

# **International Price of Crude Oil and Foreign Reserves: The Nigerian Experience (1980 – 2015)**

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## **Abstract**

The paper investigates the impact of International price of crude oil on foreign reserves in Nigeria for the period 1980 – 2015. Data covering these periods were collected from the Central Bank of Nigeria Statistical Bulletin, and annual publications. The econometric techniques of Ordinary Least Square (OLS), Augmented Dickey Fuller (ADF), Unit Root Test, Johansen Co-integration test and Error Correction Method (ECM) were employed in the empirical analysis. The result of the regression analysis shows that there is a positive relationship between the dependent variable (ER) and international price of crude oil in Nigeria. This invariably means that as the level of oil price increases, foreign reserves increases significantly and whenever there is a fall in international crude oil price, ER falls as well. This finding thus made the argument against oil dependency relevant. In the short-run, Nigeria was able to have increasing, yet external reserves balance because of the high global oil prices, but in the long-run, the inconsistency of oil prices and lack of diversification of the productive base has had a negative effect on Nigeria's external reserves position. Thus, the study suggests that global oil prices are the cause of instability in Nigerian external reserves balance. Therefore, a combination of strict fiscal policy focused on the actual implementation of developmental programs, diversification and industrialization might be effective instrument to protect the country's economy from further global shocks and lead to increased and consistent external reserves balance.

**Keywords:** Crude oil, External reserves, Foreign reserves, International price

## **1.0 Introduction**

The unpredictable movement of oil price is an important aspect of the oil industry's input to the Nigerian foreign reserves, which could not have come at a more suitable instant because the country is embarking upon enormous programme of industrialization and economic development which postulates massive imports of investment goods and dedicated services involving massive expenditure of foreign exchange. In many underdeveloped countries, especially those that depend profoundly on a constricted choice of primary produce, severe shortages of foreign exchange, over and over again exacerbated by enormous declines in world commodity prices, represent a foremost impediment to effectual foreign reserves build up. The oil industry in Nigeria now has significant foreign exchange treasury and is in good physical shape of being able to finance the foreign exchange cost of her development programmes. The industry's input to foreign exchange is not considered by the gross worth of crude oil exports for the reason that the practice followed by the oil multinationals is to hold on to the whole earnings from exports overseas, as well as to remit to the producing country merely the sum required to uphold their home operations.

Global price of crude have been well thought-out by researchers due to its noteworthy brunt on macroeconomic variables. The global economy has experienced different optimistic and pessimistic changes in the worldwide price of crude oil. Consequently, Petroleum

Exporting Nations which are extremely susceptible to pessimistic changes of crude oil prices, have established body as well as instruments for storing surplus foreign exchange revenues from sales of crude oil at soaring prices to make exploit of it at the time of occurrence of pessimistic fluctuations to oil prices for their own purposes. Energy no qualm plays the fundamental function in the world economy. In spite of substantial preference to unconventional renewable sources of energy like wind, water, nuclear and lunar power, the fundamental position of crude oil in macroeconomic activities has not waned hitherto. So, worldwide price of crude oil may possibly have macroeconomic penalty in both oil exporting and oil importing nations in terms of their external reserves balance.

It has been reported that foreign reserves management is the practice of optimizing a nation's external wealth to convene its monetary requirements (Anifowose, 1997). In Nigeria, the Central Bank has the solitary conscientiousness of management of foreign reserves. The mechanism of foreign reserves consist of monetary gold, reserve position at the International Monetary Fund (IMF), holding of special drawing right (SDRs) and foreign exchange which are convertible currencies of other countries (CBN, 1997). Aluko (2007) postulated that external reserves have, in recent times, played momentous responsibility in the Nigeria economy. It has increased the height of money supply and consequently brunt optimistically on the height of economic activities as additional funds became obtainable for investment in fruitful activities. Employment was in turn generated, output increased and consumption boosted. Through their multiplier special effects on the economy together with the resourceful administration of the financial assets, standard of living of the people enhanced significantly. Furthermore, the input of the manufacturing subdivision to Gross Domestic Product (GDP), which has unrelenting to immerse, witnessed an increase. In an allied research, Obaseki (2007), emphasized that the uses of external reserves cannot be over emphasized. Fundamentally, external obligations have to be developed in foreign exchange. Consequently, the stocks of assets become central as a basis of financing external imbalances. Further uses to which external reserves can be lay are to intrude in the foreign exchange market, guide against unanticipated instability as well as uphold natural affluence for potential generations. Characteristically, the rationale of holding reserves is to enable the central bank an added means to calm down the issued currencies from fluctuating. In bid to gathering the transaction requirements of countries, reserves are used as a defensive rationale to offer a cushion to suck up unanticipated fluctuations or a spiky worsening in their conditions of trade or to meet unanticipated capital outflows, like the negotiated exit compensation of the Paris Club liability by Nigeria.

Reserves are also used to administer the exchange rate through intrusion in the foreign exchange market. Accordingly, the motives for holding adequate level of external reserves can consequently be summarized as the reasons why individuals hold money (CBN, 2007). Sound foreign reserves management practices are important because they can increase a country's overall resilience to shocks as the central bank will have the ability to respond effectively to financial crisis. Sound foreign reserves management can equally support but not substitute for sound macroeconomic management. Similarly, unsuitable economic policies can create severe risks to the capability to manage foreign reserves. Nevertheless, the practice of foreign reserves management has spanned over the areas of risk management, securitization and the use of derivatives (Anifowose, 1997). External reserves have impacted

considerably on the development of Nigeria economy over the years. In the word of Ojokwu (2007), Foreign Direct Investment (FDI) into the country increased from \$42.4 million in 1997 to \$540.17 million in 2002 at an exchange rate of ₦118 to a dollar, while the level of investment improved in 1999 from ₦4.24 billion to ₦63.74 billion in 2002. He maintained that employment improved from 4,093 in 1999 to 10,885 in 2002, at the same time as revenue allocation to States and Local Government Areas grew from ₦156.06 billion in 1999 to ₦440.74 billion at August 2004. Federal Government has also made considerable advancement in the war against corruption. All these are analytical of progress economically.

The significance of external reserves to any nation cannot be underestimated. It can be said to be the official public sector foreign assets controlled by the central bank of a country. The reserve location of Nigeria at any specified time is a mirror image of the state of affairs prevailing in the international oil market. According to George, (2007), the dimension of Nigeria's external reserves has been unpredictable over the years. Stock of reserve which was US\$7.47 billion at end of December 2003, improved by 127 percent to US\$16.96 billion in 2004, it could finance 18.4 months of imports. The import cover was a lot higher than the West Africa Monetary Zone (WAMZ) minimum prerequisite of 6 months. Prior to the inauguration of the Central Bank of Nigeria in 1959, the country formed part of the defunct West African Currency Board (WACB). In that period, management of external reserves posed diminutive or no problems to the country because the approach in which the Board operated barred such problems from arising. Most favorable employment of reserves then was in reality not an concern since Nigeria's non-sterling earnings were deposited in London in exchange for credit entries in the sterling accounts maintained there (Aizenman, 2005). Afterward, the 1959 Act which created the Central Bank of Nigeria (CBN) required the Bank to hold external reserves exclusively in Gold and Sterling. With the modification in 1962 of this Act, the Bank acquired the directive to keep up the country's foreign exchange reserves not only in sterling balance but also in non-sterling possessions such as gold coin or bullion, bank balances, bills of exchange, government and government-guaranteed securities of countries other than Britain and treasury bills in other countries. The monetary options obtainable to the country widened upon joining the International Monetary Fund (IMF) in 1961 to consist of numerous additional assets (Yuguda, 2003).

The evils of reserve management began during the periods of the First National Development Plan in 1962 to 1966 and the Nigerian Civil War of 1967 to 1970. In these periods, financing the plan and the war consumed a large fraction of the country's reserves. Besides, the rhythm in the foreign trade sector declined, following the interruption of economic actions in the country. The problems became compounded right away after the war in the wake of the Federal Government's concerted efforts to restructure and reactivate the war ravaged economy which continued to demand mammoth foreign exchange reserves. Because of the exigencies of this phase, the CBN became dedicated to maintaining an 'adequate' echelon of external reserves (Olawoyin, 2005).

In an interrelated development, Odozi, (2000) distinguished that in addition to the problem of depleting reserves; Nigeria faced a new scenario with reserve management. Following the admission into the organisation of Petroleum Exporting Countries (OPEC) in 1973 and the oil explosion of the period, the dilemma of reserve administration switched from that of 'inadequate' to that of 'excess reserves'. This remained so until 1981 when the

country was hit by the global economic depression that led to a dependable decline in her external reserves. In the light of this development, economic stabilization procedures rotating inflexible exchange control, which ran from April 1982 to June, 1986 (when accumulation to external reserves was low), were introduced. By the end of 1985, it was apparent that the use of stringent economic control was ineffective in restraining external reserves depletion. To this end, exchange and trade controls were discontinued in 1986, following the adoption of market based policy measures, the Structural Adjustment Programme (SAP) in July 1986. However, after more than seven years of liberation, government felt that the overall performance of the economy was unsatisfactory. Hence, in January 1994, some measures of control were re-introduced which saw the CBN as the sole custodian of foreign exchange and together with its designated agents. Again the trade and exchange policies in 1994 failed to substantially achieve the desired objectives. The guided deregulation introduced in 1995, among other things, abolished the 1962 Exchange Control Act, in a bid to enhance the flow of capital and the reserves position of the country. Other measures aimed at boosting external reserves included the introduction of an Autonomous Foreign Exchange Market (AFEM) for the purpose of trading in foreign currencies at market determined rates and further liberation of the foreign exchange system in 1997 and the trade and exchange regime in 1998

The steady raise of Nigeria's foreign exchange earnings and build-up of external reserves, which started some months ago, is already under threat from exogenous shock arising from the recent fall in oil prices. Nigeria depends on oil sales for 90percent of its foreign exchange earnings and 70percent of total revenue. However, rising shale oil production in the united states in recent months has dampened production cut carried out by members of the organization of petroleum exporting countries (OPEC) and Russia to shore up prices according Reuters, oil price slid 2percent recently, extending the previous session's dive that brought price to the lowest level this year, as record U.S. crude inventories fed doubts about whether OPCE-led supply cut will reduce a global glut. U.S crude prices fell through the 50 dollars a barrel support level, with market participants on wilding a massive number bullish wagers they had amassed after a deal by top global oil producers to limit output. External reserves consist of official public sectors foreign assets that are readily available to and controlled by the monetary authorities, for direct financing and regulating of payment imbalances through intervention in the exchange market. IMF (2003) essentially the effect of crude oil price charges on external reserves cannot be over emphasized since basically, crude oil price determine the available revenue of oil dependent countries therefore the stock of reserves is determine by the available revenue of such country. Other uses of external reserves include foreign exchange intervention so as to guide against unseen unpredictability. Although crude oil price has been seen as one for the ways in which developing countries can complement their low domestic revenue generation. In Nigeria, a rise in crude oil price has not yielded its corresponding increase in Nigeria foreign reserve due to corruption fiscal indiscipline.

External reserves are habitually called international reserves, foreign reserve or foreign exchange reserves. Whereas there are diverse definitions of international assets, the most extensively accepted is the one as defined by the IMF in its Balance of Payments Manual, 5th edition. It defined international reserves as consisting of official public sector foreign resources that are enthusiastically accessible to, and controlled by the monetary

establishment for undeviating financing of payment imbalances, and straightforwardly modifiable the enormity of such imbalances, through interference in the exchange markets to affect the currency exchange rate and/or for other purposes (CBN, 2007). The height of external reserve in a nation is inclined by external sector developments such as crude oil prices, international trade dealings, exchange rate, external liability and other associated external obligations. Nevertheless, while foreign reserves are used for financing domestic foreign exchange requirements they could wield pressures on the domestic monetary atmosphere. Thus, if a country's trade capacity increases, banks and other financial mediators may wield mounting weight on her foreign reserves. This development calls for a uninterrupted endeavor by a country at efficiently running her foreign reserves to a most favorable echelon that would uphold her abundant external commitments (CBN, 1997). The accumulation of reserves has faced a bunch of problems over the years. There has been apprehension by the Nigerian public as regards the security or otherwise of our foreign reserves as over 90 percent of this is denominated in US dollar assets. This predicament has amplified as the financial predicament on Wall Street deepens. A number of economic experts are obligatory to inquire a number of fundamental questions as regards this position. Most our monetary authority budge our autonomous possessions away from the dollar to others, apparently safer currency denominations. Given existing realities, it is essential to anticipate the wearing away in value of our autonomous resources (Yuguda, 2003). Against this backdrop, this study examined the effects of crude oil price on external reserves in Nigeria with a view to investigating the relationship between crude oil price and the Nigeria external reserves movement; and also examining the extent to which crude oil price account for external reserves instability.

## 2.0 Methodology

This section specifically deals with the methodology of the study attention has been focused on source of data, model formulation and method of data analysis. The data used in this study were mainly secondary data. They covered the period of (1980 – 2015) and obtained from various editions of CBN statistical bulletin and economic journals. Others were obtained from textbooks and websites.

### Model Specification

The study adopted the econometric model in evaluating the management of external reserves in the Nigeria economy. The econometric model used was to determine the relationship between external reserves and international price of crude oil in Nigeria. CPI was included because it captures institutional variables that promote trade as argued by the institutional economic school of thought. Thus, the model will be formulated as  $ER = f(op_t, op_{t-1}, fdi_t, fdi_{t-1}, cpi_t, cpi_{t-1}, ge_t, ge_{t-1})$ . Where ER is a External Reserves; OP is International Price Of Crude Oil; FDI is Foreign Direct Investment; CPI is the corruption Index Rating and GE Government Expenditure. Although, this study is based on global price of crude oil, yet, we included at least some other exogenous variables so as to use the result for policy formulation.

$$ER_1 a_0 + a_1 \sum_{i=1}^n OP_t + a_2 \sum_{i=1}^n OP_{t-1} + a_3 \sum_{i=1}^n FDI_t + a_4 \sum_{i=1}^n FDI_{t-1} + a_5 \sum_{i=1}^n CPI_t + a_6 \sum_{i=1}^n CPI_{t-1} + a_7 \sum_{i=1}^n GE_t + a_8 \sum_{i=1}^n GE_{t-1} + u_1 \dots \text{(Equ. 1)}$$

We also tried the non-linear specifications. Specifically, the Cobb-Douglas variety is specified, estimated and compared with the linear version. The log-linear specification will be adopted to place all the variables in the model on the same scale or level and to minimize the problem of multicollinearity. According to Cookey (2009), in practical economic research, the standard practice is to try both the linear and non-linear forms of the relationship and analyze the one that gives the best result. Hence, the Cobb-Douglas (aggregate production function) variety is specified as follows:

For External Reserves as dependent variable (ER) gives

$$\begin{aligned} \log ER_t &= a_0 \\ &+ a_1 \sum_{i=1}^n \log OP_t + a_2 \sum_{i=1}^n \log OP_{t-1} \\ &+ a_3 \sum_{i=1}^n \log FDI_t + a_4 \sum_{i=1}^n \log FDI_{t-1} + a_5 \sum_{i=1}^n \log CPI_t + a_6 \sum_{i=1}^n \log CPI_{t-1} + a_7 \sum_{i=1}^n \log GE_t + a_8 \sum_{i=1}^n \log GE_{t-1} \\ &+ u_1 \dots \dots \text{(Equ. 2)} \end{aligned}$$

### **Economic Variables Considered**

#### **Dependent/Endogenous Variables**

##### **External Reserve (ER)**

Total reserves comprise holdings of monetary gold, special drawing rights, reserves of IMF members held by the IMF, and holdings of foreign exchange under the control of monetary authorities. The gold component of these reserves is valued at year-end (December 31) London prices. Data are in current U.S. dollars.

#### **Independent/Exogenous Variables**

##### **Crude Oil Prices (OP)**

In a free and competitive market, price is determined by the forces of demand and supply. Price is the monetary measures of value. Market prices establish the relative value of the various goods and services (Tamuno and Kalu, 2007). The price of oil is of critical importance to today's world economy, given that oil is the largest internationally traded good, both in volume and value terms, creating what some analysts have called a hydrocarbon economy. In addition, the prices of energy-intensive goods and services are linked to energy prices, of which oil makes up the single most important share. Finally, the price of oil is linked to some extent to the price of other fuels. Invariably, any abrupt changes in the price of oil have wide-ranging ramifications for both oil-producing and oil-consuming countries. Therefore, an increase in oil price is expected to cause an increase in Foreign Reserve. Thus, the functional relationship between oil price and our foreign reserve is hypothesized as:

$$a_1 > 0 \text{ or } \frac{dER}{dOP} > 0$$

##### **Foreign Direct Investment (FDI)**

FDI involves the setting up new factories by foreign national in other country. Most economists usually argue in favour of Foreign Direct Investment because it does have a high

multiplier effect on the macro economy. This is true because FDI usually creates new employment opportunities thereby raising the level of income in the host country. According to Odozi, (1995), the most attractive feature of foreign direct investment is in the packages of capital, technology and investment. Any increase in Foreign Direct Investment inflow is expected to cause an increase in Foreign Reserve. Thus, the functional relationship between FDI and Foreign Reserve is hypothesized as:

$$a_3 > 0 \text{ or } \frac{dER}{dFDI} > 0$$

### **Corruption Perspective Index (CPI)**

Corruption can be defined as "an arrangement that involves an exchange between two parties (the demander and the supplier) which (i) has an influence on the allocation of resources either immediately or in the future; and (ii) involves the use or abuse of public or collective responsibility for private ends" Macrae, (1982). However, base on the data used, the corruption perspective index ranks countries and territories based on how corrupt their public sector is perceived to be. A country or territory score indicates the perceived level of public sector corruption on a scale of 0-100, where 0 means that a country is perceived as highly corrupt and 100 means it is perceived as very clean. A high corruption rating is expected to cause a decrease in the Foreign Reserve. Thus, the functional relationship between CPI and Foreign Reserve is hypothesized as thus:

$$a_5 > 0 \text{ or } \frac{dER}{dCPI} > 0$$

### **Gross National Expenditure (GE)**

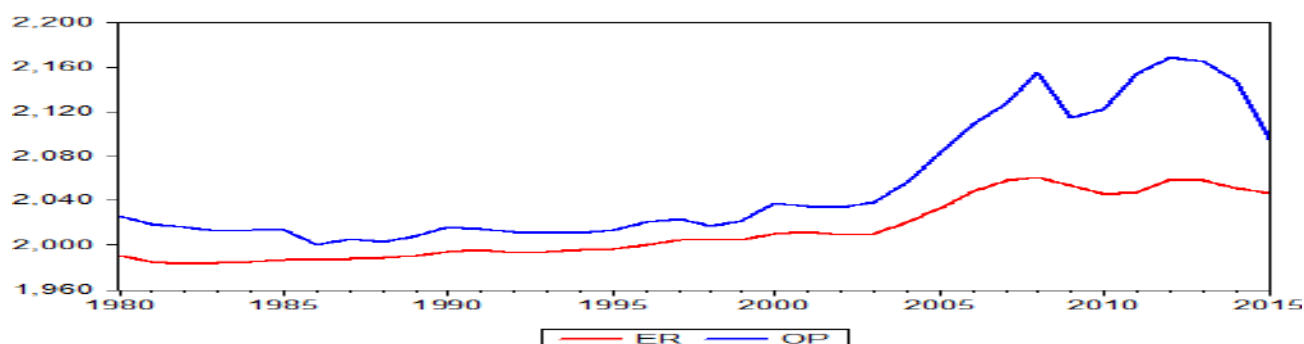
This is the total expenditure of the government during one fiscal year. The expenditure includes capital expenditure and recurrent expenditure. Capital expenditure is the expenditure of government on a capital project which needs not to be repeated yearly; while recurrent expenditure is on yearly or often projects like salary of workers. Any increase in Government Expenditure is expected to cause a decrease in Foreign Reserve. Thus, the functional relationship between Government Expenditure and Foreign Reserve is hypothesized as:

$$a_7 < 0 \text{ or } \frac{dER}{dGE} < 0$$

## **3.0 Results and Discussions**

### **Descriptive Statistics**

Conventionally, it is expected that whenever oil price rises, more income over budgeted revenue is realized, as expected therefore, the excess revenue from oil price rise could be use to build up country's foreign reserves. Figure 1 shows a positive relationship between global crude oil price and Nigeria external reserve. However, it could be observed from the graph above and specifically from 2008 during the recent past administration of Goodluck Jonathan, a sharp rise in international crude oil price does not resulted to a proportionate rise in external reserve value.



**Figure 1. External Reserves and International Crude Oil Price in Nigeria; 1980 - 2015**

### Econometric Result

Coefficient of variables: OP (ratio of Oil price): for a point increase in OP, then ER (external reserves) will increase about 84percent. FDI (foreign direct investment): for a point increase in FDI, then ER (external reserves) will decrease about 03percent. CPI (corruption perspective index rating): for a point increase in CPI, then ER (external reserves) will increase about 94percent. GE (government expenditure): for a point increase in GE, then ER (external reserves) will decrease about 01percent.  $R^2$  (coefficient of determination):  $R^2$  with the values of 0.95 indicated that 95 percent of changes of external reserves in Nigeria could be explained by oil price, foreign direct investment, corruption index rating, and government expenditure variables. t-statistics:  $t^*$  indicated that the corresponding variable is individually significant at 5%level; while  $t$  means the individual variable is not significant at 5%level of significance.

F-statistics:  $F^*$  from the table indicated overall significance of all the variables in the model.

DW test (serial autocorrelation): table value DW at 5%level of  $k=4$   $N=36$  gives  $DL=1.24$   $DU=1.73$   $DW^*$ ;  $D^{**}$  and  $DW^{***}$  indicated no autocorrelation, test inconclusive and presence of autocorrelation respectively.

**Table 1. Regression of External Reserve and International Crude Oil Price**

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	-1.621003	0.999220	-1.622269*	0.1358
LOG(OP)	0.840999	0.336530	2.499034*	0.0315
LOG(FDI)	-0.030958	0.290367	-0.106618	0.9172
LOG(CPI)	0.940525	0.577954	1.627334*	0.1347
LOG(GE)	0.011894	0.372896	0.031896	0.9752

$R^2 = 0.95$      $R^{-2} = 0.92$      $F^c = 25.61^*$      $\text{Prob}(F\text{-statistic}) = 0.000011$      $DW = 1.40^{**}$

### Augmented Dickey-Fuller (ADF) Unit Root Test

Time series data are assumed to be non stationary and this implies that the results obtained from the OLS method may be misleading. In this vein, it is cognizant that stationarity test should be conducted. The stationarity test is carried out using the Augmented Dickey-Fuller (ADF) Unit Root Test. The stationarity of data is essential for the Johnsen co-integration test. The decision rule for the Augmented Dickey-Fuller (ADF) Unit root test states that the Augmented Dickey-Fuller (ADF) Test statistic value must be greater than the Mackinnon Critical Value (a) 5% at absolute term for stationarity to be established at level and if



otherwise, differencing occurs using the same decision rule (Table 2). From the analysis, it could be deduced that all the variables were stationary at first difference i.e. I (1) series

**Table 2: The stationarity test in summary and the order of integration**

Variables	Augmented Dicky-Fuller	5% Mackinnon Critical Value	Remark	Order of Integration
ER	-4.83***	-2.951125	Stationary	I(1)
OP	-4.33***	-2.951125	Stationary	I(1)
FDI	-6.85***	-2.951125	Stationary	I(1)
CPI	-4.68***	-2.951125	Stationary	I(1)
GOE	-5.09***	-2.951125	Stationary	I(1)

### Johansen Co-Integration Test

The co-integration test establishes whether a long-run equilibrium relationship exist among the variables. To establish co-integration, the likelihood ratio must be greater than the Mackinnon Critical Value at 1% and 5% levels of significance and the co-integrating equation is chosen from the normalized co-integrating coefficient with the lowest log likelihood.

**Table 3. Johansen Co-integration Result of External Reserves and International Crude Oil Price**

Maximum Eigen Value	Trace Statistics	5% Critical Value	1% Critical Value	Hypothesized No. CE(S)
0.988712	164.0211	69.81889	77.81884	$r = 0^{**}$
0.871623	83.30880	47.85613	54.68150	$r \leq 1^{**}$
0.806000	46.35862	29.79707	35.45817	$r \leq 2^{**}$
0.585814	16.84044	15.49471	19.93711	$r \leq 3^*$
0.052699	0.974497	3.841466	6.634897	$r \leq 4$

\*Rejection of the null hypothesis at 5% significance level; and \*\*Rejection of the null hypothesis at both 5% and 1% significance levels.

Using the trace statistics, it indicates four co-integrating equations at 5% significance level which implies that long run relationship exists among the variables. This led to the rejection of the hypothesis of no co-integration. The co-integrating equation chosen from the Normalized co-integrating coefficients is presented in Table 4. From the co-integrating equation, OP and FDI have a negative relationship with ER in the long run. In the long run, a unit increase in OP and FDI leads to a decrease in ER by 0.877397 and 6.165391 units respectively while an increase (decrease) in CPI and GE will cause ER to increase (decrease) by 11.64107 and 0.12769 units respectively.

**Table 4. Normalized Integrating Coefficients**

ER	OP	FDI	CPI	GE
1.000000	-0.877397	-6.165391	11.64107	0.127619
	(0.07773)	(0.56123)	(1.88209)	(0.01158)

Note: Standard Error statistics are stated in parenthesis

### Error Correction Model (ECM)

Co-integration is a prerequisite for the error correction mechanism. Since co-integration has been established, it is pertinent to proceed to the error correction model. The first step in ECM is developing an over-parameterized model (ECM 1) and then the parsimonious model (ECM 2). The results of the over-parameterized model presented in Table 5 shows that the error correction term i.e. ECM (-1) is negative and significant. Its coefficient implies that the speed of adjustment is high. The  $R^2$  signifies that all the explanatory variables in the model accounts for 70.6% total variation in ER while the remaining 29.4% is attributed to the white noise residual. The f- statistic of 3.517925 with a probability value of 0.006531 shows that the whole model is significant. However, there is need to simplify the error correction model by estimating a parsimonious model (ECM 2) developed from the over-parameterized model (ECM 1).

**Table 5. Over-Parameterized Model (ECM 1)**

Variable	Coefficient	Standard Error	t-statistics	Probability Value
C	0.451031	0.949735	0.474901	0.6403
D(OP)	0.252859	0.101033	2.502745	0.0216
D(OP(-1))	0.167223	0.119204	1.402832	0.1768
D(OP(-2))	0.072064	0.160774	0.448233	0.6591
D(FDI)	0.395255	1.239346	0.318922	0.7533
D(FDI(-1))	0.182987	1.060884	0.172485	0.8649
D(FDI(-2))	0.854369	1.068291	0.799753	0.4337
D(CPI)	2.885627	2.849251	1.012767	0.3239
D(CPI(-1))	-0.275682	2.984560	-0.092369	0.9274
D(CPI(-2))	1.139762	2.905390	0.392292	0.6992
D(GE)	-0.055004	0.051667	-1.064586	0.3004
D(GE(-1))	-0.031743	0.044961	-0.706001	0.4888
D(GE(-2))	0.028452	0.034457	0.825733	0.4192
ECM(-1)	-0.273018	0.240412	-1.135624	0.2702
<b><math>R^2 = 0.706487</math></b>	<b><math>R^2 = 0.505662</math></b>	<b>f-statistics = 3.517925</b>	<b>Prob (F-Statistics) = 0.006531</b>	

**Table 6. Parsimonious Model (ECM 2)**

Variable	Coefficient	Standard Error	t-statistics	Probability Value
C	0.775219	0.840153	0.922712	0.3653
D(OP)	0.213805	0.079926	2.675036	0.0132
D(OP(-1))	0.251040	0.092253	2.721213	0.0119
D(FDI)	0.119699	1.113730	0.107475	0.9153
D(FDI(-1))	-0.016358	0.832524	-0.019649	0.9845
D(CPI)	3.186530	2.417029	1.318367	0.1998
D(CPI(-1))	0.668461	2.544830	0.262674	0.7950
D(GE)	-0.017717	0.027530	-0.643543	0.5260
D(GE(-1))	-0.050517	0.022984	-2.197934	0.0378
ECM(-1)	-0.214319	0.185668	-1.154311	0.2597
<b>R<sup>2</sup> =0.659183</b>	<b>R<sup>2</sup> =0.531377</b>	<b>f-statistics =5.157672</b>	<b>Prob (F-Statistics) = 0.000613</b>	

**Dependent Variable = d(GDP)**

From Table 6, the ECM equation is stated thus;

$$\mathbf{ER}_t = \mathbf{0.775219} + \mathbf{0.251040OP}_{t-1} - \mathbf{0.016358FDI}_{t-1} + \mathbf{0.668461CPI}_{t-1} - \mathbf{0.050517GOE}_{t-1} - \mathbf{0.214319ECM}^*_{t-1}$$

Note: \* Parameter is statistically significant.

The ECM equation shows that OP has a positive but not significant relationship with GDP. The positively signed coefficient of OP is in conformity with the a priori expectation. A unit increase in OP consequently means that ER rises by 0.251040 units. The findings suggest that Oil Price increase is beneficial to Nigeria external reserves position and also plays a more significant role in enhancing Nigeria external reserves balance. This could be attributed to the fact that the foreign exchange accrued from oil price increases can be channeled to the building up of the overall reserves of the economy. However, revenue from oil prices increase has often been mismanaged via corrupt leaders. FDI exerts an insignificant negative pressure on ER. This also goes contrary to the a priori expectation. A unit increase in the FDI leads to a decrease in ER by 0.016358 units. This implies that foreign direct investment has a negative impact of external reserves balance of Nigeria. CPI in contrary to the a priori expectation is positively related to ER and it is statistically insignificant. A unit increase in CPI this invariably leads to 0.668461 units decrease in ER. This implies that as corruption increases External Reserves balance reduces. GE has a negative relationship with ER, thus in line with the a priori expectation and it is insignificant on GDP. The implication of GE connotes that the more government expenditure increases the deteriorating external reserves balance. The coefficient of ECM (-1) is significant with the appropriate negative sign. It's coefficient of -0.214319 means that the present value in ER adjusts rapidly to previous changes in OP, FDI, CPI and GE.

The R<sup>2</sup> in the parsimonious model shows that the exogenous variables in the ECM equation explains 65% of total variation or changes in GDP and the remaining 35% is accounted for by factors outside the model. Also, the F-Statistic of 5.157672 in ECM 2 with its probability

value of 0.000613 provides basis to logically conclude that the overall result obtainable in ECM 2 is statistically significant.

### **Implication of Empirical Results**

**External Reserves:** External reserve responds positively to oil price changes. This suggests that positive oil price (increase in crude oil price) could help build up Nigeria external reserves; while fall in oil price would result to the depletion of external reserve. International crude oil price increases external reserves in the short run evident from the short run result above. Economically speaking, in the short run the foreign exchange earned as a result of global crude oil price increase and by definition, any foreign exchange held by a nation's monetary authority constitute part of that nation's reserves. However, the long run, and often time this excess foreign exchange earnings are not usually deposited with international monetary institutions like IMF and World Bank either as a gold standard or as a special drawing right. This has the potentials of a negative signs in the long run relationship as shown in the normalized co integration result.

## **4.0 Conclusion and Recommendations**

The purpose of this study has been to empirically investigate the relationship between oil price and external reserves. It has been observed that one phenomenon that has infected the price of crude oil in the global oil market which is also persistent and may not die out quickly as we venture into the future is instability/fluctuations. The study further reveals that a little change in the price of crude oil in the global oil market in the current period will produce a long-term effect on the Nigerian's external reserves balance. In other words, international price of crude oil affect external reserves balance over the years in Nigeria. The study therefore recommended that the energy policy makers in Nigeria should have a better understanding of how the world's oil markets are likely to evolve in the future and how the total world demand for crude oil is likely to change in response to the changes in international crude oil prices initiated by OPEC, and in response to future changes in price resulting from changing supplies in non-cartel countries; changes in the global price of crude oil would cause instabilities in macroeconomic movement and worsen the economy, so it is essential to encourage diversification as a means of cushioning the effect of oil price fluctuations in the economy. Furthermore, Nigeria should return to agriculture by providing technical input and financial support to the farmers and that concerted steps should be taken to delink public expenditure from happenings in the international oil market which can be achieved by diversifying the revenue base from oil. Efforts should be made to improve fiscal institutions and anti-corruption agencies in order to improve the management of oil revenue and promote accountability in the oil sector in Nigeria. More attention should be given to agricultural sector in the Nigerian economy because oil sector is an enclave sector with less multiplier effect while agricultural sector have an open link with other sectors and hence have a higher multiplier effect to other sectors of the economy. Thus, if the policy discussed and recommended is carried out, Nigeria will take advantage of increases in oil price and help reduce macroeconomic instabilities which in turn will improve external reserves balance and growth in Nigeria.

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