



Impact of Oil Price Changes on the Nigerian Economy

*Ekwuye, B.M.

Department of Finance and Operations Unit, Christian Aid United Kingdom/DRC 034 Bougainvillea, Goma, Nord Kivu
Democratic Republic of Congo.

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Abstract

The economy of Nigeria majorly relies on oil, making it an integral component for meeting the country's diverse requirements. Nigeria's significant reliance on oil products engenders a pronounced impact on macroeconomic indicators, including trade openness, inflation, and the currency rate, which are especially prone to instabilities in the global crude oil price. The objective of this study is to investigate the impact of fluctuations in worldwide crude oil prices on Nigeria's economy, specifically with regard, to GDP, inflation, and exchange rates. The study examined, the impact of fluctuating oil prices on Nigerian production, inflation, and exchange rates using the Vector Autoregression (VAR) methodology. Unlike previous research projects that investigated the relationship between oil prices and macroeconomic variables (such as exchange rates, production, and inflation) in developed countries, the current study concentrates on Nigeria, a developing nation. This study looks into how changes in crude oil prices affect Nigeria's trade openness, GDP, inflation rate, and currency rate relative to the US dollar. Using the Granger causality paradigm, the study attempts to investigate the links between changes in oil prices and macroeconomic variables. Determining the causal relationship between changes in oil prices and their effects on other economic variables, such as GDP-measured production, inflation, and currency rates, is also crucial. The study's conclusions showed, a one-way relationship in which inflation is causally influenced by the price of oil. This shows that there may be a link between variations in inflation and oil prices. This suggests that changes in the price of oil could be a good predictor of changes in the rate of inflation. The results of the causality analysis lead to the conclusion that there is a one-way relationship between the exchange rate and the price of oil. The correlation shown between the exchange rate and the price of oil implies that, variations in the exchange rate are a direct cause of variations in the price of oil. It is found that there is a unidirectional causal relationship between GDP and oil price in the causality analysis. There is a causal relationship between GDP and oil price in this relationship. This implies that GDP is the Granger cause of oil prices and that there is a causal relationship between GDP and oil prices. The findings suggest that the government maintain adequate stockpiles for storing oil at times when prices are generally low. Furthermore, it is important to remember that Nigeria is a country with a substantial position in the oil producing industry. Given this, it is imperative that the government think about increasing its capacity to produce oil in order to increase exports. By doing this, Nigeria might be able to increase its GDP while also lessening the negative consequences of an unfavorable exchange rate.

Keywords: Oil, Impacts, Price, Economy and Sustainability.

INTRODUCTION

Crude oil has never been more important than it is today. Crude oil truly came into its own in the 20th century, when it eclipsed coal as the world's major energy source. (Adeleke, O., Philip, N., & Harold, N. 2019). The quantity of oil used has quadrupled over the last half-century, and oil and natural gas now account for more than 70% of world energy utilization (Sule-Iko, S., & Ibrahim, A. 2021). The shift from coal to oil in the energy sector was largely driven by technological advancements. Refined oil can be used to power vehicles, homes, and factories, as it has a major role in the world economy (Uche and Effiom, 2021).

Those who believe that a nation's GDP will increase due to a rise in oil prices argue that the government will be able to generate more revenue from oil exports. Alenoghena (2020) based its arguments on data from nations that are net oil importers. There is significant inflation, little demand for goods other than oil, high input costs, and low investment in these nations. Yet, the decrease in oil prices has caused economic havoc on countries that are net exporters of crude oil. (Which reduces national income and increases budget deficits). This has caused crude oil prices to fluctuate widely as supply and demand shifted. Although the impact of fluctuating crude oil prices on GDP growth has been the subject of much debate, economists and policymakers have yet to reach a consensus on the topic. While research by Uche and Effiom (2021) suggests it may promote growth, research by Soyemi, A., Akingunola, O., & Ogebe, J. (2019)'-suggest it may inhibit development.

Nearly 90% of Nigeria's export income, 80% of the government's annual budget, and 14% of the country's total income come from selling crude oil (GNI). Before recently, oil was not Nigeria's main source of income (Alenoghena, 2020). Instead, the country has always relied on agricultural exports to keep its economy going. Between 1960 and 1966, more than 90% of the population worked in agriculture, which was the main source of income for the country. But due to the oil boom in the 1970s, mining and, especially, oil became more important than agriculture (Sanusi *et al.* 2022). This puts agriculture in the background. Nigeria's GDP in 1970 was mostly supported by oil profits (around 59%). As a result, oil prices, even if they fluctuated little, would have a significant effect on the economy (Umar & Abdulkhakeem, 2010). Yet, it is essential to look at how these changes might influence Nigeria's economy owing to the volatility of crude oil prices.

The oil sector, a key driver of GDP growth, witnessed a major contraction in 2016 with a decline of -13.65%, exceeding the -5.45% decline in 2015. This resulted in a decline in the oil sector's share of real GDP from 9.61% in 2015 to 8.42% in 2016 (The National Bureau of Statistics (NBS) in Q4 2016). Aside its impact on the growth, the sector also enhances monetary variables and contributes to a high unemployment rate, as opined by Blanchard and Gali (2007). According to Adedokun (2018), citing Nweze and Edame (2016) and information from the Central Bank of Nigeria (CBN) in 2019, approximately 75% of government income and an average of 93% of foreign earnings from trade was generated from oil exports over the past decade. These income sources have played a key role in financing the country's imports.

A country's exposure to oil price fluctuations depends on two factors; the nature of its economy and the level of the price swings. Nigeria's economy is based on only two things: selling crude oil and buying refined oil. Because of this, it is difficult to say how changes in oil prices affect Nigeria's GDP (Oriakhi and Osaze, 2013).

Recent empirical and theoretical studies by Raifu and Oshota (2022) have shown that there is price volatility in the global oil market. The effects of this volatility on the economies of different countries will depend on how much they depend on oil. Nigeria is the seventh-largest exporter of processed oil in the world. This makes up about 90% of the country's total export income and more than 70% of the government's annual budget. Examining how this uncertainty may affect Nigeria's economic growth is, therefore, essential. Many people think that the changing price of oil has caused financial crises and the fall of governments around the world. Majumdar (2016) says that shocks to oil demand and supply caused by financial crises, the discovery of new resources, geopolitical events, and innovations often show how volatile oil prices are. In the past few years, all of these factors have worked together to cause oil prices to fluctuate wildly, which has hurt economies and led to the downfall of governments in some countries.

Statement of the Problem

The effect of oil price changes on the most important macroeconomic variable is rarely looked at. Oil being a major driver of the Nigerian economy does not have a stable price. There are concerns that the intermittent changes in the oil price have Impacts on the economic growth in Nigeria. Several researchers have studied the intermittent changes in oil prices but very few have explored how the fluctuations in oil prices have affected Nigeria's economic growth. This research will examine the matter by picking the most appropriate estimating approach and offering a clear standard for determining the optimal lag period.

Oil prices and GDP growth have been the subject of study and debate for the better part of the last four decades. The connection between oil prices and economic cycles as well as the importance of oil to global trade were the driving forces behind this research. The oil industry's outsized contribution to Nigeria's GDP gives it undue sway in the country's

policies. 82.1%, 83.1%, and around 90% of the country's foreign currency earnings in 1974 came from oil profits, according to the CBN statistics report (2011). A comparable proportion (87.6%) of Nigeria's overall export profits of US\$70,579,000,000 in 2010 came from the sale of petroleum products.

Salisu and Fasanya (2013) and Aimer (2016) makes it clear that oil price instability has a major impact on the macroeconomic performance of many countries. Several studies have shown evidence of asymmetry in the volatility of oil prices via the use of clustering techniques.

Nigeria's administration is concerned about the impact of price variations on the macroeconomic stability of the country due to its reliance on oil money. Macroeconomic variables' sensitivity to shifts in the economy is referred to as their volatility. Among the many macroeconomic measures that are both shock-resistant and fragile are the GDP, inflation, currency rate, and interest rate. The impact of fluctuations in oil prices on critical economic indicators in Nigeria has been the subject of numerous studies. The effect of oil prices on GDP is a hotly debated subject, with different researchers presenting differing conclusions. Among them are Apere & Ijiomah (2013), Wilson (David, Inyiama, & Beatrice, 2014), Abayomi, & Damilare (2012), Taiwo, and Adeniyi (2011).

Nigeria has seen the implications of the continuing reduction in global crude oil prices since July 2014. The most obvious signs of this are the decline in the country's foreign reserves, currency problems, government income, and the possibility of defaulting on debt payments when they come due. From a peak of USD105.87 in 2013 to a low of USD40.76 in 2016 (World Bank, 2015), oil prices have plummeted from their all-time high. The price of oil fell by a staggering 64.5% between 2013 and 2016. As a result, we may conclude that there will be a flood of new rules and regulations from policy makers, with substantial discussion among economists about which rules and regulations should be implemented.

In reaction to the drop in global oil prices, dwindling foreign exchange reserves, and economic slowdown that began in 2015, the Nigerian government depreciated the naira (the country's official currency) by 8% in October 2015, from N155 to N168. Since October 2015, when it was N168, the official Nigerian naira exchange rate has fallen to N485 in 2023. Nigeria's inflation has continued to skyrocket since 2014. A combination of a weak naira following devaluation and increased costs across the board (including housing, food, nonalcoholic drinks, and transportation) led to the highest inflation rate since 2005.

Fuel price increase of over 100% resulted from the taking away of financial assistance in the downstream oil sector has worsened the problem. The government has cut its operations and administrative costs, and the economy has migrated away from some of its previously profitable industries as a consequence of these policy proposals. This emphasizes the need to study how changes in oil prices affect Nigeria's economy. Some studies have been undertaken in Nigeria on the influence of variations in the price of crude oil on economic growth, results and inferences also vary. Apere and Ijeoma (2013), Akin and Babajide (2011), Ani, Ugwunta, Oliver and Eneje (2014) are a few of them.

Although findings by Ani, Ugwunta, Oliver, and Eneje (2014), Akin and Babajide (2011), Apere and Ijeoma (2013), Asaolu and Ho (2012), and Gunu (2010), Oriakhi and Iyoha (2013), and Edesiri (2014) show a significant and positive impact, reveal a detrimental effect to put it another way, there isn't a lot of agreement among academics on how changing crude oil prices affect both established and emerging economies, which comprises Nigeria. To the best of our knowledge, market capitalization, one of Nigeria's important economic sectors, has not been quantified in earlier research. To support the diverse perspectives taken in past research, this study will employ more current and fresh data as well as a variety of economic expansion indices. To the best of my knowledge, no prior research has assessed several crucial economic indicators in Nigeria, hence this research will concentrate on the economic climate in Nigeria while evaluating these metrics.

Research Objectives

This research work intends to evaluate the causal association prevalent in the crude oil price movement and selected Micro Economic variable in Nigeria.

To achieve this aim, the following specific objectives were achieved to:

1. Assess the effect of oil price changes on inflation rate in Nigeria.
2. Ascertain the effects of oil price changes on exchange rate in Nigeria.
3. Determine the effects of oil price changes on the gross domestic product (GDP) in Nigeria.

Research Hypotheses

The following are hypotheses that can help get us closer to our objectives:

Hoi: Changes in Oil price does not have any significant effect on inflation rate in Nigeria.

H₀₂: Changes in Oil price does not have any significant Impact on exchange rate in Nigeria.

H₀₃: Changes in Oil price does not have any significant effect on Gross domestic product in Nigeria.

Research Methodology

Based on the most appropriate research design—ex post facto—this study is a discourse on documented outcomes with the goal of making findings and inferences. Ex post facto design, sometimes referred to as "after-the-fact" research, is a type of study design in which the effects of an independent variable (i.e., groups possessing particular attributes that existed before the investigation) on a dependent variable are examined. Because the individuals are not assigned at random, but rather are grouped based on a certain attribute or trait, it is considered a quasi-experiment. These research designs were chosen because this is an *after-the-fact research* and the utilized variables are those that the researcher cannot control, (Onwumere, 2019).

Nature and Source of Data

The CBN statistical bulletin served as the source of the data set for this research. They are pre-existing data that has been gathered by several researcher and scholars other than the researcher and is easily accessible from other sources, they are primarily secondary in nature. Although necessary for the current study, secondary data are those that were originally gathered for a different investigation (Onwumere, 2019). The World Development Indicators (WDI), the Nigeria Bureau of Statistics (NBS), the Central Bank of Nigeria (CBN) Statistical Bulletin, and other data archives and repositories are common places to get secondary data. The Central Bank of Nigeria (CBN) statistical bulletin 2021 provided the data for this study. They are arranged according to a natural frequency, and are regarded as time series statistics and are fully quantitative. (Brooks, 2014).

Model Specification

The theory that suitably underpin this work is the symmetrical and linear theory of relationships. According to this theory, Changes in oil prices result in unpredictable growths of the economy. As advocated by Charfeddine and Barkat (2020) as well as Ojikutu et al, (2017).

The research work model was a modified version of Ayadi (2005) work. The effects oil prices on Nigeria economy was the title of the study that the researcher conducted. The Vector analysis regression method was employed by the researcher. The model was modified to fit or meet the nature of the research endeavor in order to ascertain the effects of changes in oil prices on the Nigerian economy, where the monetary policy rate (MPR) is employed as a proxy. This study used the Autoregressive Distributed Lag Model (ARDL) estimate technique, which is described as follows:

General Model

$$\begin{aligned}
 ROILP_t = & \beta_0 + \sum_{n=1}^k \beta_1 \Delta ROILP_{t-n} + \sum_{n=1}^k \beta_2 \Delta INF_{t-n} + \sum_{n=1}^k \beta_3 \Delta EXR_{t-n} \\
 & + \sum_{n=1}^k \beta_4 \Delta GDP_{t-n} + \sum_{n=1}^k \beta_5 \Delta MPR_{t-n} + \rho_1 INF_t + \rho_2 EXR_t \\
 & + \rho_3 GDP_t + \rho_4 MPR_t + \varepsilon_t
 \end{aligned}$$

Where:

$ROILP_t$ Represents the independent variable

INF Represents the independent variable (Inflation rate), where it is the variable that explains other variables.

EXR Represents the independent variable (Exchange rate).

GDP Represents the independent variable (Gross domestic product).

MPR Represents the control variable.

β_0 Represents the constant or the intercept.

$\beta_1 - \beta_5$ Represents the coefficient of the long run parameters

$\rho_1 - \rho_4$ Represents the coefficient of the long run parameters.

$t - n$ Represents time series data

ε_t Represents the residual, noise or error term.

$$\sum_{n=1}^k \Delta \text{ Represents the short run regression equation}$$

To test the individual hypothesis, they were listed and all the proxies and parameters properly elaborated.

Hypothesis 1: Oil price changes does not have any significant effect on inflation rate in Nigeria.

$$LINF_t = \beta_0 + \sum_{n=1}^k \beta_1 \Delta LINF_{t-n} + \sum_{n=1}^k \beta_2 \Delta LROILP_{t-n} + \sum_{n=1}^k \beta_3 \Delta MPR_{t-n} + \rho_1 LINF_t$$

Where:

$ROILP_t$ Represents the independent variables.

$t - n$ Represents time series data

β_0 Represents the constant or the intercept.

$\beta_1 - \beta_4$ Represents the coefficient of the short run parameters.

INF Represents the dependent variable (Inflation).

MPR Represents the control variable.

ρ_1 Represents the coefficient of the long run parameter.

ε_t Represents the residual, noise or error term.

Hypothesis 2: Oil price changes does not have any significant Impact on exchange rate in Nigeria.

$$LEXR_t = \beta_0 + \sum_{n=1}^k \beta_1 \Delta LEXR_{t-n} + \sum_{n=1}^k \beta_2 \Delta LOILP_{t-n} + \sum_{n=1}^k \beta_3 \Delta MPR_{t-n} + \rho_2 LEXR_t$$

Where:

$ROILP_t$ Represents the independent variable.

$t - n$ Represents time series data

β_0 Represents the constant or the intercept.

$\beta_1 - \beta_4$ Represents the coefficient of the short run parameters.

EXR Represents the dependent variable (Exchange rate).

MPR Represents the control variable.

ρ_2 Represents the coefficient of the long run parameter.

ε_t Represents the residual, noise or error term.

Hypothesis 3: Oil price changes does not have any significant effect on Gross domestic product in Nigeria

$$LGDP_t = \beta_0 + \sum_{n=1}^k \beta_1 \Delta LGDP_{t-n} + \sum_{n=1}^k \beta_2 \Delta LROILP_{t-n} + \sum_{n=1}^k \beta_3 \Delta MPR_{t-n} + \rho_3 LGDP_t$$

Where:

$ROILP_t$ Represents the independent variable

$t - n$ Represents time series data

β_0 Represents the constant or the intercept.

$\beta_1 - \beta_4$ Represents the coefficient of the short run parameters.

GDP Represents the Dependent Variable (Gross Domestic Product)

M P R Represents the control variable.

P₃ Represents the coefficient of the long run parameter.

ε_t Represents the residual, noise or error term.

Description of Model Variables

A brief description of the variables for this study was given in table 1 below.

Table_1: Description of Model Variables

S/N	Variable name	Type	Notation	Source	Remark
1	Oil Price Movement	Dependent	ROILP	CBN Statistical bulletin (2021)	The definition of real oil prices is the dollar price that has been adjusted for inflation.
2	Inflation rate	Independent	INF	CBN Statistical bulletin (2021)	The Wholesale Price Index (WPI) value varies as a percentage from year to year.
3	Real Effective Exchange Rate,	Independent	EXR	CBN Statistical bulletin (2021)	A measure of a currency's value against the value of several ¹ foreign currencies.
4	Gross domestic product	Independent	GDP	CBN Statistical bulletin (2021)	the proportion of imports and exports to GDP.
5	Monetary policy rate	Control	MPR	CBN Statistical bulletin (2021)	MPR is a monetary instrument which is used by the CBN to achieve monetary objectives by increasing or reducing the MPR for price stability

Source: Compiled by the author

Techniques of data analysis

The basic steps followed were:

Pre Estimation Tests (PRE-TEST)

In this study, the Pre Estimation Test (PRE-TEST) contains the following:

1. **Basic descriptive statistics:** This includes measures such as measures of aggregative tendencies, measure of dispersion, symmetrical properties of the series and measure of the degree of peakness of the distribution. It is well known that descriptive statistics can be used to determine the spread and aggregative tendencies of the series.
2. **Table, graphs and Charts:** were used to depict the variables in rows and columns. The variables were graphed to display their behavioral pattern.
3. **Correlational matrix:** It is a table that displays correlation factors between different variables. The table's cells each display the correlation between two variables. Data are summarized using correlation matrices, which are also utilized as inputs for more sophisticated studies and as diagnostics for such analyses.
4. **Unit root test:** This determines whether a time series variable has a unit root and is non-stationary. The pre Estimation test (PRE-TEST) is generally used to test how good your data is for the estimation test the researcher wants to do. Also, the stationarity test (Unit root test) was used to inform the choice of the ARDL model, and the Pre Estimation Test offers the necessary guidance for choosing the best model.

Estimation method

The model to be employed in this study is Auto Regressive Distributed Lag model (ARDL). It is preferred to Ordinary Least Square (OLS) model because OLS has many shortcomings and is becoming old fashioned. This is because many economic variables now are either I (0) or I (1) variable and OLS cannot be employed for variable that has the combination of the two orders of integration. OLS model, oftentimes has diagnostics problem such as auto correlation.

ARDL popularized by Pesaran, Shin and Schmidt (2001) overcome these shortcomings and is a perfect model for this study. This is because it has the following advantages over OLS model according to (Pesaran and Shin, 1998):

- It solves diagnostic issues like autocorrelation.
- Despite the tiny sample size, it is still reliable.
- It offers the ability to hold variables with various integration orders, such as 1(0), 1(1), or a combination of both.
- It can use various lag lengths for both the regressor and the regressand.
- It concurrently predicts elasticity in the long and short runs.

Post Estimation methods

The post estimation test is done to determine the reliability of the result. The following post estimation test was used to determine whether the model is the best, linear, and unbiased:

- Test for Significance of the result
- Test for auto correlation conducted using Breusch-Godfrey Lagrange Multiplier test (BG LM).
- Test for heteroscedastic residuals conducted following the Breusch, Pagan and Godfrey test (BPG).
- Test for model stability conducted by adopting Ramsey RESET and CUSUM test.

Inferences

The statistical estimation tool used in this study is Eviews 10. The tool is a computer application software used by the author in order to develop and perform analytical processes that helped in making an informed statistical decision. The decision rule in this study is based on 5% degree of significance and conclusions were drawn based on this decision rule.

Results and Discussion

Data presentation

Tabular presentation of the data

Table 2 below comprises of the proxies for the variables used in this study. The time frame for coverage is 1981-2021. Based on the dataset as it was presented, estimates from this study were made.

Table 2: Values of Oil Price, Inflation, Exchange rate, Gross domestic product and Monetary policy rate in Nigeria.

Year	ROILP(N'Bn)	INF (%)	EXR((N)	GDP(N'Bn)	MPR (%)
1981	8.6	20.81	0.61	2,188	10
1982	7.8	7.7	0.673	1,845	10
1983	7.3	23.21	0.724	1,224	10
1984	8.3	17.82	0.765	903	10
1985	10.9	7.44	0.894	882	10
1986	8.1	5.72	2.02	639	10
1987	19.0	11.29	4.02	598	12.75
1988	19.8	54.51	4.54	550	12.75
1989	39.1	50.47	7.39	474	18.5
1990	71.9	7.36	8.04	568	18.5
1991	82.7	13.01	9.91	503	15.5
1992	164.1	44.59	17.3	434.89	17.5
1993	162.1	57.17	22.33	603.44	26
1994	160.2	57.03	21.89	849.02	13.5
1995	324.5	72.84	21.89	1488.12	13.5
1996	408.8	29.27	21.89	1961.31	13.5
1997	416.8	8.53	21.89	2120.98	13.5
1998	324.3	10	21.89	2306.48	13.5
1999	724.4	6.62	21.89	2631.53	18
2000	1,591.7	6.93	85.98	3390. f2	14
2001	1,707.6	18.87	106	3952.56	20.5

Table 2.1: Value of Oil Price, Inflation, Exchange rate, Gross domestic product and Monetary policy rate in Nigeria. Continued

2002	1,230.9	12.88	113	5520.7	16.5
2003	2,074.3	14.03	127	6507.35	15
2004	3,354.8	15	130	8699.55	15
2005	4,762.4	17.86	136	11098.5	13
2006	5,287.6	8.23	131.8	14580.1	10
2007	4,462.9	5.39	125	16644.5	9.5
2008	6,530.6	11.58	120	19178	9.75
2009	3,191.9	12.56	171	20861.5	6
2010	5,396.1	13.72	154.8	26625.3	6.25
2011	8,879.0	10.84	165.1	30582.4	12
2012	8,026.0	12.22	162.9	34847.8	12
2013	6,809.2	8.48	199	38884.8	12
2014	6,793.8	8.06	199	43265.8	13
2015	3,830.1	9.01	300	45685.3	11
2016	2,693.9	15.68	320	49236.2	14
2017	4,109.8	16.52	360	55151.6	14
2018	5,545.8	12.09	360	61961.7	14
2019	5,536.7	11.4	305	69906.8	13.5
2020	4,732.5	13.2	361	, 74041.1	11.5
2021	3,650	16.95	445.47	84516.2	1,1.5 '

Source: CBN Statistical bulletin

Where:

ROILP = Real oil price movement
 INF = Inflation rate
 EXR = Exchange rate
 GDP = Gross Domestic Product
 MPR = Monetary Policy rate

The series was log transformed to equalize the bases of the values. A log transformed series is an excellent indicator of elasticity and ultimately, it makes comprehension easier. Below is the transformed table of the series:

Table 3: Transformed series of Oil price changes and inflation, exchange rate and gross domestic product.

YEAR	LROILP	LINF	LEXR	LGDP
1981	2.147	3.035	-0.494	7.690
1982	2.056	2.041	-0.396	7.520
1983	1.981	3.144	-0.322	7.109
1984	2.112	2.880	-0.267	6.805
1985	2.390	2.006	-0.112	6.782
1986	2.092	1.743	0.703	6.459
1987	2.945	2.423	1.391	6.393
1988	2.982	3.998	1.512	6.309
1989	3.666	3.921	2.000	6.161
1990	4.275	1.996	2.084	6.342
1991	4.414	2.565	2.293	6.220
1992	5.100	3.797	2.850	6.075
1993	5.088	4.046	3.105	6.402
1994	5.076	4.043	3.086	6.744
1995	5.782	4.288	3.086	7.305
1996	6.013	3.376	3.086	7.581
1997	6.032	2.143	3.086	7.659
1998	5.781	2.302	, 3.086	7.743
1999	6.585	1.890	3.086	7.875
2000	7.372	1.935	4.454	8.128
2001	7.442	2.937	4.663	8.282
2002	7.115	2.555	4.727	8.616
2003	7.637	2.641	4.844	8.780
2004	8.118	2.708	4.867	9.071
2005	8.468	2.882	4.912	9.314
2006	8.573	2.107	4.881	9.587
2007	8.403	1.684	4.828	9.719
2008	8.784	2.449	4.787	9.861

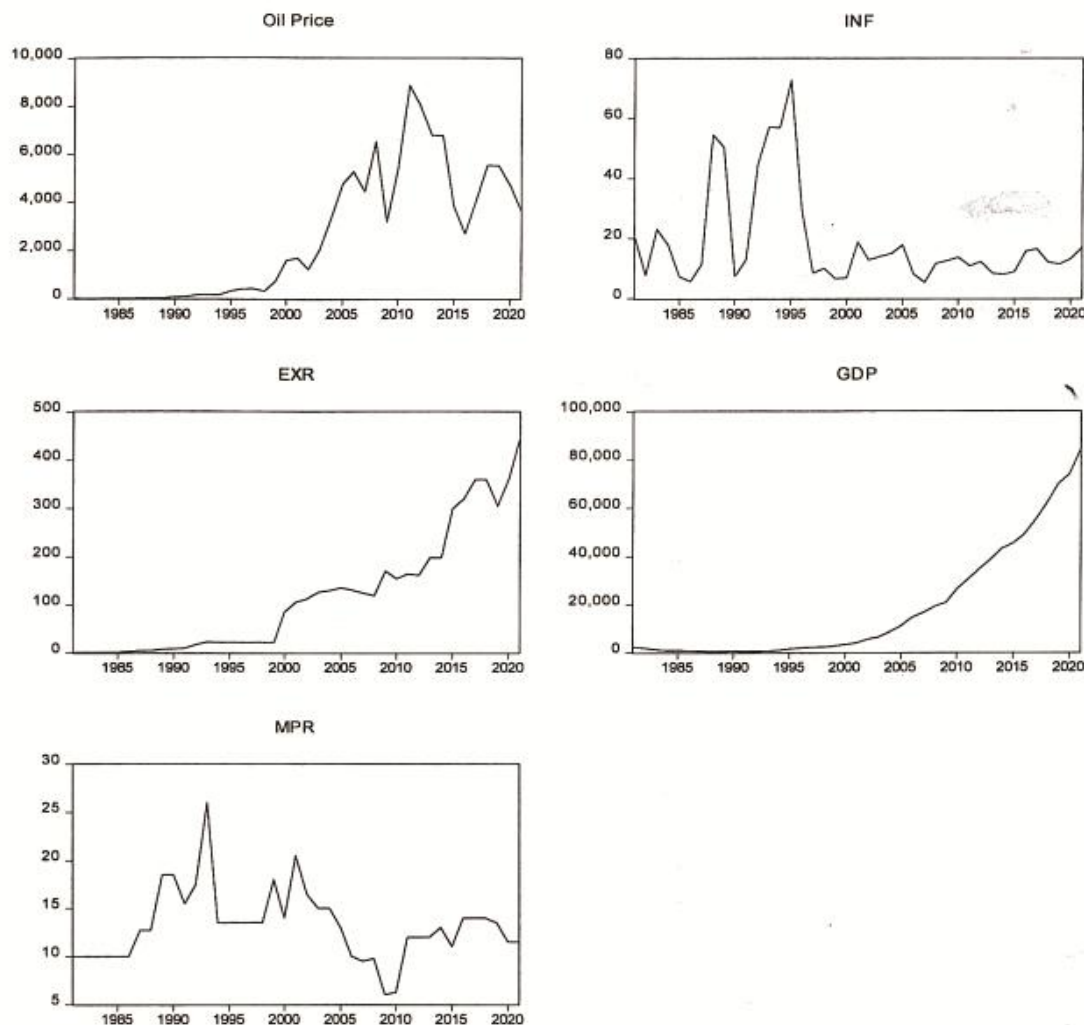
Table 3.1: Transformed series of Oil price changes and inflation, exchange rate and gross domestic product.

YEAR	LROILP	LINF	LEXR	LGDP
2009	8.068	2.530	5.141	9.945
2010	8.593	2.618	5.042	10.189
2011	9.091	2.383	5.106	10.328
2012	8.990	2.503	5.093	10.458
2013	8.826	2.137	5.293	10.568
2014	8.823	2.086	5.293	10.675
2015	8.250	2.198	5.703	10.7295
2016	7.898	2.752	5.768	10.804
2017	8.321	2.804	5.886	10.917
2018	8.620	2.492	5.886	11.034
2019	8.619	2.433	5.720	11.154
2020	8.462	2.580	5.888	11.212
2021	8.202	2.830	6.099	11.344

Source: Transformed by author using E-views.

Graphical Presentation of Data

The variables are shown in the line and symbol graph below to show the series' behavioral pattern.

**Fig 1: Line and symbol multiple graphs of the series**

Source: Graphed by the author using E-views 10

From Fig-1 above, the data sets were presented using line and symbol graph. The oil price had a fluctuating trend throughout the years but peaked in the year 2010. This may be due to the fact there was strong demands for oil in emerging markets like India and China. Inflation fluctuated but maintained a peak in the year 1995 as can be attributed to mismanagement of the economy by the military government manning the affairs of the country then. The exchange rate maintained a steady increase as it fluctuated and was at peak in 2021 which was a combination of several factors such a decline in oil prices, the effect of the COVID-19 pandemic, the use of the foreign reserve by the CBN to prop up the naira and the demand for foreign exchange increased as businesses and individuals sought to convert their local currency to more stable currency. The MPR fluctuated depending on the changes in the economy which made it unstable over the years. GDP was on a steady rise and it shows an increase in the aggregate output in the economy. This may be attributed to loans and advances of credits advanced to the private sector which leads to economic expansion.

Table 4: Summary of Basic Descriptive Statistics

Variable	Mean	Median	Std. Dev.	Skewness	Kurtosis	Jarque-Bera	Prob	CV	Obs
LROILP	6.90	7.26	0.94	-0.54	2.14	3.28	0.19	0.13	41
LEXR	2.39	2.44	0.31	-0.30	1.88	2.77	0.24	0.13	41
LINF	4.85	4.88	0.77	-1.14	4.03	10.81	0.00	0.15	41
LGDP	9.71	9.86	1.04	-0.50	2.11	3.09	0.21	0.10	41
LMPR	2.49	2.56	0.29	-0.92	3.37	6.05	0.04	0.11	41

Source: Computed by the author using Eviews

Table 4 above contains measures mean and median, standard deviation, skewness and kurtosis of the distribution. From the above table 4.3, LGDP has the highest aggregative tendency while LEXR has the lowest aggregative tendency. Standard deviation is measured by dispersion. The series indicated deviation from their mean value. Skewness is a measure of the degree of symmetry or departure from symmetry of the distribution while kurtosis is a measure of the degree of peakness of the distribution. From the table, all the variables are Negatively skewed (skewed to the left). The distribution is normal if skewness is (0) and kurtosis is (3). Also, the distribution is leptokurtic if kurtosis is > 3 , mesokurtic if it is $= 3$ and platykurtic if it is < 3 . Based on this, LMPR and LINF are leptokurtic while LROILP, LEXR and LGDP are platykurtic. Lastly, CV stands for coefficient of variation, also known as relative standard deviation (RSD). It compares the degree of variation from one data series to another. The CV of the variables are lesser than 1 which indicates that the distribution is highly dispersed.

Table 4.1: Summary of correlational matrix

Variables	LMPR	LINF	LEXR	LGDP
LMPR	1.000000			
LINF	R=0.326108	1.000000		
	{2.154314}	-----		
	[0.0375]	-----		

Table 4.2: Summary of correlational matrix continued

Variables	LMPR	LINF	LEXR	LGDP
LEXR	R=0.041953	R=-0.156133	1.000000	
	{0.262225}	{-0.987159}		
	[0.7945]	[0.3296]		
LGDP	R=-0.321297	R=-0.360557	R=0.828483	1.000000
	{-2.118842}	{-2.414052}	{9.238825}	
	[0.0405]	[0.0206]	[0.0000]	

R=correlational coefficient; {} = t-stat; [] = probability of t-statistics.

Source: Extracted from E-views 10

Decision rule: Reject H_0 if $p\text{-value} < 0.05$, otherwise do not reject H_0

The t-statistic must be > 2.5 and the probability must be < 0.05 for two variables to have a linear relationship with one another. Based on this criterion, there is no linear correlation between MPR and the independent variables

Stationarity test

In order to prevent running a spurious regression, the stationarity test was employed to look at the stationarity characteristics of the variables under examination. The Augmented Dickey-Fuller (ADF), a test that adheres to the conventional unit root test and breakpoint consistent technique, were utilized. The decision was based on a 5% level of significance.

The results of the traditional, innovation, and additive unit root tests are displayed in the table below. These tests had to be included because the traditional unit root test fails to detect the presence of outliers, making the break point unit tests the innovation and additive tests better because they take structural breaks into account.

Table 4.3: Unit Root Test Results

VARI VARIABLES	TRADITIONAL UNIT ROOT			INNOVATION OUTLIER							
	ADF STAT	TCV@ 5%	ORDER OF INT	ADF STAT	TCV @ 5% s	ORDER OF INT	BREAK DATE	ADF STAT	TCV @ 5%	ORDER OF INT	BREAK DATE
LROILP	-6.84	-3.52	0	-7.70	-5.17	0	2015	-7.86	-5.17	0	2015
LINF	-9.55	-3.52	0	-10.07	-5.17	0	1991	-10.64	-5.17 *	0	1991
LEXR	-3.58	-3.53	0	-10.45	-5.17	0	1996	-11.02	-5.17	0	1996
LGDP	-9.27	-3.52	0	-9.88	-5.17	0	1989	-10.30	-5.17	0	1989
LMPR	-6.51	-3.52	0	-7.32	-5.17	0	1992	-7.64	-5.17	0	1992

Source: Extracted from E-views 10

According to Table 4.3 above, every variable in the conventional unit root tests was level-stationary. Every variable for the Innovation outlier was level-stationary. In the Additive outlier, all the variables attained stationarity at levels.

The Granger causality test is used in the format listed below to ascertain the degree and direction of causation among the studied series:

Table 4.4: Pairwise Granger Causality Test

Null Hypothesis:	Obs	F-Statistic	Prob.
LGDP does not Granger Cause LEXR	39	0.18815	0.8293
LEXR does not Granger Cause LGDP		13.6409	4.E-05
LINF does not Granger Cause LEXR	39	3.23678	0.0517
LEXR does not Granger Cause LINF		1.95532	0.1571
LMPR does not Granger Cause LEXR	39	0.33922	0.7147
LEXR does not Granger Cause LMPR		3.48379	0.0420
LROILP does not Granger Cause LEXR	39	0.67949	0.5136
LEXR does not Granger Cause LROILP		1.87448	0.1689
LINF does not Granger Cause LGDP	39	4.35556	0.0207
LGDP does not Granger Cause LINF		3.12584	0.0567
LMPR does not Granger Cause LGDP	39	1.64722	0.2076
LGDP does not Granger Cause LMPR		1.31097	0.2828
LROILP does not Granger Cause LGDP	39	9.13660	0.0007
LGDP does not Granger Cause LROILP		1.19099	0.3163
LMPR does not Granger Cause LINF	39	2.23144	0.1229
LINF does not Granger Cause LMPR		0.77114	0.4704
LROILP does not Granger Cause LINF	39	1.38530	0.2640
LINF does not Granger Cause LROILP		0.29775	0.7444
LROILP does not Granger Cause LMPR	39	1.03983	0.3645
LMPR does not Granger Cause LROILP		0.88493	0.4220

Source: Extracted from E-views 10

The decision criteria in Pairwise granger causality are that if the P-value of a pair of variables is significant (<0.05), the pair is bidirectional, but if one of the variables is significant whereas the other is insignificant (>0.05), the pair is unidirectional. Otherwise, in a situation where none of the pair is unidirectional or bidirectional, it is said that there is no causation between the variables.

Based on this decision, it could be seen that influence is emanating from ROILP to Gross domestic Product (GDP), but there is no reverse causation between GDP and ROILP. Hence, there is a unidirectional causation between the variables.

No causation was found between ROILP and EXR (Exchange rate) as well as ROILP and INF (Inflation rate) as influence is not emanating from either of the variables.

4.2 Test of Hypothesis

Regression Analyses

The Autoregressive Distributed Lag Model (ARDL) econometric technique was used to test the hypotheses stated earlier. The following steps were taken to reach a decision;

1. The results were submitted and examined and,
2. The hypotheses were reformulated in both null and alternate forms;
3. A decision rule is formed on the acceptance or rejection of the null hypothesis in accordance with the analytical techniques' decision criteria.

The table below presents the summary of the ARDL regression results, which is a robust method for exploring the long term relationships among variables. Tire table outlines the key ARDL results including the coefficients, statistical significance and implications of the variables in the model. These results form the foundation for subsequent in-depth discussion, offering insights into variable relationships and their significance for the research objectives.

The joint statistics result in panel b of table 4.7, specifically, the R^2 of the three models shows a good test of fit. For model 1, the R^2 is 0.95 or 95% which means that 95% variation in LINF is jointly explained oil Price volatility (ROILPVOL) 5% is the unexplained variation, which is caused by factors not captured in the model. R^2 for model 2 is 0.98 or 98% which implies that 98% variation in exchange rate (LEXR) is jointly explained by oil. Price volatility (ROILPVOL). Lastly, model 3 has 99% goodness of fit, which means that 99% variation in gross domestic product is jointly explained by stock market volatility. The F-stats of the three models is greater than 2.5 that mean that the overall regressions of the three models are statistically significant. The Durbin Watson stat of the three models are approximately 2, this becomes primary evidence of no auto con-elation implying that there is no first order auto correlation. Therefore, the regression result will be subjected to a higher auto correlation test.

The long-run elasticity of the dependent and independent variables indicates a longterm link between ROILP and the explanatory variables. This suggests that the variables are co-integrating. (For the bound test and ARDL long run forms, see the appendix.)

For the diagnostics in panel c of table 4.6, the BG-LM is the test for higher auto correlation. The insignificant p-value of the BG-LM test shows that there's no higher auto correlation for the three models. BPG is a test for heteroscedastic residuals. The insignificant p-value of the BPG test suggests that the three models are without heteroscedastic residuals. The Regression Error Specification Test (RESET) being insignificant suggests that the three models are without misspecification. The CUSUM test provides evidence in favour of parameter stability. The CUSUM line of the three models being helmed in by 5% significance dotted red line shows that the model is stable, (see appendix for CUSUM graph).

In Summary, the model is best, linear and unbiased. This is due to the R^2 good test of fit. The F-statistic's conclusion demonstrates the statistical significance of the whole regression. There is no higher auto correlation, according to the diagnostic test, specifically the BG-LM test. The lack of heteroscedastic residuals in the outcome is demonstrated by the BPG's insignificance. The RESET test, which is supported by the CUSUM graph, demonstrates that the model is stable and without any specification error.

Having confirmed that the model is best, linear, and unbiased, we used them to test the hypothesis outlined in Chapter 1 of this study.

Step one

Table 4.5 shows the regression result of the three Hypothesis.

PANEL A: SHORT RUN ESTIMATES									
VARIABLE E	MODEL 1 (1, 0, 0, 0)			MODEL 2 (1, 0, 0)			MODEL 3 (1, 3, 0)		
	CO EFFICIENT	T-STAT	P-VALUE	CO EFFICI ENT	T- STAT	P- VALU E	CO EFFICIE NT	T- STA T	P-VALUE
Δ(LROILP)	0.19	3.70	0.00	0.43	2.97	0.00	0.43	2.23	0.03
Δ(MPR)	0.22	1.46	0.15	0.27	0.55	0.57	1.18	2.57	0.01
PANEL B: LONG RUN ESTIMATES									
VARIABLE E	MODEL 1			MODEL 2			MODEL 3		
	CO EFFICIENT	T-STAT	P-VALUE	CO EFFICI ENT	T- STAT	P- VALU E	CO EFFICIE NT	T- STA T	P-VALUE
LROILP	0.15	3.65	0.00	0.33	2.80	0.00	0.68	-0.77	0.03
MPR	0.18	1.47	0.14	0.20	0.56	0.57	0.34	2.20	0.44
PANEL C: JOINT STATISTICS									
STAT	MODEL 1			MODEL 2			MODEL 3		
R2	0.95			0.98			0.99		
F-STAT	5.59 (0.01)			116 (0.00)			737 (0.00)		
D-W STAT	1.70			2.07			2.15		
PANEL D: DIAGNOSTICS									
TEST	MODEL 1			MODEL 2			MODEL 3		
BG-LM	0.08 (0.92)			0.33 (0.72)			0.38 (0.68)		
BPG	0.80 (0.68)			1.32 (0.27)			0.83 (0.09)		
RESET	0.18 (0.86)			0.77 (0.38)			0.14 (0.70)		
CUSUM	Stable			Stable			Stable		

Source: Extracted by the author from E-views 10

Hypothesis One

The long run estimates are used to test the hypothesis.

Restatement of the hypothesis in null and alternate form

Ho: Oil price changes do not have any significant effect on inflation rate in Nigeria. **Hi:** Oil price changes have a significant effect on inflation rate in Nigeria.

Decision rule: Reject Ho if p-value < 0.05, otherwise do not reject Ho Decision: The null hypothesis is rejected and the alternate hypothesis is accepted because the p-value for oil price in Panel B of table 4.7 is significant <0.05 (0.00), leading to the conclusion that oil price changes have a significant effect on inflation rate in Nigeria.

Hypothesis Two

The long run estimates are used to test the hypothesis.

Restatement of the hypothesis in null and alternate form

Ho: Oil price changes do not have any significant effect on exchange rate in Nigeria. **Hi:** Oil price changes has a significant effect on exchange rate in Nigeria.

Decision rule: Reject Ho if p-value < 0.05, otherwise do not reject Ho

Decision: The null hypothesis is rejected and the alternate hypothesis is accepted because the p-value for oil price changes in Panel B of table 4.7 is significant <0.05 (0.00), leading to the conclusion that oil price changes has a significant effect on exchange rate in Nigeria.

Hypothesis Three

The long run estimates are used to test the hypothesis.

Restatement of the hypothesis in null and alternate form

Ho: Oil price changes do not have any significant effect on Gross domestic product in Nigeria.

Hi: Oil price changes have a significant effect on Gross domestic product in Nigeria.

Decision rule: Reject H_0 if $p\text{-value} < 0.05$, otherwise do not reject H_0

Decision: The null hypothesis is rejected and the alternate hypothesis is accepted as a result of the Gross Domestic Product in Panel B of Table 4.7 having a significant $p\text{-value}$ of less than 0.05 (0.03). This leads to the conclusion that variations in oil prices have a notable effect on Nigeria's GDP.

4.3 Discussion of Results

In line with the goals of the study and in answer to the research questions, the results summary, which is displayed in table 4.6, is discussed.

Table 4.6: Summary of findings

PANEL A: SHORT RUN ESTIMATES									
VARIA BLE	MODEL 1 (1, 0, 0, 0)			MODEL 2 (1, 0, 0)			MODEL 3 (1, 3, 0)		
	coefficie nt	p- value	Conclusion	coeffici ent	p- value	conclus ion	coefficie nt	p- value	conclusion
$\Delta(\text{LROI LP})$	0.19	0.00	Positive & significant	0.43	0.00	Positive & significant	0.43	0.03	Negative & insignificant
$\Delta(\text{MPR})$	0.22	0.15	Positive & insignificant	0.27	0.57	Positive & insignificant	1.18	0.01	Positive & significant
PANEL B: LONG RUN ESTIMATES									
VARIA BLE	MODEL 1 (1, 0, 0, 0)			MODEL 2 (1, 0, 0)			MODEL 3 (1, 3, 0)		
	coefficie nt	p-value	Conclus ion	Coeffici ent	p-value	conclu sion	coefficie nt	p-value	conclusion
LROIL P	0.15	0.00	Positive & significant	0.33	0.00	Positive & significant	0.68	0.03	Positive & significant
MPR	0.18	0.14	Positive & insignificant	0.20	0.57	Positive & insignificant	0.34	0.44	Positive & significant

Source: computed by the author using E-views

Table 4.6.1: Summary of finding (Objective One)

MODEL 1 (1, 0, 0, 0)						
Variables	Short Run Estimate			Long Run Estimate		
	Coefficient	P. value	Conclusion	Coefficient	P. value	Conclusion
LINF	0.19	0.00	Positive and significant	0.15	0.14	Positive and Insignificant

Source: Computed by the author using Eviews

Objective One: To assess the effect of oil price changes on inflation rate in Nigeria

Examining this goal and testing the hypothesis with an Autoregressive distributed lag model, the results show that fluctuations in oil prices have a long- and short-term positive and significant impact on Nigeria's inflation rate. This suggests that a unit shift in the price of oil would result in increases of 19% and 15%, respectively, in the medium and long terms. The country's substantial reliance on oil exports may be the cause of this important effect. As a result, rising oil prices drive up the costs of production, services, and transportation, which drives up the cost of goods and services (inflation). Again, an increase in the price of oil would lead to an increase in the cost of imported which further drives inflation higher.

The outcome is in line with the research done by Olomola (2006), who used vector analytic regression to examine the effects of an oil price shock on the Nigerian economy. The findings indicated that while there is no impact on output, the price of oil has a larger than expected effect on the rate of inflation.

Table 4.6.1: Summary of Finding (Objective Two)

MODEL 2 (1, 0, 0)						
Variables	Short Run Estimate			Long Run Estimate		
	Coefficient	P. value	Conclusion	Coefficient	P. value	Conclusion
LEXR	0.43	0.00	Positive and significant	0.33	0.00	Positive and Insignificant

Source: Computed by the author using Eviews

Objective Two: To ascertain the impact of oil price changes on exchange rate in Nigeria.

According to this goal and the results of testing the hypothesis using the ARDL model, changes in oil prices have a long- and short-term positive and considerable impact on Nigeria's exchange rate. Based on this influence, an increase in oil prices of one unit would result in a 43% short-term increase and a 33% long-term increase in the exchange rate. This might be because the majority of the oil is exported, which means that the nation depends heavily on the foreign exchange profits from the selling of oil. If the price of oil increases, the country's foreign exchange earnings increases leading to a stronger currency which implies that the value of the naira increases against other currencies. Again, when there is a decrease in oil price, the foreign exchange earnings decreases leading to a weaker currency.

The finding is in consonance with the result of Ayadi (2005) who carried out a research work to ascertain how changes in oil prices affected Nigeria's economy using the vector autoregression method. The result reveals that fluctuations in oil prices rate affects the exchange rate, which in turn influences industrial activities.

Table 4.6.1: Summary of Finding (Objective Three)

MODEL 3 (1, 3, 0)						
Variables	Short Run Estimate			Long Run Estimate		
	Coefficient	P. value	Conclusion	Coefficient	P. value	Conclusion
LGDP	0.43	0.03	Positive and significant	0.68	0.03	Positive and Insignificant

Source: Computed by the author using Eviews

Objective Three: To determine the impact of oil price changes on the gross domestic product (GDP) in Nigeria

According to this goal and the results of the hypothesis test using the Autoregressive distributed lag model, changes in oil prices have a noteworthy and beneficial effect on the gross domestic product. It follows that a unit change in the price of oil causes a short-term GDP gain of 43% and a long-term GDP rise of 68%. This is because there is a direct correlation between Nigeria's GDP and changes in oil prices. The gross domestic product grows in response to rising oil prices, and

this expansion spurs economic growth and development. On the other hand, should the price of oil decline, the GDP will also decline due to a drop in oil export revenue. This decrease in the GDP leads to economic contraction and recession.

This finding is in line with the findings of Ahuja (2010) who opines that the discovery of oil has led to an increase in available jobs throughout the nation. Because of the proliferation of oil companies in the country, the oil business provides work for tens of thousands of Nigerians which has boosted the gross domestic product of the country.

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

Summary of Findings

The findings arising from this study are summarized as follows:

1. Oil price changes has a positive and significant effect on the Inflation rate. (Coefficient =0.15, p-value = 0.00)
2. Oil price changes has a positive and significant effect on the exchange rate. (Coefficient =0.33, p-value = 0.00)
3. Oil price changes has a positive and significant effect on the Gross domestic product, (coefficient = 0.68, p-value = 0.03)

Conclusion

There is scarce literature on impact of oil price changes on the Nigerian economy. Most studies reviewed concentrated on the effect of oil shock on the Nigerian economy which sparked the motivation for this research work. The data set covers the years 1981 through 2021 and was sourced from the 2021 CBN statistical bulletin.

Some noteworthy findings were found when evaluating the effects of changes in oil prices on the Nigerian economy using the ARDL estimating method and the test for heteroscedasticity based on the Breusch-pagan-Godfrey (BPG) test. According to the research, the inflation rate is positively and significantly impacted by fluctuations in the price of oil. Once more, the outcome demonstrated that fluctuations in the price of oil have a positive and substantial effect on the exchange rate. Additionally, it shows 'that the GDP is positively and significantly impacted by fluctuations in the price of oil.

Based on these results, the study proposes that diversifying the economy into other areas in order to lessen the degree of reliance on oil revenue could help to alleviate the impact of changes in oil prices. Additionally, the research supports the idea that a stable exchange rate can be utilized to mitigate the effects of fluctuations in oil prices. The central bank can achieve this stable exchange rate by implementing mechanisms like a fixed exchange rate system, which would aid in maintaining a particular exchange rate. Lastly, the research indicates that increasing foreign reserves will, be crucial for the economy in order to mitigate the impact of fluctuations in the price of oil on the economy. It also recommends broadening the economy to include manufacturing and agriculture in order to protect it from changes in the price of oil.

Recommendations

1. The research recommends that policy makers should apply prudent fiscal management especially when oil prices are high. The use of the fiscal policy option would help to reduce government expenditure in periods of high oil price. Additionally, it recommends that the central bank can put in place monetary policies which would manage the supply of money and put inflation under control.
2. The research advises that maintaining a stable exchange rate would be of great essence for economic predictability and growth. Although there are many benefits to a stable exchange rate, the research recommends a flexible exchange rate system that will allow the exchange rate to adjust to market forces, which can help the economy to adapt to external shocks such as oil price changes.
3. Finally, the research recommends the implementation of policies which will reduce the reliance of the economy on oil by diversifying the economy and investing in infrastructure such as energy, transportation, and telecommunication. Additionally, policy makers can put in place measures such as subsidies and tax incentives to support the development of other sectors and reduce the impact of oil price fluctuations on the gross domestic product.

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