



CRUDE OIL PRICE AND MACROECONOMIC VARIABLES NEXUS: IMPACT ON NIGERIA'S ECONOMIC GROWTH

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ABSTRACT: *It is no longer news that Nigeria runs a single-product economy where the only source of revenue for the country is crude oil exportation. Changes in the prices of crude oil in the international market continue to have severe implications on the country's economy's growth rate, exchange rate and even inflation. This study seeks to investigate the impact of four key variables (crude oil price, real exchange rate, inflation and population) on Nigeria's economic growth. This is to give necessary policy makers a clear direction on the inter-relationship of these explanatory variables on the economic growth of Nigeria. This study employs annual time series data obtained from the World Development Indicator (WDI). Augmented Dickey Fuller (ADF) test was used to determine the presence of unit roots among the variables before the Johansen Before the Johansen Cointegration test and Vector Error Correction Model (VECM) were carried out to determine the cointegration and relationships existing among the variables. The study reveals that all the variables were all integrated at the first order I which necessitated the presence of a long-run of a long-run relationship among the variables; this is further confirmed by the Johansen Cointegration test carried out. The findings of this study clearly show that the explanatory variables used in this study are all significant on the response variable (GDP) in both long-run and short-run. The rise and fall in the prices of crude oil have negatively affected Nigeria's economic growth, real exchange rate and are equally responsible for the inflationary increase in the country in the long run.*

KEYWORDS: Crude oil price, Economic growth, Real exchange rate, Inflation, Population.



INTRODUCTION

It is a general notion and an acceptable fact that Nigeria is the largest producer of oil and gas in Africa (Oduyemi & Owoeye, 2020; Graha & Ovadia, 2019). The country remains one of the major exporters of petroleum products and crude oil to major countries of the world like the United States of America (USA) (Amadi et al., 2021; Oludimu & Adeola, 2021). In 2010 alone, Nigeria exported over one million barrels of crude oil to the USA which represented 9% of the U.S total crude oil and petroleum products imports and over 40% of Nigeria export (Akinyetun et al., 2021; Ayoola and Olarenwaju, 2018). Recent trend shows that the country's average production is 1.451 million barrels/day in September 2021; this represents an increment of 156 barrels/day when compared to the average production in August 2021, which was 1.296 million barrels/day. It remains the major and dominant source of income for Nigeria's economy and also a basis upon which the country's year on year budget and revenue allocations solely depend (Oludimu & Adeola, 2021; Maku et al., 2021).

Though the country is blessed with so many abundant natural resources, over the years, Nigeria's oil sector has witnessed commendable growth where export and production continue to increase enormously due to huge demand (Cust & Mihalyi, 2017; Adams, 2016). Crude oil remains one of the energy sources in Nigeria and continues to have an important economic contribution in every affair of the country (Musa et al., 2019). The revenue obtained from crude oil has over the years been used in building infrastructure, improving the quality of health, providing education, developing the country politically, among others. This sector provides the largest foreign exchange around 95 percent of the country's foreign exchange earnings and over 80 percent of the country's budget (Zhou et al., 2019; Ifeanyi & Ayenajeh, 2016).

The real exchange rate is another important factor that contributes to the economic growth of nations as it is very helpful in improving private investment and increasing a country's exports (Masipa, 2018). In Nigeria, the non-stable oil price determines how the country's economy performs and the magnitude of these effects is strictly on factors like the real exchange rate at that particular time, oil price in the national income and the level of dependence on imported oil (Jibir & Aluthge, 2019; Dike, 2018). The numerous problems faced by Nigeria are the results of the solely major exportable product which is crude oil; as such, the country's economy is regularly confronted by falls in the price of oil in the world market which oppose growth of the economy (Musa et al., 2019). The stability of the real exchange rate influences price stability, investments and economic growth (Ioan et al., 2020; Alagidede & Ibrahim, 2017). Research on crude oil price and real exchange rate remains a cogent area of concern to finance experts and policy makers especially economies of developing countries like Nigeria because the exchange rate determines the relative price of one's currency and how powerful the exchange power of a country is compared to other countries in the global market (Maku et al., 2021).

Another key factor that affects the crude oil price and real exchange rate at macroeconomic level is inflation (Phuc & Duc, 2021; Qiang et al., 2019). A notable example was in 2015, when the international market witnessed a steep fall in oil price which resulted in Nigeria's foreign exchange rates decline. During this period, inflation rate was seen to rise from 12.5% to 13% between first and second quarters despite the urgent interventions of the country's apex bank to have the naira at a constant value. Though the country's economy has been prevented from the direct effects of changes in oil price due to fuel subsidies, it has further experienced



different inflationary pressures that arose from the increase of having imported goods produced when the price of oil increases in the global market.

Considering the inter-relationship between crude oil price, real exchange rate, inflation and population. Population and energy resources are known to be intrinsically connected where everyone believes that as the world population increases every year, more energy resources are needed at a higher rate to cater for human daily activities. This explains why the relationship between energy consumption and population is positive (Mesagan et al., 2018). Limited energy products will definitely slow the pace of human activities thereby preventing economic growth. It is a known fact that Nigeria's population keeps increasing every year and the country keeps experiencing a reduction in her oil revenue. Hence, the need to diversify her economy in order to cater for the increasing population and have the economy sustained. The recent inflation in the country which is as a result of increasing the dollar to naira exchange rate continues to have numerous effects on the teeming population where the majority can no longer afford to live comfortably.

Although, some works have considered the impact of crude oil price and real exchange rate on economic growth (Musa et al., 2019; Charles et al., 2019; Mgbame et al., 2015) where crude oil price and real exchange were found to impact economic growth both on the short run and on the long run stressing the needs for government to diversify into other sectors in order to reduce its large reliance on crude oil without distinguishing the economic effects of either increase or decrease of crude oil price and real exchange rate on economic growth. Changes in the prices of crude oil and real exchange rate are always used to forecast short term economic growth and other macroeconomic variables like unemployment. But, little or no study has considered the role inflation plays on the fluctuations of crude oil price and real exchange rate and the inter-relationship effects these variables have on a developing country's economic growth. In a country where only one source of income (crude oil exportation) is used to finance most of its budget with yearly increasing population, researching this gap is important because the concerned independent variables (crude oil price, real exchange rate and inflation) determine the quality of life citizens in the country are living.

To effectively determine the misalignment of real exchange rate and the fluctuations of crude oil price in connection with how inflation affects these two variable and the entire population of Nigeria as a developing country on economic growth, this study seeks to determine the impact of four cogent variables which are crude oil price (COP), real exchange rate (RER), inflation (INF) and population (POP) on Nigeria's economic growth. This will be done empirically using Augmented Dickey Fuller test to determine the stationarity conditions of the variables before applying the Johansen Cointegration test, Granger Causality test and vector error correction model (VECM) on the variables.

The rest of the paper is organized as follows: Section two covers theoretical and empirical literature. Section three justifies the methodological considerations of the study. Section four discusses the empirical results, while the last section presents some concluding remarks, policy implications and further research directions on the subject under study.



LITERATURE REVIEW

Review of Past Studies on Crude Oil Price and Real Exchange Rate on Economic Growth

Conducting a thorough review of literature reveals that there is no previous or existing work that has actually examined the economic impact of crude oil price, real exchange rate, inflation and population on economic growth. Although, some studies have considered the relationship between crude oil price and economic growth or real exchange rate on economic growth. The only study that has considered the impact of crude oil price and real exchange rate on economic growth in Nigeria is the one conducted by Musa et al. (2019). The study was performed using an autoregressive distributed lag (ARDL) model from 1982 to 2018. It was revealed that both crude oil price and real exchange rate contribute significantly to Nigeria's economic growth on both short-run and long-run. The study also emphasized the need for concerned policy makers and government to re-diversify from crude oil absolute reliance to other areas like industrialization, agriculture, telecommunication, information and communication technology (ICT).

Agu (2020) investigated the impact of crude oil price on economic growth using Structural Vector Autoregressive (SVAR) model. The study's finding shows that whenever the price of crude oil becomes negative, it has a stronger economic effect on the country's economic growth than other types of crude oil price changes. Adegbemi et al. (2019) considered the impact of oil price volatility on Nigeria's economic growth covering a period of 1995 to 2017 using descriptive statistics and regression analysis. The study revealed that oil price has an insignificant and a negative effect on Nigeria's economic growth. The study recommended that policies that will reduce the negative shocks of crude oil price on the country's economic growth and budgetary system should be adopted. Charles and Oguntade (2016) also explore the economic effects of crude oil price on economic growth in Nigeria from 1980 to 2016 using the ordinary least squares method. The study revealed that a significant long-run relationship exists among crude oil prices and economic growth in Nigeria and equally emphasized the need for the country's economy to be re-diversified into other sectors.

Bala and Alhassan (2020) empirically explored the impact of crude oil price and importation of food on Nigeria's economic growth. With two control variables (inflation and real exchange rate). The study employed the Structural Vector Autoregressive (SVAR) Model and the data ran from 1970 to 2015. The SVAR result revealed that crude oil price and food importation both have significant effect on economic growth on both short-run and long-run with much variability obtained from crude oil price, exchange rate and food importation to economic growth while inflation is seen to contribute little variability from the structural decomposition. The study also recommended the need to adopt policies that will diversify the country's economy and focus on other alternative sources of revenue for the economy.

Real exchange rate plays a pivotal role in any country's trade level which is equally important to free market economies. Substantial research has been done on the economic effects of real exchange rate on economic growth especially Nigeria as a developing country. Ufoeze et al. (2018) explored the effects of monetary policy on Nigeria's economic growth where gross domestic product (GDP) in its natural log form was used as the dependent variable and the independent variables were money supply, monetary policy rate, lending rate, real exchange rate and investment using ordinary least square. The study employed time series data covering 1986 to 2016 while the findings of the study revealed that long-run relationships ran among



the variables and real exchange rate was seen to have a significant negative effect on Nigeria's economic growth.

According to Guzman et al. (2018) in a study on the impact of real exchange rate in enhancing economic growth, it was revealed that competitive and stable real exchange rate policies may help to correct major failures in the market and improve economic growth. The authors also revealed that conventional policies from industries may also influence real exchange rate and that capital flow regulation goes a long way to have a stable real exchange rate which directly influences economic growth. The fluctuations of crude oil price directly transmit into economic output through real exchange rate. A related study by Ehikioya et al. (2020) where Johansen Cointegration techniques were used to explore the relationship between prices of crude oil and real exchange rate in selected sub-Saharan African countries from 2004 to 2017. The results obtained from the study showed that fluctuations in the prices of crude oil predicted real exchange rates movement in countries like Angola, Congo, Equatorial Guinea, Nigeria and Gabon. The author also suggested urgent diversification of the economy in these countries to other sectors in order to reduce heavy dependence and negative impact of prices of crude oil on economic growth.

Review of Past Studies on Inflation and Population Growth on Economic Growth

On impact of inflation on economic growth and other interesting variables, studies revealed that inflation has contributed negatively to the economic growth of Nigeria over years (Idris & Suleiman, 2019; Anochiwa & Maduka, 2015), and a long-run relationship exists between inflation and economic growth. The economy of Nigeria has always experienced depreciation in its real exchange rate in the market which is majorly caused by inflation (Osabuohien et al., 2018). On the other hand, Gidigbi et al. (2018) investigated the influence real exchange rate fluctuations has on price inflation in Nigeria using an annual data that covered 1981 to 2015. The authors employed a vector error correction model (VECM) to examine the relationship between these variables and the results clearly showed that the variables were related in the long run but real exchange rate does not determine price inflation on the short-run.

Population growth rate keeps increasing in Nigeria with a larger percentage being young ones and youth who have physical and mental capabilities to contribute to their country's economic growth. Some scholars have argued that the impact of the country's increasing population growth does not reflect on its economic growth but Tartiyus et al. (2015) investigated the influence population growth has on Nigeria's economic growth using regression analysis. The results revealed that Nigeria's average population growth had a positive effect on economic growth during the study period. Another related study by Peter and Bakari (2018) that used generalized method of moments (GMM) on panel data consisting fifty-three African countries to determine the impact of population growth on African economic growth, resolved that population growth positively influences economic growth in these African countries but recommended that policies that will enhance population productivity should be adopted.



METHODOLOGY

This study employs the Augmented Dickey Fuller (ADF) test, Johansen Cointegration technique and vector error correction model (VECM). Although both tests have been timely tested in time series analysis, they remain tests preventing obtaining spurious results and determining whether econometric analysis results are trustworthy or not. These methods are preferred for several reasons, such as the ADF test which is usually used to determine the unit root conditions of the variables in order not to have spurious results and making ineffective, misleading conclusions. The Johansen Cointegration test is a test that does not require any prior assumption of exogeneity among the concerned variables. The VECM allows a variable to impact itself and other variables without any need to have a theoretical framework on the estimates but through impulse response functions and variance decomposition. Time series annual data were gotten from the World Development Indicator (WDI) on the independent variables, that is, crude oil price (COP), real exchange rate (RER), inflation (INF), Ln of population (LNPOPN) and the dependent variable which is GDP/Capita (GDP) from 1991 to 2020.

The random walk characteristics of all macroeconomic variables would always produce spurious and misleading results when regressed with one another. Therefore, it is necessary to mitigate this problem by differencing these data to be stationary. To prevent this and to determine the appropriate and necessary estimation technique that will be required for this study, the ADF test by Dickey and Fuller (1979) was employed. The intercept and the ADF trend are represented in the two equations below:

$$\Delta Y_t = \delta_0 + \beta Y_{t-1} + \delta_i \Delta Y_{t-1} + \varepsilon_t \quad (1)$$

$$\Delta Y_t = \delta_0 + \beta Y_{t-1} + \delta_t + \delta_i \Delta Y_{t-1} + \varepsilon_t \quad (2)$$

Where Y_t is the variable that is being tested, Δ denotes the first differencing level, ε_t is the white noise process at period t and Y_{t-1} is a lag period. This was carried out at level before differencing the data. When series are stationary at first order, there is a need to determine whether a long-run relationship exists among the variables using the Johansen Cointegration test. According to literature, (Pesaran et al., 2001; Johansen & Juselius, 1990; Engle & Granger, 1987), co-integration is used to examine the presence of long-run relationship among variables. The Johansen test type simply determines the number of co-integrating equations that exist among variables. It uses two test procedures to determine co-integrating equation numbers which are Trace statistic and Maximum Eigenvalue statistic. The Johansen framework is developed from vector auto-regression as given below

$$Y_t = \gamma + B_1 Y_{t-1} + \dots + B_p Y_{t-p} + \varepsilon_t \quad (3)$$

Where Y_t denotes an $n \times 1$ order one, $I(1)$ vector of variables and ε_t remains an $n \times 1$ vector of error terms. The Johansen trace statistic and maximum eigenvalue statistic are given as



$$J_t = -P \sum_{i=r+1}^n \ln(1 - \varphi_i) \quad (4)$$

$$J_m = -P \ln(1 - \varphi_{r+1}) \quad (5)$$

Where J_t denotes trace statistic, P is the sample size while φ_i is the i th canonical correlation. Also, J_m denotes maximum eigenvalue statistic.

When co-integrating equations are found among variables, then a suitable estimation technique which adjusts to short-run changes and deviations that arise from equilibrium among the variables is vector error correction model (VECM). The general estimation equation for VECM model is given below

$$\Delta Y_t = \gamma_1 + \gamma_2 EC_{t-1} + \gamma_3 \Delta Y_{t-1} + \Delta \gamma_4 X_{t-1} + \varepsilon_t \quad (6)$$

Where EC is the error correction term and EC_{t-1} determines the adjustment speed of growth to its equilibrium.

RESULTS, INTERPRETATION AND FINDINGS

Table 1: Unit Root Test

Variable	T-statistic	Prob	Order
GDP	-4.4938	0.0068	I(1)
Inflation	-4.9293	0.0031	I(1)
LnPOP	-3.8807	0.0285	I(1)
COP	-4.4495	0.0075	I(1)
RER	-3.9748	0.0223	I(1)

Source: Authors' Computation (2022)

Table 1 above shows the Augmented Dickey Fuller test carried out to test the stationarity conditions of the variables employed for this study. The outcome of this test shows that the variables GDP, INF, LNPOP, COP and RER were stationary at their respective first differencing level with the absolute value of their t-statistic being above 2 and their probability values less than 0.05. This shows that their mean, variance and covariance remain constant overtime and equally establishes a long term relationship among the variables. Statistically, it also means all the variables are moving together in time and any observed deviations from this long term trend will quickly be noticed and corrected (Al-Gasaymeh et al., 2019). Since the variables become stationary at the first difference level as proved in Table 1, we proceed to conduct the Johansen Cointegration test to determine the long-run relationships among the variables.

**Table 2: Johansen Cointegration Test (Trace)**

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.9081	150.0652	69.81889	0.0000
At most 1 *	0.7872	83.2361	47.8561	0.0000
At most 2 *	0.6443	39.9152	29.7971	0.0025
At most 3	0.2969	10.9711	15.4947	0.2133
At most 4	0.03869	1.1049	3.8415	0.2932

Source: Authors' Computation (2022)

Having established that all the variables were stationary at their first difference level, it becomes statistically right to test for Johansen cointegration test in order to check the level of long-run relationships among the variables. Table 2 shows the trace test for the Johansen cointegration test. It shows a total of three co-integrating equations and with the null hypothesis that says there are no long-run relationships among the variables being rejected. With at least three co-integrating equations, it is a proof that there exists long-run relationship among GDP, INF, LNPOPN, COP and RER

Table 3: Johansen Cointegration Test (Maximum Eigenvalue)

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.9081	66.8291	33.8769	0.0000
At most 1 *	0.7872	43.3209	27.5843	0.0002
At most 2 *	0.6443	28.9441	21.1316	0.0033
At most 3	0.2969	9.8661	14.2646	0.2209
At most 4	0.0387	1.1049	3.8415	0.2932

Source: Authors' Computation (2022)

To strengthen the result obtained from the trace statistic in Table 2, the maximum eigenvalue test is carried out to also ascertain the level of long-run relationship among the variables. It also indicates three co-integrating equations among the variables which equally means the null hypothesis of no long-run relationship among variables is rejected. It is a known fact that whenever any economic theory is right on some set of macro-economic variables, the variables will be linked in the long run.

**Table 4: Granger Causality Test**

Null Hypothesis:	F-Statistic	Prob.
COP does not Granger Cause GDP	3.2629	0.0566
GDP does not Granger Cause COP	0.6829	0.5151
RER does not Granger Cause GDP	0.8091	0.4575
GDP does not Granger Cause RER	4.8951	0.0169
INF does not Granger Cause GDP	0.1308	0.878
GDP does not Granger Cause INF	0.4511	0.6425
LNPOPN does not Granger Cause GDP	5.1405	0.0143
GDP does not Granger Cause LNPOPN	26.8934	1.00E-06
RER does not Granger Cause COP	1.2876	0.2951
COP does not Granger Cause RER	2.5044	0.1037
INF does not Granger Cause COP	0.2049	0.8161
COP does not Granger Cause INF	0.3254	0.7255
LNPOPN does not Granger Cause COP	10.3853	0.0006
COP does not Granger Cause LNPOPN	2.07589	0.1483
INF does not Granger Cause RER	0.39534	0.6779
RER does not Granger Cause INF	0.5427	0.5884
LNPOPN does not Granger Cause RER	15.3028	6.00E-05
RER does not Granger Cause LNPOPN	2.2601	0.127
LNPOPN does not Granger Cause INF	0.4927	0.6173
INF does not Granger Cause LNPOPN	5.1109	0.0146

Source: Authors' Computation (2022)

This is a test that checks the causality direction among variables under study. According to [41], the Granger Causality Test helps to determine the forecasting connections among variables and the direction of relationships among the variables. It tells whether the relationship between two variables are either unidirectional, bidirectional or whether there exists no linkage between these variables. Since the co-integration test does not consider the impact of previous values of a variable on the present value of the other variable, the Granger Causality test takes cognizance of lags number used in the estimation process where notable selection criteria like Schwarz Criterion (SC) are always used to obtain the suitable lag length. To obtain the different directions of relationship that exist among the variables, Table 5 shows the Granger Causality Test for this study. It shows that the only variables that have bidirectional relationships are LNPOPN and GDP while unidirectional relationships exist among the following variables: GDP and RER; LNPOPN and COP; LNPOPN and RER and INF and LNPOPN. Table 5 also shows that there is no causation among the variables COP and GDP; INF and GDP; RER and COP; INF and COP; INF and RER.

Vector Error Correction Model (VECM)

When variables are cointegrated, this shows there exists a long term relationship among these variables. Since there is existence of more than two co-integrating equations among our variables, the Vector Error Correction Model (VECM) which usually adjusts to changes on the short run and long term is used to estimate the variables of the long-run equation and the short-



run equation. An important parameter which is always used in the estimation of VECM is error correction term coefficient (EC_{t-1}) which determines the adjustment speed of all economic growth to its equilibrium level. The significance of (EC_{t-1}) coefficient is usually used to estimate long term relationship while short run relationship is determined through the different coefficients of each term whose errors are uncorrelated with one another and assumed to be normally distributed with mean (0) and variance (σ^2).

Table 5: Long-run Relationship

Variable	Coefficients	Standard Error	Statistic
GDP(-1)	1.0000		
COP(-1)	3427.589	869.203	3.9434
RER(-1)	5162.148	578.856	8.9178
INF(-1)	26.9835	547.294	0.04930
LNPOPN(-1)	-2955512	297206	-9.9443
C	54368854		

Source: Authors' Computation (2022)

The long run relationship between GDP, COP, RER, INF and LNPOPN according to Table 6 is displayed below:

$$GDP = -54368854 - 3427.589COP - 5162.148 RER - 26.98345 INF + 2955516 LNPOPN$$

Based on the results gotten from Table 6, it is evident that Crude Oil Price (COP), Real Exchange Rate (RER) and Inflation (INF) all have negative impacts on Nigeria's economic growth (GDP) while Ln of Population (LNPOPN) has a positive impact on the country's economic growth. According to Musa et al. (2019), COP and RER are both variables that can affect Nigeria's economic growth on the short run and on the long run and call for the need for policies makers and government in the country to reduce its huge reliance on crude oil which is primarily influenced by exchange rate and improve its earnings in industrialization, agriculture, entrepreneurship, investment, among others. In another related study, Adaramola and Dada (2020) revealed that real exchange rate (RER) and inflation (INF) both have a notable negative effect on Nigeria's economic growth. To ascertain the impact of population growth on economic growth from previous works done by other researchers, Ogunleye et al. (2018) revealed that Nigeria's population growth has significant and positive impact on the nation's economic growth. Though Dauda and Peter (2015) acknowledged the unfavorable implications that surface with a growing population like unemployment, pollution, poverty, among others issues, if not well annexed and managed.

**Table 6: Short run Relationship**

Variable	Coefficients	Standard Error	Statistic
COINTEQ1	-0.072479	0.12914	-0.56124
COP(-1)	31.29112	853.381	0.03667
RER(-1)	472.3256	883.623	0.53453
INF(-1)	-140.9022	845.012	-0.16675
LNPOP(-1)	7530778.	1.7E+07	0.44184
C	-187163.2	434625	-0.43063

Source: Authors' Computation (2022).

From Table 6 above, the short run equation becomes

$$\Delta GDP_t = -0.0725ECT_{t-1} + 0.183758\Delta GDP_{t-1} + 31.29112\Delta COP_{t-1} + 472.3256\Delta RER_{t-1} - 140.9022\Delta INF_{t-1} + 7530778\Delta LNPOP_{t-1} - 187163.$$

The short run equation shows an increase in the following variables COP, RER and LNPOP will positively affect GDP while INF is also seen to impact the country's economic growth negatively on a short run. It also shows that the previous year's deviations from long run equilibrium is corrected in the current period at an adjustment speed of 6.7%.

The empirical analysis performed for this study shows that our variables were all stationary at their first differencing level I (1) which indicated the presence of a long-run relationship among them. This necessitated us carrying out Johansen cointegration test in order to determine the level of co-integrating relationship among these variables. The test revealed there are three co-integrating equations. Having established long run relationships among these variables, the Vector Error Correction Model (VECM) was used to estimate the long run equation and the short run equation. The long run equation shows that Nigeria's crude oil price (COP) between these periods negatively impacts the country's economic growth which means the rise and fall in the prices of crude oil has not been helpful to the country's economic growth. According to Adegbebi et al. (2019), fluctuations in the prices of crude oil in Nigeria have negatively affected the country's economic growth (GDP) and insignificantly contribute to the per capita income of the country.

Another related result obtained from a previous study by Ani et al. (2014) also showed that there exists an insignificant and positive relationship between Nigeria's crude oil price and the country's economic growth. It also revealed that no causal relationship exists between the two variables. Although some studies have all shown that there should be positive connection and significant impact between crude oil price and economic growth of countries both on the short run and on the long run (Maijama'a et al., 2019; Charles & Oguntade, 2018; Al-zanganee, 2017; Apere & Eniekezimene, 2016). This long-run equation study also shows that there is a negative relationship between real exchange rate (RER) and the country's economic growth (GDP); this result is in tandem with the study that equally pointed a significant negative relationship between real exchange rate (RER) and economic growth (GDP) (Adaramola & Dada, 2020).



Also, inflation being one of the macroeconomic variables that undermine economic growth of nations. This study result also reveals a negative relationship between inflation (INF) and economic growth (GDP). The long run equation also shows a positive connection between Ln population (LNPOP) and economic growth (GDP). An increase in population consequently increases labor output and productivity in the country and population rise may also be attributed as one of the contributing factors to the rise in the economic growth of the country over the years (Ogunleye et al., 2018).

This Granger Causality test revealed that bi-directional relationship only occurs between LNPOP and GDP; this is a clear indication that the ever increased population the country witnesses every year has always been productive in terms of increased labor force and a production of domestic market that promotes locally made goods, entrepreneurship which directly contributes to economic growth. Conversely, when the economy booms and almost everyone in the country becomes comfortable, there is every tendency that fertility rate increases, mortality rate decreases because there is availability of resources in terms of money to access good health services that will aid living long thereby increasing population growth.

The unidirectional relationship between GDP and RER has proven that Nigeria still depends largely on importation with little or no patronage for locally or internally produced goods from the country. Any economic boom increases people's quest to travel or import foreign made goods which has always caused the real exchange rate (RER) to keep increasing.

CONCLUSION, PRACTICAL IMPLICATION AND POLICY RECOMMENDATION

This research work seeks to determine the impact of crude oil price and some notable variables like real exchange price, inflation and population on Nigeria's economic growth. Augmented Dickey Fuller test to determine the stationarity conditions of the variables before applying the Johansen Cointegration test to determine the long-run relationship among the variables. Granger Causality test and vector error correction model (VECM) were also carried out as stated earlier. From this study, it is evident that all the explanatory variables used in this study are all significant on the response variable (GDP) in both long-run and short-run. Especially, any increase in crude oil price and naira appreciation in the foreign exchange market will cause an economic boom for the country while any recorded decrease in these two variables coupled with all-time increasing inflation the country does experience will cause economic meltdown which will result in a great economic effect on the entire population in the country.

This study has shown that the inter-related effects of our concerned explanatory variables on the dependent variable goes a long-way to determine the economic buoyancy and development of Nigeria being a country that is solely dependent on a source of income. This is equally felt by the entire population. To reduce the volatility on foreign exchange and heavy dependence on crude oil in Nigeria, it is very important every major stakeholder and policy makers in the country have a consensus and diversify the economy whereby the country's industrial and agricultural sector be improved in order to have the oil industry itself diversified. This will make the country export only refined products out of the country to other neighboring African countries for an improved economic growth that will reflect on the entire country's population. This research highlights the urgent needs to create policies that will aim at addressing the fall



in oil prices in order to reduce or annul the rate at which these negative prices affect the country's national income and budget.

The study is limited by the time frame which is as a result of paucity of data. Further studies can compare the Nigerian scenario with other countries in sub-Saharan Africa.

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