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OIL PRICE VOLATILITY AND ITS CONSEQUENCES ON THE GROWTH OF THE NIGERIAN ECONOMY: AN EXAMINATION (1970-2010)

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ABSTRACT

This study examines the consequences of oil price volatility on the growth of the Nigerian economy within the period 1970 to 2010. Using quaterly data and employing the VAR methodology, the study finds that of the six variables employed, oil price volatility impacted directly on real government expenditure, real exchange rate and real import, while impacting on real GDP, real money supply and inflation through other variables, notably real government expenditure. This implies that oil price changes determines government expenditure level, which in turn determines the growth of the Nigerian economy. This result seems to reflect the dominant role of government in Nigeria. Considering the destabilizing effects of oil price fluctuations on economic activity and government spending in Nigeria, the study makes some recommendations. Some of these include; fiscal prudence, reform in budgetary operations, export diversification, revival of the non-oil sector of the economy, accountability and corporate governance.

Keywords: Oil price volatility, Economic growth, Impact variables, Real gross domestic product, government expenditure.

INTRODUCTION

Issues in oil price volatility and how it impacts on economic growth have continued to generate controversies among economic researchers and policy makers. While some (such as Akpan (2009), Aliyu (2009), Olomola (2006), etc) argue that it can promote growth or has the potential of doing so others (such as Darby (1982), Cerralo (2005) etc) are of the view that it can inhibit growth. The former argue that for net-oil exporting countries, a price increase directly increases real national income through higher export earnings, whereas, the latter cite the case of net-oil importing countries (which experience inflation, increased input costs, reduced non-oil demand, lower

investment, fall in tax revenues and ultimately an increase in budget deficit which will further reduce welfare level) in advancing their argument.

Thus the impact (positive or negative) which oil price volatility could have on any economy, depends on what part of the divide such economy falls into and of course the nature of such price change (rise or fall). However, the Nigerian economy uniquely qualifies as both an oil exporting and importing economy, by reason of the fact that she exports crude oil, but imports refined petroleum products. Making a conclusive and authoritative statement on the impact of oil price volatility on the Nigerian economy is therefore difficult.

Estimating the consequences of oil price shocks on growth is particularly relevant in the case of Nigeria. As a small open economy, it has no real influence on the world price of oil, whereas, it is greatly influenced by the effect of oil price volatility both as an exporter of crude oil and importer of refined petroleum products. It thus implies by simple reasoning that oil price volatility whatever the nature (either a rise or fall) can both benefit and hurt the economy at the same time.

Basically, the crux of the problem lies in the fact that the country has extremely relied on this commodity over the years, making its economy a mono-product economy and this has triggered severe structural difficulties for the economy. For example, in 2008 when oil price fell from a peak of $147 to about $37.81 per barrel, the budget witnessed significant cuts in budgeted revenue and expenditure. These cuts had attendant effect on all aspects of the Nigerian economy; apparently budgetary operations in Nigeria are strongly linked to happenings (price, demand and supply) in the international oil market.

Oil price volatility has been found to have had a more direct effect on the exchange rate of the Naira than probably any other economic variable, this is because crude oil export earnings accounts for a large chunk of Nigeria's foreign exchange (about 90%) and thus ultimately determines the amount of foreign reserves of the country which is alarmingly low (about $30billion from over $60billion in 2008) and continuously keeps depleting.

This paper has as its main objective, the examination of the consequences of oil price volatility on the growth of the Nigerian economy within the period of 1970 and 2010 using quarterly time series data sourced from the CBN Statistical Bulletin. In order to achieve this objective, the paper is structured into five sections. The introduction makes up Section 1, Section 2 reviews related literature (theoretical and empirical). Section 3 highlights the theoretical foundations of the study. The model for our empirical work is also specified in this section. Empirical analysis and discussion of the policy implication of the empirical results are presented in Section 4. Section 5 contains the recommendations and conclusion.

REVIEW OF RELATED LITERATURE

The literature on oil price volatility and its attendant consequence on economic growth are quite broad and continue to expand. As Adelman (2000) notes; "crude oil prices have been more volatile than any other commodity price [although in principle it ought to be less volatile]". He notes that though oil price movements have always occurred mainly due to seasonal changes in demand, such movements were small. For example, between 1948 and 1970, nominal prices fluctuated between $2.50 and $3 per barrel. He notes that between 1998 and March 2000 international oil prices rose from $10 to $31 per barrel, it further rose to $37 in September 2000, before declining to less than $18 per barrel in November 2001. Since then there has been an upward movement in the prices of crude oil reaching about $147 per barrel in 2008, before averaging $90 per barrel in 2010. He adduces this volatility of crude oil prices to the fixation of prices by collusion in the OPEC cartel and the unrest in the Middle East at various times. Kolawole (2002) seems to be in full agreement with Adelman (2000), pointing out that disagreements on production quotas and members mistrust have fuelled volatility. Ayadi (2005) does not think differently either, in his opinion, speculation surrounding OPEC meetings can also induce volatility. He revealed that whenever OPEC meetings approach, volatility drifts upwards and therefore blames the frequency of OPEC meetings and quota adjustments in recent years as a crucial causal factor. Whatever the cause however, as Osije (1983) remarks, oil prices like other market commodities is dictated fundamentally by market trends and therefore subject to price volatility.

The fact that oil price volatility has significant impact on economic aggregates of any economy is not in doubt; however, it is the channel through which the impact is transmitted and nature/severity of the impact that has been argued by researchers. Gounder and Bartleet (2007) argue that the demand-side impacts of energy crisis suggest that an energy price shock can result in higher inflation and higher unemployment at the same time; this is known as "stagflation". Their argument finds support in the empirical work of Mork, Olsen and Flo (1992) on Oil price volatility and its impact on key growth variables of economies. Their results indicate that oil price volatility may trigger an external inflation spike, they assert that inflation results from oil price fluctuations and not an increase in domestic money supply. Olaokun (2000), in a related study, arrived at some interesting conclusions; He showed that oil price increases exerts a negative effect on the economies of Ghana and Nigeria (although the later is an oil-producing country), but has a positive effect on Russia, which like Nigeria is an oil producing country. This outcome raises a lot of questions. Relating this volatility to the Nigerian economy, Olomola (2006) has argued that oil price volatility is highly significant in explaining GNP growth and unemployment. Okonju (2009), after a careful assessment of Nigeria's growth path in post oil discovery period, judged it as having been very rough. He explained that during the oil boom era GDP grew positively by 6.2% annually, but the growth rate turned negative through the larger part of the 80's when oil prices crashed; this

period also saw inflation rate jump to 11.8% on average, with a period peak of 41% in 1989; Gross Domestic Investment (GDI) as percentage of GDP fell from 16.3% to 14%. However GDP growth rate managed to turn positive (averaging about 4%) between 1988 and 1997 as a result of structural adjustment policies (SAP). Okonju concluded that oil price volatility has been a major contributory factor to instability in GDP growth pattern in Nigeria.

Richard and Ronald (1980) lamented the continuous over reliance of the Nigerian budget on oil revenue. They noted that periods of oil price upheavals especially price slumps have necessitated significant alterations in budget figures, plans, targets and even allocations to states and government-owned parastatals and agencies. Total abandonment of policies and projects have also characterized such times, this they opined had serious growth implications for the Nigerian economy. Damilola (1982), reasoned along same line, recalling the increase in income, savings, employment, public and private investments in Nigeria during the 70's when global oil fortunes looked good. The Nigerian economy was expected to grow rapidly, but as Olaokun (2000) pointed out, events did not go this way; on the contrary a slump overtook the global economy and the years between 1978 and 1982 witnessed the deepest global recession ever since the 1930's. Thus all the expectations of continuous growth in the Nigerian economy were dashed as a result of the volatility in international crude oil prices.

Obioma (2006) explained that Nigeria became more exposed to oil price fluctuations the moment she started importing refined petroleum products due the collapse of local refineries in the late 1980's. Thus, the country could not grapple with the enormous subsidy it committed itself to, so that between 1999 and 2010, the Federal Government had adjusted its subsidy on petroleum products back and forth approximately 8 times. This has negatively affected production, consumption, general welfare and hence the pace of economic growth.

Some researchers have wondered why Nigeria during times of hike in crude oil prices still reported unimpressive growth performances (such as; double digit inflation rate, huge fiscal deficits, huge external debt and so on). Duncan (2008) defined Nigeria as a crude oil exporter and importer of refined petroleum products. He re-stated the fact that oil price volatility tends to exert a positive effect on the GDP growth of a net-oil exporting country and a negative effect on a net-oil importing country. On the basis of this, Nigeria's situation is clearly peculiar. The literature on the relationship between oil price volatility and economic growth volatility keeps expanding as new economic challenges unfold. Ademola (1998) in his work "oil price volatility or economic volatility?" which was necessitated by the economic crisis of the late 1990's particularly in the Asian nations, introduced a twist in the argument, arguing that there exists a two-way causation between oil price volatility and economic volatility. He made reference to the fall in crude oil prices in the late 1990's, this he adduced to the economic collapse in the Asian countries which was

more pronounced in the 2nd quarter of 1998. During this time the demand for crude oil by the Asian countries which had been the major consumers had fallen considerably. Ademola's argument has been supported by (Oyinola, 2001; Onoja, 2002; Ayisafe, 2005). The literature on oil price volatility and its consequences on the growth of the Nigerian economy are expanding and will continue to as long as oil revenue still predominantly drives the Nigerian economy. This paper is a contribution to the existing literature.

Review of Empirical Studies

The first generation studies of the economic growth effect of oil price volatility dealt with the experience of the developed countries. However, since the 1980's, a number of studies for some developing economies have produced insightful results. Studies by Mork (1989), Lee and Ralti (1995) and Hamilton (1983) for the Pakistani economy introduces non-linear transformation of oil prices to provide evidence of a positive relationship between increases in oil prices and economic growth. Gary and Sunoh (1994) had found similar evidence for the Gambia. A related study by Mork (1989), specified increases and decreases in real prices of crude oil as separate variables, His findings were that effects of an oil price increase are different from those of decreases and that oil price decreases are not statistically significant. (Mork, 1989) in a study for Nigeria, also found an asymmetric relationship between oil price changes and economic growth. Loungani (1996), found a similar evidence for the Russian economy. Evidences from the study carried out for Norway by Olsen and Flo (1992); indicate that positive non-normalized shocks in real oil price are strongly related to negative real growth. In another study for Nigeria, Olomola (2006) found out that oil price volatility is highly significant in explaining GNP growth and unemployment.

However evidences from other studies have not been as straightforward as those just reviewed. Akide (2007) investigated the impact of oil price volatility on economic growth indicators in Nigeria using quarterly data from 1970 to 2000. He found out that within the period of study oil price shocks did not affect output and inflation in Nigeria, but significantly influenced real exchange rate. Also Jimenez and Sanchez (2005) empirically assessed the effect of oil price volatility on the real economic activity of the main industrialized countries using both linear and non-linear models. Evidence of non-linear impact of oil price volatility on real GDP was established.

Theoretical Framework

The standard growth theories focus on primary inputs such as; Capital, labour & land, while failing to recognize the role of primary energy inputs such as; oil deposits. However, natural scientists and some ecological economists have made efforts at evolving some theories which capture the role of oil price volatility on economic growth, thus incorporating the linkage between energy resources;

its availability and volatility and economic growth. The theories reviewed in this paper are primarily reduced-form models, rather than a single theory.

The Mainstream theory of economic growth postulates that production is the most important determinant of growth of any economy, and production which is the transformation of matter in some way, requires energy. This theory categorizes capital, labour and land as primary factors of production; these exist at the beginning of the production period and are not directly used up in production (though they can be degraded or added to). While energy resources (such as; oil and gas, fuels, coal) are categorized as intermediate inputs, these are created during the production period and are entirely used up during the production process. In determining the marginal product of oil as an energy resource useful in determining economic growth, this theory considers in one part its capacity to do work, cleanliness, amenability to storage, flexibility of use, safety, cost of conversion and so on, it also considers other attributes such as; what form of capital, labour or materials it is used in conjunction with. The theory estimates the ideal price to be paid for crude oil as one that should be proportional to its marginal product.

The Linear/Symmetric relationship theory of growth which has as its proponents, Hamilton (1983), Gisser (1985), Goodwin (1985), Hooker (1986) and Laser (1987) postulated that volatility in GNP growth is driven by oil price volatility. They hinged their theory on the happenings in the oil market between 1948 and 1972 and its impact on the economies of oil-exporting and importing countries respectively. Hooker (2002), after rigorous empirical studies demonstrated that between 1948 and 1972 oil price level and its changes exerted influence on GDP growth significantly. Laser (1987), who was a late entrant into the symmetric school of thought, confirms the symmetric relationship between oil price volatility and economic growth. After an empirical study of her own, she submitted that an increase in oil prices necessitates a decrease in GDP, while the effect of an oil price decrease on GDP is ambiguous, because its effects varied in different countries.

The Asymmetry-in-effects theory of economic growth used the U.S economy as a case study. The theory posits that the correlation between crude oil price decreases and economic activities in the U.S economy is significantly different and perhaps zero. Mark *et al.* (1994), members of this school in a study of some African countries, confirmed the asymmetry in effect of oil price volatility on economic growth. Ferderer (1996) another member of this school explained the asymmetric mechanism between the influence of oil price volatility and economic growth by focusing on three possible ways: Counter-inflationary monetary policy, sectoral shocks and uncertainty. He finds a significant relationship between oil price increases and counter-inflationary policy responses. Balke (1996) supports Federer's position/submission. He posited that monetary policy alone cannot sufficiently explain real effects of oil price volatility on real GDP.

The Renaissance growth theory/model was an off-shoot of the symmetric and asymmetry in effect schools. Lee (1998) who was a leading proponent of this school focused her theoretical work on attempting to distinguish between oil price changes and oil price volatility. Lee (1998) defined volatility as the standard deviation in a given period. She submitted that both have negative impacts on economic growth, but in different ways: Volatility has a negative and significant impact on economic growth immediately, while the impact of oil price changes delays until after a year. She concludes by stating that "it is volatility/change in crude oil prices rather than oil price level that has a significant influence on economic growth".

There exist other theories on the oil price volatility effect on economic growth in the literature, such as; the Decoupling theory, Income transfer model of growth etc. The theories reviewed are still at their crude stage, this is vivid from the quality of their analysis, ambiguity in conclusions and submissions and a clear absence of an econometric face. This is not unconnected to the background of the proponents of these theories, many of whom are scientists, ecological and environmental economists. The submissions of these theories however provide analytical foundations on which to compose our empirical investigations.

Model Specification

From the review of literature, the discussion and examination of the theoretical framework we specify our model. The model uses oil prices and real GDP figures, since our main objective is to analyze the effects of change in the former on the later. This research study uses real GDP as the measure of economic growth. The unrestricted VAR model of order P is presented in equation 1;

$$Y_t = A_i Y_t + \ldots + A_p Y_{t-p} + B_{zt} + E_t \quad \text{----------1}$$

Zt = [constant, D1, D2, D3, D4, D5, D6, D7]

Where;

Y_t is the vector of endogenous variables

$_{Zt}$ is the vector of exogenous variables

A_i and B are coefficient matrices

$_p$ is the lag length

E_t is an unobservable zero-mean white noise process.

D1 – D7 are the variables chosen from 1970-2010 for the VAR model.

OPRV is measured by deriving the standard deviation of international oil prices between 1970 and 2010 over four quarters.

Using Cholesky (1977), this research work assumes the following ordering of the seven variables used in the VAR: Oil Price Volatility (OPRV), Real GDP (RGDP), Real government expenditure

(RGOVEX), Real exchange rate (REEX), Inflation rate (INFL), Real money supply (RMS), Real imports (RIMP), (real money supply represents the monetary sector, while real imports represents the external sector, so that the three broad sectors of the economy are captured in the model) This is necessary because the orthogonalization method involves the assignment of contemporaneous correlations only to specific series.

Data employed for the analysis are obtained from the Central Bank of Nigeria (CBN). The VAR method allows us assess the relative importance of a particular variable in the changes of other variables. Another advantage of this technique is that it circumvents the problem involved with the specification and estimation of structural simultaneous equations. This is because the VAR model considers all variables as endogenous. Our empirical analysis will involve 3 steps; Unit root test for the variables, Granger causality test and Forecast Error Variance Decomposition (FEVD).

EMPIRICAL ANALYSIS AND POLICY IMPLICATIONS OF EMPIRICAL RESULT

This section presents the empirical results of the analysis beginning with the time series properties of the variables used for the estimation.

Unit Root Test for variables

The analysis is based on time series data. This therefore requires some specific approaches to the analysis. It is generally known that the econometric estimation of a model based on time series data demands that the series be stationary, as non-stationary series usually results in mis-leading inferences. Engle and Granger (1987) provide a standard technique to deal with this problem. This involves testing the variables of an equation for stationarity by running the regressions for all the series at both first difference and levels and, with constant and trend in the equation employing the Augmented Dickey and Fuller (1979) (ADF) tests. The ADF-tests are reported in table 1 appendix.

The result of the ADF unit root test presented in table 1 appendix establishes the existence of non-stationarity in all the data series (except inflation) in level, as the absolute values of ADF test statistic of the variables (in level) were less than the absolute (values of the) 95% critical value of the ADF statistic, thus signaling the non-stationarity of six (6) of the variables. However, upon 1st differencing non-stationarity in the data series of these 6 variables is gotten rid of and stationarity was attained. Meaning the hypothesis of unit root could not be rejected at the 1% level.

Having established the foregoing, we proceeded to establish the causality tests;

Testing for Significance and Granger-Causality

This research study investigates the relationship between oil price volatility and the macroeconomic variables selected in the model. Table 2 appendix reports the results of the Pairwise Granger Causality Tests. The first line results display the Granger causality test of the response of inflation to oil price volatility. The results from the table indicate that at an F-ratio of 4.201, the null hypothesis cannot be accepted. Thus oil price volatility significantly granger causes inflation rate even at the conservative 1% level of significance. Similarly, the 7th line results follow similar analysis. With the F-ratio of 4.071, it is difficult for us to accept the given null hypothesis, leaving us with the option of accepting the implied alternative hypothesis that oil price volatility granger causes real exchange rate in Nigeria. Focusing on the direction of causality between oil price volatility and real government expenditure, the 9th line of this result reports this causality. At 1% significant level, the F-statistic value of 3.74 passes the significant test and gives us enough evidence to accept the alternative hypothesis that oil price volatility granger causes government expenditure. Expectedly, line 18 indicates that with an F-value of 4.99, causality running from real money supply to real GDP is significant, thus real money supply granger causes real GDP in Nigeria. By way of summing up, the results show that the interaction between oil price volatility and major macroeconomic variables in Nigeria is generally significant with the direction of causality going in at least one direction across all the oil price specifications. Interestingly however, the results reveal that we cannot reject the hypothesis of non-causality running from oil price volatility to real GDP.

Forecast Error Variance Decomposition

The series of analysis in the VAR methodology is the Forecast Error Variance Decomposition (FEVD). Here, we determine the percentage of variances in each endogenous variable that is determined by the other variables. This can help provide the amount of influence the endogenous factors exert on each other. The Forecast Error Variance Decomposition results are reported in table 3 appendix.

The variance decomposition suggests that shocks to oil prices as presented in table 3 (appendix) had the greatest impact on real exchange rate throughout the period of the analysis. It increased steadily and significantly overtime. Oil price volatility accounted for about 4% of shocks to real exchange rate in the first quarter, increasing in effect to about 15% in the tenth quarter and further to about 19% in the fifteenth quarter. It increased further to about 22% in the twentieth quarter and peaked at about 24% in the twenty-fifth quarter. Other variables which had significant impacts on variations in real exchange rate were; real government expenditure and change in commodity prices (inflation). Real government expenditure accounted for about 10% of variations in real exchange rate in the first quarter; it however declined minimally to about 9% in the fifth quarter and further to about 7% in the tenth quarter. By the fifteenth quarter its contribution had fallen further to about

6% and then averaged about 5% through the twenty-fifth quarter. However, inflation rate had an increasing effect on real exchange rate. Its contribution increased from 0 in the first quarter to about 2% in the fifth quarter, this increased to about 5% in the fifteenth quarter. From the fifteenth quarter to the twenty-fifth quarter the contribution of inflation to variations in real exchange rate averaged about 7%. The error decomposition of real government expenditure shows that through the first ten quarter period of the analysis, real government expenditure variations were mostly explained by itself, after which the effect declined over time. The two other variables that had considerable impact on its variations were real exchange rate and oil price volatility. Real exchange rate contributed about 3% to variations in real government expenditure in the tenth quarter after having not contributed in the first and fifth quarters. This rise continued to about 6% in the fifteenth quarter and then about 10% in the twentieth quarter, its contribution finally peaked at about 15% in the twenty-fifth quarter. Expectedly, the result shows that the response of real government expenditure to shocks in oil prices was significantly different from zero. In the fifth quarter it accounted for about 1% this increased considerably to about 4% in the tenth quarter and then declined to about 3% in the fifteenth quarter, by the twentieth quarter its effect had risen to about 4%, with a further rise to about 6% in the twenty-fifth quarter.

However, the empirical result indicates that real GDP largely explains itself for the first ten quarter period of the analysis, after which its explanatory power declines substantially. Specifically, the empirical result indicates that real government expenditure accounted for the largest variations in real GDP. For instance about 3% of the shocks in real GDP in the fifth quarter were as a result of variations in real government expenditure. This rose to about 12% in the tenth quarter and then about 15% by the fifteenth quarter, by the twentieth quarter it accounted for about 17% of variations and finally, 19% in the twenty-fifth quarter. The contribution of oil price volatility was insignificant over the period of the analysis, averaging just 1%. Furthermore, the contributions of real exchange rate, inflation rate and real imports were also significant. While real exchange rate accounted for about 15%, 16% and 18% of variations in real GDP in the fifteenth, twentieth and twenty-fifth quarters respectively, inflation rate persistently increased its contribution to variations in real GDP from about 6% in the fifteenth quarter to about 7% in the twentieth quarter and then about 9% in the twenty-fifth quarter. The contribution of real import to variations in real GDP was not different, averaging about 9% through the fifteenth to twenty-fifth quarters of the analysis. The real import response to a shock in oil prices is positive and significantly different from zero. This positive response of real imports to oil price volatility lasts until the end of the period of analysis. As indicated by the table its contribution declined to about 2% in the fifth quarter from about 3% in the first quarter. It deepened further to about 1% in the fifteenth quarter, but rises to about 3% in the twentieth quarter and further to 5% in the twenty-fifth quarter. Government expenditure accounted largely for variations in real imports. It accounted for about 16% of variations in the first quarter, and then about 24% in the fifth quarter, this rise continued to about 45% in the fifteenth

quarter, by the twenty-fifth quarter, real government expenditure accounted for about half of the variations in real imports. Real exchange rate also had a significant impact on real imports, accounting for about 11% of variations in the fifteenth quarter and about 22% in the twenty-fifth quarter. This confirms the strong linkage between government, real exchange rate and real imports in the Nigerian economy. Finally, real GDP and oil price volatility accounts for the largest share of variations in inflation rate. Real GDP accounted for about 6% of changes in commodity prices in the first quarter, increasing to about 10% in the fifth quarter and then to about 14% through the twenty-fifth quarter. Oil price volatility explained only 0.88% of changes in inflation rate in the first quarter; it however rose to about 13% in the tenth quarter, its contribution to variations in inflation rate averaged about 13% through the twenty-fifth quarter. Similarly, real government expenditure also had significant impact on variations in inflation rate within the period of analysis. It accounted for about 2% of total variations in the first quarter and then about 3% in the fifth quarter. It steadily increased to about 10% in the fifteenth quarter, and then averaged at about 11% through the twenty-fifth quarter. Other variables were not significant in explaining variations in inflation rate in Nigeria within the period of analysis.

An interesting aspect of the result is that variations in real money supply were almost totally explained by real government expenditure. Government expenditure accounted for about 30% of variations in money supply in the first quarter, this rose to about 44% in the fifth quarter, this further increased to about 67% in the fifteenth quarter. Through the twenty-fifth quarter, its contribution averaged 69%. Also the contribution of oil price volatility was significantly different from zero. Oil price volatility accounted for 0.02% of variations in real money supply in the first quarter; this increased to about 2% in the tenth quarter and then accounted for about 6% in the twentieth quarter, through the twenty-fifth quarter. Inflation also contributed significantly, fluctuating between 3% and about 6% within the first and tenth quarter. It then settled at about 3% through the twenty-fifth quarter. The contributions of the other variables were insignificant.

Policy Implications of Regression Results

The estimates of the models that are outlined in the previous sub-sections give us results that are instructive and far-reaching in policy implications. Firstly, the Forecast Error Decomposition result suggests that shocks to real exchange rate in all twenty-five quarters were accounted considerably for by oil price volatility. As a net-oil exporter, Nigeria's real exchange rate appreciates when oil price hike facilitates higher inflow of foreign exchange into the economy. Although, this may sound good for the economy, it, however, has serious implications on real economic activities and the foreign scene due to the heavy reliance of the economy on foreign inputs. This finding is consistent with (Amano and Norden, 1998; Olomola, 2006). Specifically, the introduction of SAP in the 1980's marked a new era in Nigeria's exchange rate policy—it was deregulated. Post-SAP period has witnessed a steady depreciation of the Naira exchange rate. Cost of production in

Nigeria has been very high relative to other countries. Simply because amongst other reasons, the dollar value of imported (both intermediate and final) technology required for production in terms of the Naira is extremely high. As a result the country has become a dumping ground for foreign goods which are far cheaper than the Nigerian made goods. Considering this fact, the country has rolled out a number of policies aimed at protecting and promoting locally made products, these policies however have been academic, as the imported goods predominantly 'China goods' have continued to flourish in our markets, basically because of their affordability. Secondly, the result showed that oil price volatility had a significant effect on real government expenditure. Increase in oil prices had the effect of increasing government expenditure. The result confirms the huge monetization of crude oil receipts and subsequent increase in government expenditure explained earlier. This finding however, contradicts that of Farzanegan and Markwardt (2007) where positive oil shocks accounted for an insignificant variation in government expenditure. Another finding from the result was that real exchange rate impacted heavily on real government expenditure; this might not be unconnected with the over-dependence of the government budget on oil prices (oil benchmarking). Hence, the prevailing exchange rate of the dollar to the Naira on receipt of the dollar value of its oil, influences government ability to well meet its domestic capital and re-current expenditure obligations. The implication of this result is that oil price volatility has a direct as well as indirect effect on government expenditure, with the later effect been through real exchange rate.

The third aspect of the result is the indirect and marginal impact of oil price volatility on real GDP in Nigeria. This contradicts the expectations that oil price shocks tend to lower real GDP (Gordon, 1989) and impacts significantly on it (Farzanegan and Markwardt, 2007), rather it confirms the findings of (Barsky and Kilian, 2004) as well as (Akpan, 2009), that oil price shocks had marginal impact on real GDP. An explanation for the rather weak causality between oil price volatility and real GDP as demonstrated by the result is suggested. Oil price volatility may not have a direct impact on real GDP in Nigeria; rather it works through real government expenditure and real exchange rate as indicated by the result. Characteristically, government has remained the major driver of the Nigerian economy; therefore through its expenditure it dictates the growth trend and speed of the economy. The implication of this result therefore is that *at the prevailing exchange rate, oil prices determine government's expenditure which in turn determines growth in Nigeria.*

Another explanation which can be put forth is the difference in estimation periods. Some related studies such as; (Akpan, 2009; Aliyu, 2009), which employed estimation periods of 1980-2009 and 1981-2008 respectively, reported a direct significant impact on real GDP by oil price volatility. But the studies of (Olomola, 2006) that used an estimation period similar to this study, reported a weakly significant impact of oil price volatility on real GDP. This implies that the period chosen for the analysis could be considered as a likely factor. Another likely explanation is the recent economic diversification goal being pursued by policy makers at all levels in the country. There has

been a lot of effort geared towards reducing the dependence on oil. Some state governments have improved their tax collection mechanisms so as to reduce their reliance on the oil determined revenue allocations from the Federal government. If these efforts are anything to go by, the implication ordinarily will be that the direct causality between oil price volatility and real GDP should expectedly fade away. A fourth consideration in this direction is the significant impact of oil price volatility on inflation rate. The results of the VDC showed an increasing effect of oil price volatility over the period; from 0.88% in the first quarter to 13% by the tenth quarter**.** This implies that oil price changes will stir up price instability in the country. This can be adduced to the "Dutch disease" and the "Spending effect". The findings of Barker and Paul (2004), that oil price changes can significantly affect inflation rate confirms the results of this study.

Another interesting angle to the analysis is the tremendous impact of real government expenditure on variations in real money supply in Nigeria. Following from the explanation on the dominant role of government in Nigeria, this result should not be surprising. Government is the largest employer of labour in Nigeria. This implies that government dishes out the lion share of liquid assets (cash) circulating in the economy by way of salaries, benefits, compensations, subsidies, subventions, periodic allocations, which all form part of government expenditure. Expectedly, the result shows that real exchange rate impacts significantly on real imports in Nigeria. The depreciated Naira was expected to reduce imports, but that has not been the case. On the other hand, Nigeria has been importing refined petroleum products over the last two decades, this also accounts for the significant impact government expenditure has on real imports. Exchange rate stabilization policies should be implemented, while measures at controlling "unnecessary imports" should be taken. In conclusion, the effect of oil price volatility on the economy can be said to be rather divergent. While the effect on some variables have been significant, the effect on others have been either weakly significant or insignificant.

RECOMMENDATIONS AND CONCLUSION

Recommendations

This paper has analyzed particular effects arising from oil price volatility on the growth of the Nigerian economy. On the basis of this, some recommendations are put forward to ensure sustainable growth of the Nigerian economy,

i. Policy makers should strengthen manufacturing through tax incentives and infrastructural development by way of public-private sector partnership in order to create the enabling environment for local and foreign investment.
ii. The country's refineries should either be privatized or re-positioned, while crude oil should be supplied to them at less than international prices. This will put an end to the incessant fuel shortage experienced in the country.

iii. Concrete steps aimed at decoupling budgetary management from oil-revenue inflows should be taken. The Fiscal Responsibility Act and the recent oil wealth fund are steps in the right direction.

iv. More stringent policies to discourage importation, especially of items which can be readily purchased within the country, should be formulated and implemented to the letter.

Since real government expenditure significantly impacted on virtually all the other variables, it is important government spending is not increased rapidly to levels which may become unsustainable if oil prices fall in future. Fiscal prudence should be expressed through spending plans, with the citizenry's welfare as its main objective.

In addition, the current practice whereby the Federal government of Nigeria solely controls exploration rights of mineral resources anywhere and everywhere it may be located within the country should be reviewed with a view to giving states some autonomy. Furthermore, it is recommended that the monetary sector should be more vibrant, as it is the "watch dog" of the economy, considering the fact that Nigeria is renowned to possess an under-developed capital market, a very large informal sector and a porous/loose financial system. Finally, the diversification policy drive of government should not just focus on agriculture alone, rather its rich untapped solid mineral deposits should be exploited. Lastly, Accountability, corporate governance and responsibility should be cultivated as core values by all stakeholders to ensure that Nigeria's growth ambitions remain firmly on track.

CONCLUSION

This study assessed the consequence of oil price volatility on the economic growth and development of the Nigerian economy between 1970 and 2010. The focus was on the relationship between oil price changes and selected macroeconomic variables with particular emphasis on real GDP which acted as proxy for economic growth. The instruments of data analysis are the Granger-causality tests and the Vector Autoregressive (VAR) techniques. As a first step the Augmented Dickey Fuller (ADF) test showed that six of the seven variables used in the study namely; oil price volatility, real GDP, real government expenditure, real exchange rate, real import and real money supply were non-stationary in their levels, but achieved stationarity at first difference. The variables were entered into the VAR model in an ordering which follows the intuition of the researcher and in line with the Cholesky laid down criteria. Results from the Granger-causality tests and VAR permit us to conclude that the interaction between oil price volatility and macroeconomic variables in the Nigerian economy is significant, with the direction of causality going in at least one direction. However, an interesting observation was made in the nature of causality between oil price volatility and real GDP. Oil price volatility is found to impact on real GDP, through other

variables in the economy. The variables were found to be real government expenditure and real exchange rate, simply referred to as "impact variables" in Economics. This finding is confirmed by other related studies. (See sub-section 4.4 for explanations).

From the findings, it was observed that "Oil price at the prevailing exchange rate determines the level of government spending, which in turn determines real GDP". Overall, it can be said that there is a crucial relationship between oil price volatility and economic growth and due to the fact that the Nigerian economy is highly vulnerable to oil price changes, expected growth targets are hardly met.

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APPENDIX

Table-1. Summary of Result for Unit Roots Test of Variables

Variables	ADF Lag	ADF test Statistic	95% critical value for the ADF Statistic	Remark
OPRV	1	-0.933478	-2.8801	Non-Stationary
RGDP	1	-2.079468	-2.8799	Non-Stationary
RGOVEX	1	-0.091294	-2.8799	Non-Stationary
REEX	1	-0.069071	-2.8799	Non-Stationary
INFL	1	-4.109861	-2.8799	Stationary
RMS	1	1.637732	-2.8799	Non-Stationary
RIMP	1	-0.332549	-2.8799	Non-Stationary
DOPRV	1	-5.025705	-2.8800	Stationary
DRGDP	1	-6.820084	-2.8800	Stationary
DRGOVEX	1	-6.253270	-2.8800	Stationary
DREEX	1	-4.557885	-2.8800	Stationary
DINFL	1	-5.486349	-2.8800	Stationary
DRMS	1	-26.15264	-2.8800	Stationary
DRIMP	1	-6.117871	-2.8800	Stationary

Note: Dickey-Fuller Regressions include an Intercept and a linear trend.

Source: Author's Results Using E-views.

Table-2. Summary of results for the Forecast Error Variance Decomposition

Variance Decomposition of OPRV

Period	S.E.	Oprv	Rgdp	Rgovex	Reex	Infl	Rms	Rimp
1	0.009995	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
5	0.047241	93.49504	0.861945	4.746571	0.057023	0.255780	0.145435	0.438201
10	0.055304	74.96952	3.957954	16.01444	0.627148	0.219542	3.382599	0.828804
15	0.056891	72.06586	4.302276	17.20838	1.105099	0.346066	3.811691	1.160624
20	0.057211	71.51677	4.440430	17.03788	1.202698	0.742451	3.778070	1.281710
25	0.057351	71.19355	4.548817	16.95786	1.229016	0.769830	3.808214	1.492710

Variance Decomposition of RGDP

1	0.075749	0.116533	9.88347	0.000000	0.000000	0.000000	0.000000	0.000000
5	0.242637	0.058540	91.99949	3.342377	0.189656	0.008895	3.794889	0.606153
10	0.270366	4.292087	0.052889	0.84402	3.377134	2.621404	3.284385	5.528080
15	0.325902	3.705664	0.077303	76.02527	6.949374	3.437225	4.724856	5.080309
20	0.378984	4.727300	0.098548	72.91848	10.78233	2.824173	4.513374	4.135791
25	0.425522	6.670427	0.201876	69.05926	13.90276	2.249247	4.335029	3.581404

Variance Decomposition of RGOVEX

1	0.046106	0.309076	0.248801	99.44212	0.000000	0.000000	0.000000	0.000000
5	0.185685	1.401942	0.020150	95.26844	0.646296	0.526609	0.598970	1.537598
10	0.270366	4.292087	0.052889	80.84402	3.377134	2.621404	3.284385	5.528080
15	0.325902	3.705664	0.077303	76.02527	6.949374	3.437225	4.724856	5.080309
20	0.378984	4.727300	0.098548	72.91848	10.78233	2.824173	4.513374	4.135791
25	0.425522	6.670427	0.201876	69.05926	13.90276	2.249247	4.335029	3.581404

Variance Decomposition of REEX								
1	0.052242	0.740266	0.270797	10.11625	88.87268	0.000000	0.000000	0.000000
5	0.212797	3.274547	0.288358	9.573110	84.32200	1.765182	0.087175	0.689629
10	0.361242	14.34455	0.301330	7.465599	71.36477	5.327485	0.122025	1.074239
15	0.451142	18.99467	0.459427	6.396064	65.88685	7.133425	0.341458	0.788103
20	0.506291	22.26525	0.763387	5.792353	62.36130	7.320967	0.811056	0.685688
25	0.539850	24.21844	1.106787	5.659672	59.50197	7.249609	1.467331	0.796197
Variance Decomposition of INFL								
1	0.170258	0.881896	5.900053	2.248032	0.285546	90.68447	0.000000	0.000000
5	0.534746	3.445223	9.976532	3.167031	0.813537	82.50914	0.031734	0.056804
10	0.665274	13.15063	12.61302	5.373210	1.744169	66.57855	0.400199	0.140220
15	0.717111	12.95375	13.95477	10.81862	2.504664	57.42898	1.689724	0.649490
20	0.735166	12.98389	14.58107	12.03938	2.878609	54.69192	2.072374	0.752760
25	0.738405	12.93096	14.89212	11.98696	2.889156	54.29018	2.063226	0.947400
Variance Decomposition of RMS								
1	1	0.142188	1.465713	29.90223	0.045817	3.019969	65.42408	0.000000
5	0.102256	0.367040	0.637223	44.08197	0.123700	6.529105	48.07788	0.183089
10	0.177561	2.419841	0.232567	58.15206	0.453709	5.572181	32.96528	0.204353
15	0.247184	4.361254	0.128298	67.20977	1.641185	3.937308	22.21354	0.508642
20	0.306685	5.753647	0.123765	69.04292	3.352520	3.398615	17.44289	0.885643
25	0.357098	6.381869	0.164416	68.99691	5.282543	3.145013	15.05047	0.978770
Variance Decomposition of RIMP								
1	0.065899	3.772981	0.415052	16.34752	0.117844	0.043264	0.004320	79.29902
5	0.235094	2.052242	0.711874	23.98596	0.189387	0.642689	0.419708	71.99814
10	0.346492	1.236452	0.463242	45.38562	3.991972	1.649460	1.172248	46.10100
15	0.450422	1.255395	0.329299	54.21267	11.25625	3.285475	1.264441	28.39647
20	0.529493	3.356947	0.276328	53.19547	17.98639	2.577015	1.146538	21.46132
25	0.588715	5.517519	0.356024	50.32819	22.69577	2.169442	1.200951	17.73210

Table-3. Granger Causality tests results

Pairwise Granger Causality Tests
Date: 07/08/11 Time: 07:07
Sample: 1970:1 2010:4
Lags: 3

Null Hypothesis:	Obs	F-Statistic	Probability
OPRV does not Granger Cause INFL	157	4.20127	0.03030
INFL does not Granger Cause OPRV		0.36461	0.77865
REEX does not Granger Cause INFL	157	0.08201	0.96973
INFL does not Granger Cause REEX		1.00097	0.39424
RGDP does not Granger Cause INFL	157	0.38459	0.76425
INFL does not Granger Cause RGDP		0.26057	0.85370
RGOVEX does not Granger Cause INFL	157	0.40913	0.74666
INFL does not Granger Cause RGOVEX		0.37206	0.77328
RIMP does not Granger Cause INFL	157	0.55845	0.64327
INFL does not Granger Cause RIMP		0.30671	0.82051
RMS does not Granger Cause INFL	157	0.22528	0.87870
INFL does not Granger Cause RMS		1.38244	0.25039
REEX does not Granger Cause OPRV	157	0.82906	0.47983

OPRV does not Granger Cause REEX		4.07063	0.03410
RGDP does not Granger Cause OPRV	157	2.18809	0.09182
OPRV does not Granger Cause RGDP		0.21980	0.88254
RGOVEX does not Granger Cause OPRV	157	2.06584	0.10717
OPRV does not Granger Cause RGOVEX		3.74130	0.41006
RIMP does not Granger Cause OPRV	157	1.51214	0.21372
OPRV does not Granger Cause RIMP		0.26563	0.85009
RMS does not Granger Cause OPRV	157	2.30886	0.07877
OPRV does not Granger Cause RMS		0.07028	0.97573
RGDP does not Granger Cause REEX	157	2.23235	0.08681
REEX does not Granger Cause RGDP		1.74304	0.16065
RGOVEX does not Granger Cause REEX	157	1.21729	0.30552
REEX does not Granger Cause RGOVEX		1.24775	0.29458
RIMP does not Granger Cause REEX	157	0.77530	0.50952
REEX does not Granger Cause RIMP		2.55572	0.05750
RMS does not Granger Cause REEX	157	1.99999	0.11645
REEX does not Granger Cause RMS		0.64532	0.58707
RGOVEX does not Granger Cause RGDP	157	1.75839	0.15761
RGDP does not Granger Cause RGOVEX		1.06782	0.36466
RIMP does not Granger Cause RGDP	157	8.66764	2.4E-05
RGDP does not Granger Cause RIMP		0.19790	0.89769
RMS does not Granger Cause RGDP	157	28.1205	1.7E-14
RGDP does not Granger Cause RMS		4.99308	0.00249
RIMP does not Granger Cause RGOVEX	157	2.20024	0.09041
RGOVEX does not Granger Cause RIMP		2.99560	0.03271
RMS does not Granger Cause RGOVEX	157	1.24221	0.29654
RGOVEX does not Granger Cause RMS		8.86731	1.9E-05
RMS does not Granger Cause RIMP	157	1.67336	0.17518
RIMP does not Granger Cause RMS		3.80037	0.01159