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Effect of Crude Oil Price Fluctuation on Macroeconomic Performance in Nigeria 1980-2020

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ABSTRACT

The study examined the effect of crude oil fluctuations on macro-economic performance in Nigeria from 1980-2020. The specific objectives were centred on the evaluation of the effect of Crude oil price, corruption Perspective Index and Per-Capita Income on Gross domestic product, Unemployment rate and External Reserve in Nigeria using Autoregressive Distributed Lag (ARDL) technique with bound test approach to cointegration and Granger causality test from 1980-2020 precisely. The time series data showed stationariety and long run relationship between the variables. Findings in the gross domestic product model showed a positive and significant relationship between crude oil prices and macro-economic performance. With CointEq (-1.535) this speed of adjustment coefficient was negative indicates convergence of the variance and demonstrates the short run disequilibrium converged at the speed of 153% annually.

Findings in the unemployment model revealed the effect of crude oil prices on unemployment rate was negative and significant at 5% level on the long run analysis with the CointEq (--0.5238) coefficient indicating that the speed of adjustment coefficient was negative which shows the short run disequilibrium converged at the speed of 52% in the long run annually. The implication of this finding is that crude oil pricessupport to lessen macroeconomic shocks by fostering convergence as established in the short run dynamics to long run equilibrium annually.

Findings in the foreign reserves model showed that the effect of crude oil prices on foreign reserves was positive but significant at 5% level with the CointEq(--0.3225) was negative which indicates the short run disequilibrium converged at the speed of 32 % in the long run annually. The implication of this finding is that crude oil priceshelp to aggravate macroeconomic shocks by enhancing convergence of the short run to long run. The study therefore recommends that policy makers should ensure proper implementation and management of crude oil prices volatility in order to cushion macro-economic shocks specifically on foreign reserves, unemployment rate and gross domestic product for sustained economic growth.

Keyword: Crude Oil Prices, Macroeconomic Performance, Gdp, Unemployment And External Reserves.

INTRODUCTION

1.1 Background to the study

Nigerian economy has been absolutely subjected to crude oil and the basis upon which government budgeting, revenue distribution and capital allocations are anchored or used. Crude oil is a major source of revenue for Nigerian economy due to its vital role in shaping the economy and political landscape of the country. It is also a major source of foreign exchange earnings and the dominants source of revenue for the Nigerian government.

The international price of crude has been considered by economist due to its significant impact on macroeconomic variables. The world economy has experienced various positive and negative changes in the international price of crude oil. These changes in the world oil price have impacted on the macroeconomic variables. It has also influence greatly the economic conditions of these countries and pushed them to consider means to feel secure and save against the negative effects of international price therefore, petroleum exporting nations which are vulnerable to this negative consequences of crude oil prices, have form institutions and instruments for saving net foreign exchange revenues from sales to make use of it at the period of incidence of negative fluctuations in the oil market for their advantage (Nigerian excess crude account).

Energy plays an important role in the world economy, in spite of considerable inclination to alternative renewable sources of energy like water, wind, nuclear and solar powers, the central role of crude oil in macroeconomic environment has not failed yet. So, international price of crude oil may have macroeconomic consequences in both oil producing and oil consuming nations. Because in the former group, oil is the major source of revenue and in the latter it is a major input for production. Perhaps due to the dynamic and strategic importance, price of crude oil is highly volatile; even more than any other commodity Dehn (2001).

At the same time changes are hardly predictable these facts led to a great number of scholars to investigate the effects of crude oil price changes on macroeconomic activities, identifying the ways and channels through which these effects transmit and proposing effective monetary and fiscal policy measures to avoid any ugly impacts of undesirable changes e.g Hamilton1983, 1996, Bernanke 2004, Devlin &Lewin 2004. This various studies proved that international price of crude oil changes is an important source of macroeconomic instabilities such that its increase worsen the economic situation of most countries. Although, all the aforementioned studies like most of other articles focused on industrialized importing economies and their results are valid only for such nations.

1.2 Statement of the Problem

The international price of crude oil determines the fortunes of yearly budget in Nigeria, has fallen from 40 to 50% since June 2014 till date making the price to dwindle within $50 to $56 currently and as well forced the economy to drop into recession by second quarter of 2016 with contracted growth figure 2.06% between April and June 2016 (NBS) 2019. The country's 37.453 billion barrels of oil reserves as of 2019 are now significantly less valuable than before. Previous slumps in prices have spelt disaster for Nigeria and other oil dependent countries leading to reduction in government coffers, painful fiscal cuts and reduced economic growth.

Today, Nigeria has lost earnings from oil and has to fund the 2016 budget mainly from borrowed funds and perhaps from recovered loot Nwoba*etal*(2017). It is also argued that Nigeria is faced with consistent decrease in living standard. The current living standard in Nigeria showed that about 60% of her citizens live below one dollar per day. There are instances where the economic activities become stagnated due to government's inability to implement its fiscal and monetary policies. Consequently, jobs are being lost on daily basis, public sector struggle to pay salaries and government constantlyconfronted with the issue of foreign exchange instability and budget deficit.

However, the reality is a far cry from this expectation only few households seem to benefit from the crude oil price windfall while others are subjected to further deprivation, higher food prices, higher transport costs and higher energy costs. On the other hand, there are groups of studies who believe that the massive infrastructural development of the mid-1970s would not have been possible if not for the oil money (Egwaikhide, 2012).

Previous studies have discussed international price of crude oil fluctuations and its effects on Nigeria economic performance. These studies have provided evidence that there is a relationship between international price of crude oil movement and macroeconomic variables. but, those studies did not capture the link between oil price changes and living standard of Nigerian measured by per-capita income, also, oil price changes and the selected macroeconomic structure to be explored using autoregressive distributive lags (ARDL)hence the choice of this study making it more flexible and robust to examine the relationship using the above econometric techniques.

1.3 Objective of the Study

The broad objective of this study is to evaluate the relationship between changes in global price of crude oil and macroeconomic behaviour in Nigeria since 1980-2019 and the specific objectives were to:

i. Review the nature, magnitude and factors responsible for global price of crude oil fluctuations.
ii. Examine the impacts of global price of crude oil changes on selected macroeconomic variables, (GDP, Unemployment rate, External reserves) in Nigeria.
iii. Examine the impact of other relevant economic variables (rating of corruption index and Nigerian living standard) and how it can lead to macroeconomic stability in the face of global price of crude oil instability.

2 .LITERATURE REVIEW

2.1 Theoretical Literature

2.1.12.1.1 Mainstream economists view on resource-based growth

Mainstream economics believe that countries should produce and export according to their comparative advantage. The theory of comparative advantage suggests a country gains the greatest economic benefit relative to other countries by producing at lower overall cost commodities which a country has in abundance or can be easily produced. Other trading countries will therefore benefit if they accept the cost advantage of the trading country and focus on

producing a commodity in which they have an advantage. It is this theory which guides mainstream economists belief in free trade, specialization and the international division of labour. This is their reasoning behind why somecountries produce agricultural and mineral commodities while others produce industrial goods, Tool (2007).

2.1.3 Structural Economists View

Structural economistdoctrine embraced the idea of industrialization and less reliance on the production of primary products O'Toole (2007). The doctrine reject many of the claims of mainstream economists argued that the economy is influenced by power and politics and markets were controlled by the elite who did little to create growth. Similarly while mainstream economists argued for free trade, structural economists argue that free trade leads to high development in the centre (developed countries) whichdeeply affects less developed countries (LDC'S). As a solution to free trade, structural economists encourage developing countries to trade among themselves in order to reduce reliance on industrialized economies. The main theme of structural economics is the notion that developing countries are all characterized by free market failures therefore there is a role for the state to play to ensure development.

2.2 Conceptual framework

Concept of economic growth(Gdp)

The term growth broadly connotes quantitative increase this is driven by Kuznets (1955) assertion that economic growth is essentially a quantitative phenomenon, thus providing the basic for making substantial advancement in the empirical and theoretical analysis of the growth phenomenon. In conceptualizing economic activity can only be identified and its outcomes quantified if there is prior identification of the underlying purpose of that activity.

Shema(2015) defined economic growth as population plus productivity. This measures economic growth by adding the rate at which thelabour force is expanding to the rare at which productivity is increasing overtime. Uwakaeme(2015) posit that economic growth is viewed as the positive and sustained increase in total goods and services produced in an economy within the specific period of time. When measured with the population of a given country in a given period.

Economic growth can equally be conceptualized in nominal and real terms, when the increase in the aggregate level of goods and services is deflated as real economic growth otherwise when measured without deflation; it is called nominal economic growth. In economic literature the notable measure of economic growth is gross domestic product (Gdp). More so, economic growth is an increase in the capacity of an economy to produce goods and services, compared from one period of time to another.

However, Belshaw and Livingstone (2002) argue that while GNP per capita figures are the traditional measurement of economic growth and development, a better indicator of well-being is now available, namely the human development Index. The HDI defines well-being in terms of combinations of a measure of income, a health indicator and an access to knowledge indicator. The process of development should at least create a conducive, environment for people, individually and collectively, to develop their full potential and to have a reasonable chance of leading a productive and creative life according to their needs and interests (UNDP, 2015).

2.2.2 Concept of Foreign Reserve

IMF(2014) view foreign reserves as those external assets that is readily available to and controlled by a country's monetary authorities. They comprise foreign currencies, other assets denominated in foreign currencies, gold reserves, special drawing rights (SDRs) and IMF reserve positions. These reserves may be used for direct financing of international payments imbalances or for indirect regulation of the magnitude of such imbalances via intervention in foreign exchange markets in order to affect the exchange rate of the country's currency"Similarly, CBN (2011) described foreign exchange reserves as assets held in reserve by a monetary authority in foreign currencies. These reserves are used to back liabilities and influence monetary policy. They include foreign banknotes, deposits, bonds, treasury bills and other foreign government securities. These assets serve many purposes, but are most significantly held to ensure that a government or its agency has backup funds if their national currency rapidly devalues. Foreign exchange reserves are also called international or external reserves.

2.3 Empirical Literature

Habib and Kalamova (2007) examine the effect of crude oil price fluctuation on exchange rate.Findings revealeda positive relationship in the case of Russia, but no relation in the cases of Norway and Saudi Arabia. In single-country settings, sonic attempts have been made to find explanations for variations over time in the estimated degree of co variation between real exchange rates and the real oil price. Sosunov and Zamulin (2006) and Issa et al. (2016) point to the relative importance of oil exports and the domestic economy to account for the degree of appreciation following oil price hikes.

Bagella et al. (2016) examine the relationship between crude oil price volatility and inflation and produced evidence that fluctuations negatively impact on per capita income. Real exchange rate volatility is one of the central mechanisms behind the so-called Dutch Disease. There is some evidence that a fluctuating real exchange rate may be harmful for economic growth.

Oriakhi and Osaze (2013) examined the consequences of oil price volatility on the growth of the Nigeria economy within the period 1970 to 2010. With the use of VAR model, the study find that oil price volatility has direct impact on government expenditure, real exchange rate, and real import while real GDP and inflation are indirectly influenced by the oil price volatility. By implication the study shows that changes in oil price determine Government expenditure which in turn determines the growth of the Nigeria economy.Similarly, using monthly data, Apere and Ijomah (2013) indicated unidirectional relationship between interest rate, exchange rate price with direction from oil prices. Also, it showed that oil price has no significant impact on real GDP. They arrived at this conclusion with the use of EGARCH model, Impulse Response Function and Lag-Augmented VAR for the investigation of the macroeconomic impact of oil price levels and volatility in Nigeria during the period 1970-2009.

Wilson, David, Inyiama and Beatrice (2012) examined the relationship between crude oil price volatility and economic development in Nigeria. Applying Ordinary Least Square and Granger Causality Test, the study revealed that there is no significant relationship between oil price volatility and key macroeconomic variables (Real GDP, inflation, interest rate and exchange rate).Contrarily, the study of oil price shocks and volatility of selected macroeconomic indicators in Nigeria carried out by Taiwo, Abayomi and Damilare (2012) using Johasen Co-integration Test and Error Correction Model indicated the crude oil price, stock price and exchange rate have significant influence on the growth of the Nigeria economy.

3.RESEARCH METHODOLOGY

3.1 Research Design

Research design provides the blueprint or required procedure for carrying out an investigation. Kerlinger (1973) asserts that research design defines what the researcher intends to do from formulating hypotheses and their operational implications to proper data analysis. Also, Van-Wyk (2010) posits that research design provides in-depth information on the nature of data required method of obtaining the required data and techniques to be adopted in analyzing theresearch, a factorial research design will be adopted so as to appropriately evaluate the long-term impact of the regressors on the regressands.

3.2 Sourcesof Data

The data that was used for this study come primarily from secondary sources. That is, data will come principally from the publications of the Central Bank of Nigeria's (CBN) Annual Reports and Statement of Accounts; Economic and Financial Review: and Principal Economic Indicators. Furthermore, publications from the National Bureau of statistics (NRS): Annual Abstract of Statistics and the International Financial Statistics (IFS) published by the International Monetary Fund (IMF).

3.3 Model Specification

The mathematical from:

GDP= f (COP, CPI, PCI) (i)

UN= f (COP, CPI, PCI) (ii)

ER=f (COP, CPI, PCI) (iii)

The econometrics form:

The ARDL model as specified as:

$lnGDP_t = \lambda o_t + \beta_1 Cop_t + \beta_2 CPI_{t-1} + \beta_3 PCI_{t-1} U_t$ (i)

$UN_t = \lambda o_t + \beta_1 Cop_t + \beta_2 CPI_{t-1} + \beta_3 PCI_{t-1} U_t$ (ii)

$lnER_t = \lambda o_t + \beta_1 Cop_t + \beta_2 CPI_{t-1} + \beta_3 PCI_{t-1} U_t$ (iii)

$$\sum_{i=1}^{h} \beta_1 \Delta lnGDP_t + \sum_{i=1}^{h} \beta_2 \Delta Cop_{t-1} + \sum_{i=1}^{h} \beta_3 \Delta CPI_{t-1} + \sum_{i=1}^{h} \beta_4 \Delta PCI_{t-1} + U_{it}$$

$$\sum_{i=1}^{h} \beta_1 \Delta UN_{t-1} + \sum_{i=1}^{h} \beta_2 \Delta Cop_{t-1} + \sum_{i=1}^{h} \beta_3 \Delta CPI_{t-1} + \sum_{i=1}^{h} \beta_4 \Delta PCI_{t-1} + U_{it}$$

$$\sum_{i=1}^{h} \beta_1 \Delta lnER_t + \sum_{i=1}^{h} \beta_2 \Delta Cop_{t-1} + \sum_{i=1}^{h} \beta_3 \Delta CPI_{t-1} + \sum_{i=1}^{h} \beta_4 \Delta PCI_{t-1} + U_{it}$$

COP = Crude oil price

UN = Unemployment rate

GDP = Gross domestic product
ER = External Reserve
CPI = Corruption Perspective Index
PCI = Per-Capita Income
ln = Natural logarithm operator
Δ = First difference operator
λ = Term
φi = Long run multiplier
β_1-β_5 = Coefficients of the lagged first differenced regressor
g and h = Lag lengths
U_{it} = Random disturbance term

3.4 Data Analytical Technique

The time series data was estimated using the Autoregressive Distributed Lag (ARDL) Bound testing approach, developed by Pesaran*et al* (2001) to examine the long-run relationship between the variables. This flexibility of the lag structure of the independent variables is commendable because reactions to a change in each variable could be different depending on the underlying factors with a lag. Finally, the approach adopted pre-estimation and post estimation test, Granger causality test to analyze the study.

4. Results

Table 4.1. Summary Statistics Results

Variable	GDP ($ US Billion)	ER ($ US Billion)	UN (%)	COP ($)	CPI (Index)
Mean	233.27	17.61	7.35	41.27	2.08
Max	469.38	53.60	23.10	109.45	2.80
Min	107.86	0.93	1.90	12.28	0.69
Std.Dev.	124.09	18.28	3.81	29.43	0.62

Source: Author's Computation

4.2.1 Pre-estimation Tests

4.2.1.1 Unit Root Tests Results

Table 4.2: PP and KPSSUnit Root Test Results at Levels

	PP			**KPSS**	
Variables	Const (crit.)	Const.+ Trend (crit.)	None (crit.)	Const (crit.)	Const.+Trend (crit.)
LOG(GDP)	0.773 (2.94)	3.971* (3.533)	2.209*(1.950)	0.701 (0.463)	0.202 (0.146)
LOG(ER)	0.792 (2.94)	3.908* (3.533)	0.022 (1.950)	0.641 (0.463)	0.136* (0.146)
UN	2.637 (2.948)	2.637 (2.948)	0.616 (1.951)	0.735 (0.463)	0.092* (0.146)
LOG(COP)	1.051 (2.939)	2.263 (3.530)	0.186 (1.950)	0.501 (0.463)	0.136* (0.146)
LOG(CPI)	3.403*(2.998)	4.445*(3.622)	0.370 (1.956)	0.646 (0.463)	0.130*(0.146)

Source: Author's Computation , 2020.

Table 4.3: ADF and PP Unit Root Test Results at 1st Difference

	PP			**KPSS**	
Variables	Const (crit.)	Const.+ Trend (crit.)	None (crit.)	Const (crit.)	Const.+Trend (crit.)
LOG(GDP)	4.230(2.943)	3.931* (3.537)	3.082* (1.950)	0.393* (0.463)	0.145* (0.146)
UN	3.856* (2.943)	4.369* (3.537)	3.552* (1.950)	0.329* (0.463)	0.170 (0.146)
LOG(COP)	6.004* (2.941)	5.998* (3.533)	6.065* (1.950)	0.176* (0.463)	0.110* (0.146)

Source: Author's Computation, 2019.

4.2.3 Model Estimation Results

4.2.3.1 ARDL GDP Model Result

Variable	Coefficient	Probability
DLOG(GDP(-1))	0.628547	0.0337
DLOG(GDP(-2))	1.218880	0.0127
DLOG(COP)	0.069466	0.0168
DLOG(COP(-1))	-0.105407	0.0067
DLOG(CPI)	-0.045501	0.3640
DLOG(CPI(-1))	0.072928	0.1358
DLOG(CPI(-2))	-0.091669	0.0605
DLOG(CPI(-3))	0.055233	0.0771
CointEq(-1)	-1.535734	0.0033
Long Run		
Variable	Coefficient	Probability
LOG(COP)	0.120337	0.0004
LOG(CPI)	-0.037309	0.4915

Source: Author's Computation

4.2.3.2 ARDL Unemployment Rate Model Result

Variable	**Coefficient**	**Probability**
	Short run	
D(UN(-1))	1.179442	0.1308
D(UN(-2))	0.592300	0.2992
D(UN(-3))	0.628118	0.1567
DLOG(COP)	-1.883591	0.0656
DLOG(COP(-1))	3.042776	0.0396
DLOG(COP(-2))	3.414594	0.0110
DLOG(COP(-3))	-1.657804	0.1027
DLOG(CPI)	5.199644	0.0298
CointEq(-1)	-1.523876	0.0626
Long Run		
Variable	Coefficient	Probability
LOG(COP)	-5.184062	0.0180
LOG(CPI)	4.255711	0.0133

Source: Author's Computation

4.2.3.3 ARDL External Reserve Model Result

Variable	**Coefficient**	**Probability**
	Short run	
DLOG(ER(-1))	1.386279	0.0145
DLOG(ER(-2))	-0.075844	0.5942
DLOG(ER(-3))	0.334492	0.1689
DLOG(COP)	0.053232	0.7207
DLOG(COP(-1))	0.406313	0.0930
DLOG(COP(-2))	-0.502162	0.1036
DLOG(CPI)	2.252711	0.0134
DLOG(CPI(-1))	-1.332912	0.0107
DLOG(CPI(-2))	0.565114	0.0689
DLOG(CPI(-3))	-0.769241	0.0729
CointEq(-1)	-1.394189	0.0127
Long Run		
Variable	**Coefficient**	**Probability**
LOG(COP)	0.199823	0.1888
LOG(CPI)	3.442398	0.0014

Source: Author's Computation

5.Conclusion

The study evaluated the effect of crude oil prices on macroeconomic performance in Nigeria from 1980-2020 adopting unit root test, bound test cointegration test and autoregressive distributive lags(ARDL) as the data techniques to explore the empirical evidence in the time series data in order to analyze both dependent and independent variables and showed a long run cointegration between external reserves, unemployment, gross domestic product and crude oil prices at level [1(0)].The implication showed that overall model was fit and confident for use. This study discovered that crude oil prices had a statistically positive and significant relationship with gross domestic product within the year under review. More so, the findings revealed a negative and significant relationship between crude oil prices and unemployment and finally the results of the study established a positive and significant effect between crude oil prices and external reserves in Nigeria. Therefore the study concludes that the stability of crude oil volatility is anchored on the variance of macroeconomic shocks and the influence of its performa**nce.**

Recommendations

(i).Government should review the nature, magnitude and factors responsible for global price of crude oil fluctuations through consistent growth of foreign reserve earnings and exchange rate stability.

(ii). Government should implement policies capable of impacting favourably on global prices of crude oil on the selected macroeconomic variables such as gross domestic product and unemployment rate in Nigeria.

(iii). Policy makers should establish and monitor policies to specifically examine the impact of corruption index and per capita income in Nigerian that can lead to macroeconomic stability in the face of global price of crude oil volatility.

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