative), β_3 (positive) and β_4 (negative)

3.3 Estimation Technique

This study employed the use of Autoregressive Distributed Lag (ARDL) model to examine the effects of monetary policy on oil price shocks in Nigeria. The variables were subjected to unit root test through the use of Augmented Dickey-Fuller (ADF) test. The study also adopted the bounds testing approach to co-integration based on Autoregressive Distributed Lag (ARDL) model framework, as proposed by Pesaran, Shin, and Smith (2001).

4. Data Analysis and Discussion

4.1 Unit Root Test Result

The study investigates the stationary of the data using ADF test to avoid spurious regression results. The result of the unit root test is presented in table 1:

Table 1: Unit Root Test Result

VARIABLES	ADF TEST AT LEVELS		ADF TEST AT FIRST DIFF		ORDER OF INTERGRATION
	ADF statistics	Critical Value at 5%	ADF statistics	Critical Value at 5%	
ΔROPS	-2.126296	2.58362	-2.736653	2.58362	I(1)
ΔRIR	-2.638320	2.02548	-4.274882	2.02548	I(0)
ΔRER	-2.34855	2.17351	-3.272738	2.17351	I(0)
ΔBMS	-2.42567	2.93663	-3.163721	2.93663	I(1)
ΔINF	-2.75373	2.146468	-3.63552	2.146468	I(0)
Δ = Difference Operator, I(d) = No. of times of integration, Level = 5% level of significance					

Source: Author's compilation from E-views 10

Table 1 indicates the estimated results of the stationarity test of Augmented Dickey-Fuller (ADF) method. The results revealed that real oil price shocks (OPS) and broad money supply (BMS) were stationary at first difference [I(1)] while real interest rate (RIR), real exchange rate (RER) and inflation rate (INF) were stationary at level [I(0)] while exchange rate (EXR) is stationary at first difference [I(1)].The means that the variables are combination of I(0) and I(1) series. The study therefore calls the use of co-integration test.

4.2 Autoregressive Distributed Lag (ARDL) Co-integration Test

The study test for the long-run relationship among the variables of the study and result is presented in table 2 below:

Table 2: F-Bound Test for Co-integration H_0: No Co-integration

Test Statistic	Value	Degree of freedom	Probability
F-statistic	63.74	(5,825)	0.0000
Chi-square	593.4	6	0.0000
Pesaran Critical values		***Lower bound***	**Upper bound**
		1.38	2.41
		2.27	2.96
		2.38	3.67

Source: Author's compilation from E-views 10

The F-bound test for co-integration results revealed that the calculated *Chi-square* value of 593.4 is higher than all the Pesaran lower and upper bound limits at 1%, 5% and 10% respectively and the probability value of 0.000 is lower than 0.05. The study therefore rejects the null hypothesis and accepts the alternative. This means that there exists a long-run relationship among the variables of the study.

Table 3: Estimated Long-run Coefficients of ARDL Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(OPS-1)	-0.0379	0.0296	1.6239	0.0894
D(RIR-1)	-0.1930	0.0372	-2.6328	0.0281
D(RER-1)	-0.0283	0.1848	-3.1739	0.0071
D(BMS-1)	0.0926	0.0385	2.6256	0.0153
D(INF-1)	0.1742	0.0832	-1.7443	0.6021
C	-0.681	1.4873	6.5383	0.0017
R-Squared **Adjusted R-Square**	0.582 0.541	Mean Dep Var S.D Dep Var	124.9 142.8	

Source: Author's compilation from E-views 10

The result of estimated long-run coefficient of ARDL indicates that oil price shocks (OPS), real interest rate (RIR) and real exchange rate (RER) have negative relationship with oil price shocks in Nigeria. They are all statistically significant as indicated by their respective t-statistics and probability values except for oil price shocks (OPS). Similarly, broad money supply (BMS) and inflation rate (INF) show positive relationship with oil price shocks (OPS) and are statistically significant except for inflation rate (INF). The coefficient of determination indicates that about 58% of the variation in oil price shocks is explained by all the explanatory variables while the remaining 42% have been captured by the error term. This result is in line with the study conducted by Obi, Awujola and Ogwuche (2016).

Table 4: Estimated Short-run Coefficients of ARDL Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(RIR)	-0.0783	0.1033	-4.5726	0.002
D(RER)	-0.0315	0.02718	-4.1671	0.004
D(BMS)	0.5279	0.2874	-3.5027	0.006
D(INF)	-0.0462	0.1873	-3.4538	0.010
ECMt(-1)	-0.3241	0.5246	-2.4273	0.025

Source: Author's compilation from E-views 10

Table 4 revealed that all the variables are inversely related to oil price shocks except broad money supply (BMS). This means that an increase in (RIR), (RER) and (INF) by 1% would results to decrease in oil price shocks (OPS) by 0.08%, 0.03% and 0.05% respectively. Broad money supply (BMS) indicates a positive relationship. All the variables are statistically significant as all their respective probability values are less than 0.05. The result reveals that the Error Correction Term (ECM (-1)) is negative, as expected, and is highly statistically significant. The negative sign implies that there is adjustment from short-run to long-

run equilibrium among the variables of the study. That is, the oil price shocks responds to deviations from equilibrium such that if the short run variables deviate from equilibrium, they tend to re-adjust back to equilibrium in the long run. The coefficient of ECM (-1) indicates an annual speed of adjustment of about 0.32% from long-run disequilibrium per annum. This indicates that about 32% of the disequilibrium errors, which occurred the previous years, are corrected in the current year.

4.4 Serial Correlation LM Test Result

Table 5: Breusch-Godfrey Serial Correlation LM Test Ho: No Serial Correlation

F-statistic	18.946	Prob. F(3,17)	0.0062
Obs*R-squared	13.036	Prob. Chi-Square(2)	0.0015

Source: Author's compilation from E-views 10

The serial correction test revealed that the probability value is 0.0015 indicating that the study cannot reject null hypothesis rather accept null hypothesis. It means that the model has no serial correlation. Therefore the model can be used for policy making without re-specification. It can therefore, be deduced that the estimated model is valid and can be used for policy making.

4.5 Heteroskedasticity Test Result

Table 6: Heteroskedasticity Test: ARCH Ho: No Heteroskedasticity

F-statistic	21.6453	Prob. F(1,17)	0.0295
Obs*R-squared	11.4734	Prob. Chi-Square(1)	0.0179

Source: Author's compilation from E-views 10

Table 6 displayed the Breusch-Pagan-Godfrey residual diagnostic test for heteroskedasticity of the ARDL model. The test result indicates that probability of (0.017) is less than 0.05 (5% significant level). The study concludes by accepting the null hypothesis of no heteroskedasticity.

5. Conclusion and Recommendations

The study shows that monetary policy variables (real interest rate, real exchange rate, inflation rate) have negative relationship with oil price shocks while broad money supply has positive relationship with oil price shocks. In the short-run, all the monetary policy variables used in the study are statistically significant in influencing the behaviour of oil price shocks. While in the long-run, broad money supply and inflation indicates positive relationship with oil price shocks and real interest rate and real exchange rate indicates negative relationship with oil price shocks. Based on these findings, the study recommends that the monetary authority should adjust monetary policy rate favourable for other interest rate to be stimulates for investors to operate at lower cost, reduce the exchange rate and control inflation.

Reference

Adebayo Adedokun (2018) the effect of oil shocks on government expenditure and Government revenues nexus in Nigeria.

Alley, Asekomeh Mobolaji and Adeniran (2014) employed the (GMM) to examine the Impact of oil price shocks on the Nigeria economy.

Adeleke, Monica and Moses (2012) studied oil price shocks and fiscal policy Management: implication for Nigerian economic planning (1980-2009)

Bernanke, B.S. and Gertler M., and Watson, M. (1997). Systematic Monetary Policy and the Effects of Oil price shocks Economic Research Reports. New York: C.V. Star Center for Applied Economics, New York University.

Brown S.P.A. and Yucel, M.K. (2002) Energy prices and Aggregates Economic Activity: An Interpretative Survey Working paper series

(Vol. Working paper No. 0102). Dallas: Federal Reserve Bank of Dallas.

CBN. (2006) what is Monetary policy? Vol CBN/MPD/SERIES/01/2006. Monetary Policy Series. Abuja: CBN

Hamilton, J.D. (2001). A parametric Approach to Flexible Nonlinear Inference. Econometrica, 69 (3), 537 – 573.

Hamilton, J.D. (2008). Understanding crude oil prices. NBER working paper No. 14492. National Bureau of Economic Research. Cambridge.

Hamilton, J.D., and Herrera, A.M. (2001). Oil shocks and Aggregate Macroeconomic Behaviour: The Role of Monetary Policy. Working paper University of California. California.

Huntington, H.G. (1998). Crude Oil prices and U.S. Economic performance: Where goes the Asymmetry Reside. The Energy Journal, 19 (4) 107 – 132.

Kanu and Nwadiubu (2020) studied global oil price shocks and effects on economic Growth in Nigeria.

Kilian, L. (2006). Oil price volatility: Origins and Effects WTO's World Trade Report 2006. Geneva: World Trade organization.

Malik, A. (2008). Crude Oil price, Monetary and output: The case of Pakistan. The Pakistan Development Review, 47 (4 part II), 425 – 436.

Mork, K.A. (1998). Business Cycles and the oil Market. The Energy Journal, 15 (1989), 15-38.

Obi, Awujola and Ogwuche (2016) examined the effects of oil price shocks on Macroeconomic performance in Nigeria.

Plante, M. (2014). How should Monetary Policy Respond to changes in the Relatives price of oil: Considering Supply and Demand Shocks Journal of Economic Dynamics and Control, 44 (2014), 1 – 19.