External Economic Uncertainty Indicators and Nigeria's Foreign Exchange Reserve

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Abstract

Following palpable instabilities in critical international economic fundamentals and the implications on the health of individual economies, this study examines selected external economic uncertainty indicators to ascertain effects on foreign exchange reserves accumulation in Nigeria over the sample period, 1986 to 2022. To achieve this goal, data on crude oil price, Eurobonds, food imports bill, exchange rate, debt services and external reserves were sourced from the Statistical Bulletin of the Nigeria's apex bank, 2023. The processes of Autoregressive Distributed Lag (ARDL) estimation were applied. The results indicated that Eurobonds, exchange rate and oil price had positive and significant short-run effects on external reserves accumulation while food imports and debt services exhibited negatively insignificant effects. In the long, Eurobonds and exchange rate exerted positively significant effects on external reserves, but oil price positively and insignificantly impressed on external reserves, debt services and food import exerted negative and significant effects. The study also revealed that about 59 percent of total variation in the external reserve of Nigeria was explained by changes in the selected uncertainty indicators. Thus, the researcher concluded that the selected external economic uncertainty indicators indisputably influenced external reserves accumulation in Nigeria over the sampled period. It is thus, recommended among others that the Nigerian government should ensure to establish contingency plans for economic uncertainty, including the creation of stabilization fund. This fund can be utilized during economic downturns to cushion the impact on external reserves and maintain financial stability.

Keywords: *External Economic Uncertainty Indicators, Foreign Exchange Reserve, Nigeria, Autoregressive Distributed Lag*

INTRODUCTION

Globally, every economy is interrelating with some others for purpose of possible economic gains with none existing in isolation. As an emerging economy, Nigeria is not an exemption, as it economically associates with Rest of the World to galvanize its economic health. However, like others, the African most populous economy is not immune against international economic uncertainty fundamentals which determine level of external reserves. External reserves are crucial for maintaining economic stability and resilience, as they serve as a buffer for absorbing external shocks and ensure the country's ability to meet financial obligations (Osuji and Ebiringa, 2012). Understanding the connect between external uncertainty and reserves is essential for policymakers and investors to make informed decisions. External reserves are variously called international

reserves, foreign reserve or foreign exchange reserves. While there are several definitions of international reserves, the most widely accepted is that proposed by the IMF in its Balance of Payments Manual, 5th edition (Osuji and Ebiringa, 2012), stating international reserves as consisting of official public sector foreign assets that are readily available to, and controlled by the monetary authorities for direct financing of payment imbalances, and directly regulating the magnitude of such imbalances, through intervention in the exchange markets to affect the currency exchange rate and/or for other purposes (CBN, 2007).

The level of a country's external reserves is influenced by external economic uncertainty conditions and some internal or domestic factors. External uncertainty refers to situations in which the future economic environment changes unpredictably with respect to factors not controlled by a particular region or country and there is a high degree of risks and ambiguities (Adarov, 2021). External economic factors some of which are international trade transactions, exchange rate, external debt and other related external requirements. Domestic economic uncertainty refers to a lack of predictability or clarity about the future economic conditions evident in the outcomes of related economic fundamentals within a specific county (Francis and ThankGod, 2016). Some domestic factors that affect external reserves include; central bank interventions in financial markets, change in government policy after election, price instability, energy price uncertainty and uncertain government response, trade tensions and recession. External reserves, also known as foreign exchange reserves or foreign currency reserves refer to assets held by a country's central bank in various foreign currencies. These reserves serve as store of value and are typically used to promote stability in the country's domestic currency and the overall economy (Chinn, *et al.,* 2003). Foreign reserves serve to finance necessary imports, support the domestic currency, or address balance of payments imbalances. A country's external reserves act as a signal of monetary and economic stability. (Ghosh, *et al.,* 2013).

Economic uncertainty can impact a country's external reserves in several ways. High economic uncertainty often leads to fluctuation in exchange rates, trade imbalances and changes in investor confidence. In times of uncertainty, investors may seek safer assets, affecting a country's currency and potentially depleting its reserves. Governments may also use reserves to also stabilize their currency or manage balance of payments crisis during economic uncertainty. If a country faces significant economic downturn or external shock, it may draw on its reserves to support its currency, pay off debts or mitigate the impact of the uncertainty. However, when foreign reserves are used for financing domestic foreign exchange needs, they could exert pressures on the internal monetary environment (CBN, 2007). Thus, if a country's trade volume increases, banks and other financial intermediaries may exert increasing pressure on her foreign reserves. The persistent decline in the external reserves as well as increased foreign exchange demand can be largely attributed to uncertainty in crude oil prices and low foreign exchange earnings. This scenario calls for continuous efforts at effectively and optimally managing foreign reserves to ensure sustainable external commitments (CBN, 2007).

Nigeria's external reserves data evidenced fluctuation over the years. Its level rose from US$0.70 billion in 1992 to US$1.30 billion in 1993 and further to US$1.70 billion in 1994. After falling by 17.70 percent to US$1.40 billion in 1995, accumulation rose by 192.90 percent to US$4.10 billion in 1996. In 1997, Nigeria's gross external reserves stood at US$7.58 billion and plummet by 6.30 percent to US$7.10 billion in 1998. It further plunged by 22.50 percent in 1999 to US$5.50 billion

(Udo and Antai, 2014). The end of year gross reserves declined by 23.30 percent from end-December 2001 level of US$10.42 billion to US$7.99 billion in 2002. It declined further by 6.50 percent to US$7.47 billion in 2003. Reasons for the downward trend in reserves were inadequacy of foreign exchange receipts, coupled with huge fiscal spending and the consequent pressure on the country's payments obligations (Udo and Antai, 2014). Frequent fluctuations in stock markets, bond yields, currency exchange rates, ongoing trade disputes, tariff measures and fluctuations in the prices of commodities such as oil, metals, agricultural products and debt problems in various countries created ripple effects throughout the global economy.

Nigeria's external economic stability is increasingly challenged by most of the preceding factors, including its reliance on external reserves to manage international payments and exchange rate stabilization as buffer. This undermines reserves accumulation as occasioned by uncertainty external economic fundamentals; hence, the aim of this study is to analyze the implications of selected external economic uncertainty indicators as; oil price, food imports bill, debt servicing obligations, exchange rate and Eurobond on external reserves accumulation.

LITERATURE REVIEW
Uncertainty Theory
This theory is often associated with Frank Knight was developed in 1921 and later developed by others, it distinguishes between risk and uncertainty. This distinction has implications for decision making and economic behaviour, influencing how individuals and firms make choices in the face of incomplete information. This theory suggests that economic uncertainty arise due to various factors, such as changes in government policies, market fluctuations, technological advancements, geopolitical tensions, and natural disasters. Uncertainty can impact investment decisions, consumption patterns, and overall economic activity. Economic agents, such as businesses, individuals, and policymakers, often face challenges in making informed decisions under conditions of uncertainty (Augustine, 2015). The interplay between uncertainty theory and external reserves is particularly evident during times of global economic turbulence. In uncertain economic environments, governments and central banks often rely on robust external reserves to stabilize their currencies, manage inflation, and ensure the overall health of their economies (Augustine, 2015). For instance, during a period of heightened uncertainty, a country may experience capital outflows as investors seek safer assets. In such scenarios, a well-managed external reserve can act as a buffer, helping to stabilize the national currency and prevent a full-blown economic crisis.

Optimal Reserve Level Theory
This theory by James Tobin was developed 1963 and focuses on the management of external reserves by central banks and governments. It suggests that there is an optimal level of reserves that countries should hold to maintain macroeconomic stability and manage external uncertainty. Optimal reserve levels depend on various factors, including trade openness, foreign debt levels, exchange rate regime, and the country's ability to access capital markets during times of crisis (Audu, 2004). The core principle of optimal reserve theory is to assess the specific economic circumstances of a country and establish a reserve level that aligns with its unique needs and vulnerabilities. Factors such as trade dynamics, exchange rate stability, and the country's susceptibility to external uncertainty are considered in this evaluation. The optimal reserve level is not a one-size-fits-all measure but is contingent on a country's economic structure and goals. For

instance, a nation heavily reliant on international trade might aim for higher reserves to cushion against trade imbalances and currency fluctuations.

Empirical review

Adarov, (2021), studied 24 countries using the GMM and panel VAR framework; countries were grouped either as market-based or bank-based economies. His findings show that financial cycles play a significant role in shaping macroeconomic imbalances, with expansions inducing economic overheating and downward pressure on public debt to GDP ratios. Financial dis-equilibrium causes a more profound and faster response of business cycles in bank-based economies, while in market-based economies is more persistent but mild, with greater significance for current account and public debt dynamics. High-public debt countries reveal much more potent effects on fiscal stance and output gap trajectories.

Shi and Shen, (2021), studied the effect of natural gas prices and economic uncertainty. They identified three markets and the three different gas pricing mechanisms: the U.S. market for hub pricing, the Japanese market for oil indexation, and the German market for transition between the two pricing regimes. In addition, the study investigated the dynamic causal effect of macroeconomic uncertainty on formulating natural gas prices. The finding shows that macroeconomic uncertainty plays a vital role in determining variations in natural gas prices, thereby driving the business cycle fluctuations among countries considered in the study.

Batabyal and Killins, (2021), examined the effect of policy uncertainty on stock market return evidence from the Canadian economy. Findings show that both the short run and long run are asymmetric. In the long run, increased policy uncertainty motivates investors to take a 'risk-off' method to gravitate toward lower-risk investments, decreasing asset prices, whereas decreased uncertainty prompts investors to take on portfolio risk for higher returns.

Mwangi, (2021), analysed the determinants of food import demand, a panel data set of 37 sub-Saharan African countries on agricultural import, using augmented gravity model. The study found that, GDP, membership to regional trade agreement, inflation and quality of governance encourage agricultural imports in these countries. Abdullahi, (2021), examined the determinants of food import demand in Africa using Nigeria as a case study. The study employed ARDL bound testing approach to cointegration. Results from the study showed that population growth and domestic food production influence food import demand in both short run and long run, while exchange rate appeared to be insignificant factor.

Fossong. *et al*., (2021) investigated how oil and non-oil earnings affected Cameroon's economic growth. The study employed the Autoregressive Distributive Lag (ARDL). Gross domestic product (GDP), revenue from oil and other sources, gross capital creation, and general government spending all have a long-term relationship. The findings also showed that the long-term effects on economic growth were positive and significant. However, the findings demonstrated that when the two revenue streams interacted, non-oil and oil revenue were both competitive in terms of long-term economic growth.

Abere and Akinbobola, (2020), assess the extent of the impact of external uncertainty and institutional quality on macroeconomic performance in Nigeria from 1986 to 2016. Using Structural Vector Autoregressive (SVAR), the study finds that external uncertainty had a dominating influence on macroeconomic performance in Nigeria. Given the mixed results from the extant literature, this study therefore examines the impact of external reserves on economic growth in Nigeria.

Onifade, *et al.,* (2020), examined the linkages between revenue from oil transaction, rate of inflation, and growth of the Nigerian external reserves. Utilizing both the Granger Causality test, and Autoregressive Distributive Lag (ARDL) as analytical methods for the investigation. The findings reported a positive and substantial interaction amongst the study variables. The Granger causality test also offered supplementary proof of the linkage between oil revenue generated during the study period and changes in monetary policy and growth. They recommended aggressive diversification plans to lessen the nation's heavy reliance on oil revenues while the monetary authorities closely monitor and control the monetary environment to effectively limit the effects of inflation and promote sustainable growth over the long term.

Punzi, (2019), developed a model depicting the economy as a small open economy consisting of households and firms consuming energy for domestic consumption at the household level while firms use it as productivity input. Data were obtained for 10 countries in Asia between 2000 and 2016 while dynamic stochastic general equilibrium (DSGE) was adopted for the study. The study's findings revealed that the increase in the price of energy causes an economic slowdown due to a rise in the cost of consumers, and firms' energy price volatility uncertainty generate an increase in GDP in the short run and a reversal in the long run.

Oluwatomisin, *et al.,* (2018), established the effects of oil price, external reserves and interest rate on exchange rate volatility in Nigeria covering the period 1970 to 2017. The study employed Johansen Co-integration technique and vector correction mechanism. The result established that proportionate change in oil price leads to a more than proportionate change in exchange rate volatility in Nigeria; which implies that exchange rate is susceptible to changes in oil price.

Marwa *et al.,* (2017), examined the impact of the oil price decline on Nigeria with focused on international reserves, oil prices likely played a meaningful role, real GDP growth as was compared to pre-shock forecasts for 26 countries with substantial oil exports in their economy within the period of 2013 to 2017. They researcher's made use of a cross-country regression and impulse scattered response graph approaches. The finding of the study revealed that Nigeria experienced a substantial decline in oil exports in the wake of the shock, as did most oil exporters. While a number of other countries have oil exports exceeding Nigeria's 2013 level of 17.6 percent of GDP, Nigeria is heavily dependent on oil for export receipts and fiscal revenue. However, it was also found that there was no correlation across countries between the importance of oil in either exports or fiscal revenue and the impact of the shock on real GDP, and the impact on Nigeria was larger than could have been foreseen based on any of these metrics.

Porkka *et al.,* (2017), posited that food security of 1.4 billion people has become dependent on imports globally. Kim and Sophia, (2014), added that, million peasants and small-holder farmers have improved their livelihoods and well-being through food trade. Contrarily, Suweis *et al.,* (2015), observed that increase dependence on global food trade has weakened global food system resilience making it increasingly unstable and susceptible to conditions of crisis.

Akpan, (2016) assessed the impact of a wide range of macroeconomic variables such as exchange rate, GDP, inflation rate, total trade, investment, unemployment and external debt on external reserves in Nigeria with data covering the period 2004–2014. Among other things, the study finds that gross domestic product and exchange rate exert a significant positive impact on the level of external reserves in Nigeria.

Ifeanyi and Ayenajeh, (2016), investigated the impact of crude oil price volatility on economic growth of Nigeria. The study utilizes secondary data covers a period of 1980 to 2014 using multiple regressions. The findings of the study reveal positive and significant relationship between oil price and economic growth. Based on the findings the researchers hereby conclude that oil price

volatility does not have a positive impact on the economy but oil price itself does. More so, Yusuf, (2015), examined the relationship between oil prices, exchange rate and external reserves in Nigeria. The results show that the variables are cointegrated and that oil prices and exchange rate were significant in predicting the level of external reserves.

D'Odorico *et al.*, (2014), studied the global patterns of food trade and evaluated the dependency of food security on imports. The findings showed that, about 23% of the food produced for human consumption is traded globally, this has helped doubled the amount of food calories traded across borders between 1986 and 2009. Likewise, the number of links in the trade network has increased by more than 50%. In addition, global food production has increased by more than 50% in the same period. Kinnunen, *et al*., (2020) argued that only about 22–28% and 11–16% of world populations could satisfy their demand for temperate cereals, rice, tropical cereals, pulses; and tropical roots/maize within 100 km of their residency. This implies, global food trade enables food flows from food surplus region to food deficit region thereby averting food scarcity.

Umar and Abdulhakeem, (2010), investigated how oil price uncertainty affect the macro economy using a VAR approach and found that oil price uncertainty had strong impact on GDP. Ani *et al.,* (2014), examined the causal relationship between four macroeconomic variable including inflation rate, exchange rate, interest rate and real GDP in Nigeria using ordinary least squares and Granger causality approach. Their results show a positive but insignificant relationship between oil price and the Nigerian Gross domestic product. Overall oil prices have no significant impact on Nigerian economy.

Empirical Gap

The literature on Nigeria's external economic uncertainty and their implications on external reserves highlighted a complex interplay of factors influencing the nation's economic health. Scholars emphasize the vulnerability of Nigeria's economy to external uncertainty quantities, including fluctuations in global oil prices, a major determinant of the country's export revenue. These uncertainties contribute to a precarious economic environment, influencing the Central Bank's ability to maintain robust external reserves. Overall, as much as massive research efforts have been expended on implications of economic uncertainty on Nigeria external reserves no research has been carried out with Eurobonds, food import, oil price, debt servicing and exchange rate as explanatory variables on Nigeria's external reserves and this research aims to bridge that gap.

METHODOLOGY
Research Design
Research design involves the blue-print that guides the researcher in a study: the procedures and techniques which the researcher employs to thoroughly apply scientific scheme in the examination of the problem, Baridam, (2012). This research employed analytical research design since they are helpful for assessing huge and minute populations mainly where a minute population is to be derived from a huge one. It will rely on past data which have a common characteristic of an *ex-post-factor* research. It aims at measuring the impact of oil price, debt services, food import, Eurobond and exchange rate as the independent variables on external reserves as the dependent variable which data cannot be manipulated by the researcher. The study used secondary annual time series data spanning 1986 to 2022, gathered from the Central Bank of Nigeria Statistical Bulletin and World Development Indicator (2023).

Model Specification

The study employed the Autoregressive Distributed Lag econometric method to estimate the relationship between selected variables. The variables utilized are external reserves (ER), Eurobond (EB), food import (FI), oil price (OP), debt services (DS) and exchange rate (EXR). The model for this research is a modification from Abere and Akinbobola, (2020), who examined the effects of external uncertainty and institutional quality on macroeconomic performance in Nigeria, from 1986 to 2016. Thus, this study is modeled as expressed below.

$$ER = f (EB, FM, OP, DS, EXR) \tag{3.1}$$
$$ER_t = \beta_0 + \beta_1 EB_t + \beta_2 OP_t + \beta_3 FI_t + \beta_4 DS_t + \beta_5 EXR_t + U_{it} \tag{3.2}$$

Where; ER is external reserve, EB is Eurobond, FI is food import, DS is debt services, EXR is exchange rate, U is the Stochastic term, and β_1 to β_5 are coefficients of independent variables, with all estimated within time t. The summarized descriptions and expectations of the variables are provided in Table 3.1 below.

Table 3.1: Variables' Descriptions and Expectations

Variables	Descriptions	Expectations
ER	Yearly total value of Nigeria's External Reserves (₦'B) managed by the apex monetary authority	Dependent Variable
EB	Eurobond, used as value of fixed-income debt instruments of Nigeria denominated in U.S Dollar ($'B)	+
FI	Food import bill, employed as the amount of money Nigeria spend annually on food importation in (₦'B)	-
OP	Oil price, annual average international market price of a barrel of crude oil, typically quoted as U.S dollars per barrel.	+
DS	Debt service bill, used as the annual amount Nigeria pay for debt service obligations (₦'B)	-
EXR	Official exchange rate, utilised as the average yearly Naira-US Dollar rate of exchange, (₦/$1)	+

Source: Researcher's Idea, 2025.

Techniques of Analyses

To empirically analyze the study's objectives, the summary statistics for checking the variables for normality were conducted relying on the Jarque-Bera statistics. Following this in principle is

the unit root test of the individual variables employed to obtain the orders of integration. The Augmented Dickey-Fuller (ADF) (Dickey & Fuller, 1981) test at 5% significant benchmark is applied. The general ADF model for unit root estimation is specified as follows:

$$\Delta Y_t = \lambda_0 + \lambda_1 + \delta Y_{t-1} + \sum_{i=1}^{n} \lambda_1 \Delta Y_{t-i} + \mu_t \tag{3.3}$$

Where, Y = the time series variables under consideration, t = Linear time trend, Δ = First difference operator, λ_0 = Constant term, n = Optimum number of lags on the dependent variables and μ_t = the stochastic error term.

Further, to ascertain the long run effect in this study, the ARDL Bounds cointegration test is conducted (Pesaran, Shin and Smith 2001). It is employed when $I(0)$ and $I(1)$ mixed order of integrations are establish in the variables. This method has three decision options which are existence of cointegrating, no cointegrating and inconclusive relationships, when the calculated F-statistic value is respectively greater than the upper bound $I(1)$, below the lower bound $I(0)$ and between the lower $I(0)$ and the upper $I(1)$ bounds. Presented below is the general form of the ARDL Bounds cointegration model:

$$Y_t = \Delta_t Y_{t-1} + \dots \Delta_p Y_{t-p} + \delta R_t + U_t \tag{3.4}$$

Where Y_t = the time series variables under consideration in time t, Y_{t-1} and Y_{t-p} = cointegrating equations estimates, Δ = First difference operator and U_t = stochastic error term.

Predicated on the ARDL bounds test for cointegration, the ARDL long-run and the short-run dynamic analyses were carried out to examine the theoretical and significance effects of the independent variables on the regressand of the study. Thus, to do this, the ARDL model capturing the error correction term is presented below;

$$\Delta ln(ER_t) = \beta_1 + \beta_{1i}\Delta ln(ER_{t-1}) + \beta_{2i}\Delta ln(EB_{t-1}) + \beta_{3i}\Delta ln(OP_{t-1}) + \beta_{4i}\Delta ln(FI_{t-1})$$
$$+ \beta_{5i}\Delta ln(DS_{t-1}) + \beta_{6i}\Delta ln(EXR_{t-1}) + \sum_{t=1}^{p} \alpha_{1i}\Delta ln(ER_{t-1})$$
$$+ \sum_{t=1}^{q} \alpha_{2i}\Delta ln(EB_{t-1}) + \sum_{t=1}^{q} \alpha_{3i}\Delta ln(OP_{t-1}) + \sum_{t=1}^{P} \alpha_{4i}\Delta ln(FI_{t-1})$$
$$+ \sum_{t=1}^{P} \alpha_{5i}\Delta ln(DS_{t-1}) + \sum_{t=1}^{P} \alpha_{6i}\Delta ln(EXR_{t-1}) + \Omega ECT_{t-1} + U_{1i} \tag{3.6}$$

Where Δ defines difference operator and indicates the optimum lag; β_1 to β_6 are long-run coefficients; α_1 to α_6 are short-run dynamic coefficients; U_{1i} is serially stochastic term. Further, the ECT_{t-1} defines the error correction term indicated in the short-run analysis and Ω serves as coefficient of the error correction term, defining the annual speed of adjustment level from its previous period's disequilibrium to re-establish long-run stability. This coefficient indicator of the ECT is expected to be negative and significant. However, this method is limitation when all variables are first difference stationary in unit root analyses.

Furthermore, post diagnoses of the Ramsey RESET test shall be conducted on the model for correctness of the specified model, the Jarque-Bera normality statistic test for variables' data jointly normality, the serial correlation **test** to know whether the residuals are serially independent, the heteroscedasticity test to check for homoscedasticity and the CUSUM stability test to test whether the estimated regression result is stable.

RESULTS AND DISCUSSIONS

Trend Analyses

Presented in Figure 4.1 below are the trends of external reserve (ER), Eurobond (EB), oil price (OP), food imports (FI), debt services (DS) and exchange rate (EXR) in Nigeria. Unlike food imports (FI) and exchange rate (EXR) that maintained a fairly upward movement throughout the research period as shown in Figure 4.1, external reserve (ER), Eurobond (EB), oil price (OP) and debt services (DS) demonstrated high level of inconsistencies in their movements. This is shown by their levels of inconsistent upward and downward movements throughout the sampled period.
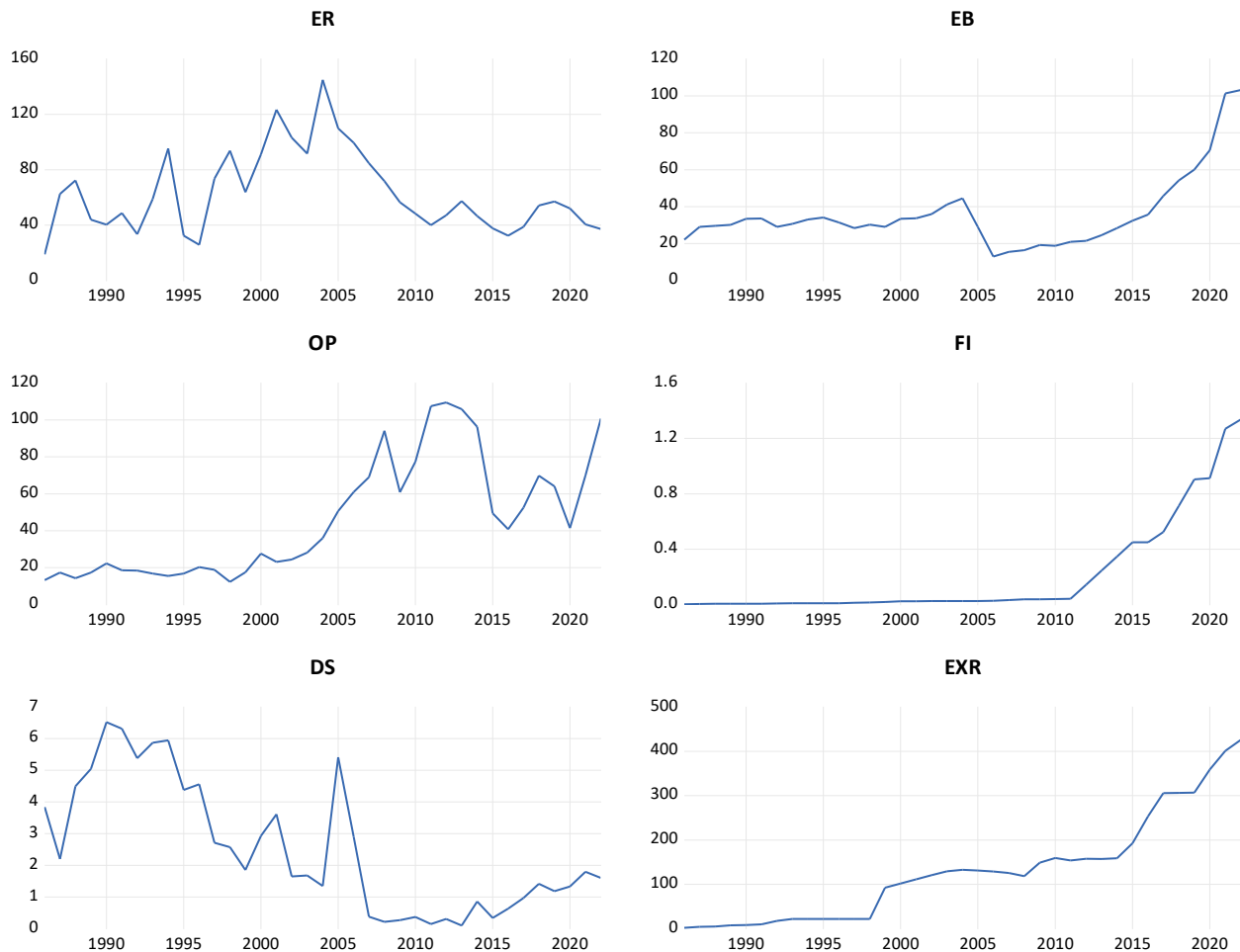
Source: *Researcher's Computation (EViews 12), 2025.*

Figure 4.1: Line Graphs Showing the Trends in External Reserve (ER), Eurobond (EB), Oil Price (OP), Food Imports (FI), Debt Services (DS) and Exchange Rate (EXR)

Descriptive Statistical Analysis

The estimation outcomes of the statistical properties of the variables' data are presented in table 4.1 below. It clearly presents that the external reserve (RE) of Nigeria as recorded over the period of 1986 to 2022 had an average of ₦62.93 billion with a maximum value of ₦144.75 billion and minimum value of ₦18.92 billion per annum, indicating not normally distributed with Jarque-Bera value of ₦22.69 billion. Eurobond (EB) transaction recorded a mean value of ₦35.775 billion with a maximum value of ₦103.11 billion and minimum of ₦12.961 billion over the sampled period.

Its value of ₦10.78 billion shows that the variable is not normally distributed. Furthermore, oil price (OP) had a mean value of $45.94 per barrel while its maximum and minimum values are $109.45 and $12.28 respectively. However, it is normally distributed with value of $3.35 per barrel. In addition, food imports (FI) had a mean value of ₦0.21 billion while its maximum and minimum values are ₦1.34 billion and ₦0.002 billion respectively, and it is normally distributed by showing ₦5.45 billion in the period under review. Also, debt services had a mean value of ₦2.52 billion with maximum and minimum values of ₦6.52 billion and ₦0.1 billion respectively while its Jarque-Bera value of ₦40.63 billion normal distribution.

Table 4.1: Descriptive Statistics

	ER	EB	OP	FI	DS	EXR
Mean	12087.18	10041.50	17.93579	127.8518	4041.461	4367.238
Median	4335.285	2042.370	17.57500	123.4000	1365.100	3247.800
Maximum	62278.99	48462.07	29.80000	425.9800	24431.21	12586.53
Minimum	62.86000	22.30000	9.250000	0.890000	13.00000	12.60000
Std. Dev.	16103.40	13622.15	4.199228	118.9430	6081.713	4170.793
Skewness	1.625607	1.281160	0.529324	0.927390	2.002117	0.402061
Kurtosis	4.938544	3.495330	3.996661	3.058606	6.102678	1.665092
Jarque-Bera	22.68655	10.78382	3.347274	5.452432	40.62912	3.845270
Probability	0.000012	0.004553	0.187564	0.065467	0.000000	0.146221
Observations	38	38	38	38	38	38

Source: *Researcher's Computation (EViews 12), 2025.*

Lastly, official exchange rate had a mean value of ₦131.43 per US Dollar with maximum and minimum values of ₦425.98 and ₦1.75 per US Dollar respectively while it is normally distributed with Jarque-Bera value of ₦3.85 per US Dollar.

Pre-Estimation Tests
Unit Root Test
The data representing variables in this study were subjected to Augmented Dickey-Fuller (ADF) unit root analyses. The results as shown in the Table 4.2 below indicates that the Augmented Dickey Fuller (ADF) test statistics for oil price (OP) is greater in absolute value than the critical value, indicating that oil price (OP) is stationary at level and therefore integrated at order zero [that is, I(0)]. On the other hand, the Augmented Dickey Fuller (ADF) test statistic for external reserve (IDO), Eurobond (EB), food imports (FI), debt services (DS) and exchange rate (EXR) are greater in absolute values than their critical values, suggesting that theses set of variables are stationary at first difference, hence, integrated at order one [that is, I(1)]. Therefore, given that all the variables exhibited mixed orders of integration at order zero [I(0)] and order one [I(1)], this necessitates estimation to ascertain existence or nonexistence of long-run cointegrating relationship among the variables in the equation using ARDL bounds cointegration test, but before then, the optimum lag test is conducted for use going forward.

Table 4.2: Augmented Dickey-Fuller (ADF) Test Results

Variables	At Levels		At First Difference		Stationarity Order
	ADF	Mackinnon Critical Value@ 5%	ADF	Mackinnon Critical Value@ 5%	
$InER_t$	-1.473894	-2.954021	-3.830279	-2.954021	1st Difference I(1)
$InEB_t$	-0.091906	-2.945842	-4.448133	-2.948404	1st Difference I(1)
$InOP_t$	-4.896956	-2.948404	-	-	at Level I(0)
$InFI_t$	-0.011599	-2.945842	-5.321625	-2.948404	1st Difference I(1)
$InDS_t$	-1.969940	-2.945842	-8.091084	-2.948404	1st Difference I(1)
$InEXR_t$	-2.867863	-2.945842	-6.184278	-2.948404	1st Difference I(1)

Source: *Researcher's Computation (EViews 12), 2025.*

Lag Selection Criteria

The maximum lag selection test result shown in Table 4.3 below revealed that the appropriate optimal lag length that will lead to reliable estimates going forward according to Akaike Info Criterion (AIC) is lag one. Therefore, subsequent analyses are carried out using the optimal lag length of one.

Table 4.3: Lag Selection Criteria

Lag	LogL	OP	FPE	AIC	SC	HQ
0	-693.0057	NA	8.96e+09	39.94318	40.20981	40.03522
1	-517.3067	281.1185*	3159451.*	31.96038*	33.82680*	32.60467*
2	-483.0132	43.11177	4216194.	32.05790	35.52410	33.25443

Source: *Researcher's Computation (EViews 12), 2025.*

Bounds Cointegration Test

The results of the Bounds cointegration test are presented in Table 4.4 below:

Table 4.4: Bounds Cointegration Test

Null Hypothesis: No Long-Run Relationships Exist				
Critical Value Bounds				
T-statistic	Value	Significance	I(0)	I(1)
F-statistic	5.888497	10%	2.08	3
K	5	5%	2.39	3.38
		1%	3.06	4.15

Source: *Researcher's Computation (EViews 12), 2025.*

The result in Table 4.4, indicates that since the computed F-statistic (5.888497) is greater than upper bound critical value (4.15) at 5% significant level, the null hypothesis (H_0) is therefore rejected, suggesting existence of cointegration among the variables. Thus, there is sufficient statistical evidence to conclude that there exists a long run relationship or cointegration among external reserve variables. Consequently, the existence of long run relationship, with mixed order of stationarity are pre-conditions for fitting the Autoregressive Distributed Lag (ARDL) model. Thus, the estimated long run and short run dynamic results are presented below.

Model Estimation Results
Long-Run Autoregressive Distributed Lag (ARDL) Analysis
The estimated long run results for external economic uncertainty indicators on Nigeria's external reserves are presented in Table 4.5 below: The long-run results revealed that Eurobond, oil price and exchange rate had positively significant effects on external reserves in Nigeria. This is evident by the respective positive coefficient values of 0.783891, 1.899641 and 0.474646, and their p-values of 0.0306, 0.0237 and 0.0135 which are individually less than 0.05 percent. The implications are that one billion Naira increase in Eurobond deal, one Dollar rise in oil price and one Naira rise in value of the Nigeria's currency relative to the US Dollar, respectively encouraged external reserves in the long-run by about 0.78, 1.90 and 0.47 billion Naira over the sampled period.

Table 4.5: Result of Long-Run ARDL Coefficients

Dependent Variable = $InER_t$				
Variable	Coefficient	Std. Error	t-Statistic	Prob.*
$InEB_t$	0.783891	0.306003	2.561715	0.0306
$InOP_t$	1.899641	0.698940	2.717891	0.0237
$InFI_t$	-0.300401	0.169367	-1.773665	0.0874
$InDS_t$	-0.012903	0.162485	-0.079408	0.9373
$InEXR_t$	0.474646	0.179586	2.642999	0.0135
C	2.584087	2.717033	0.951069	0.3500

Source: *Researcher's Computation (EViews 12), 2025.*

Conversely, the long-run estimates revealed in Table 4.5 that food imports and debt service bills appeared to have exerted negatively insignificant impact on external reserves. This is evidenced by the negative coefficient values of -0.300401 and -0.012903 respectively. Their respective p-values of 0.0874 and 0.9373 are individually greater than 0.05 percent. This suggests that one billion Naira increase in food imports and debt service bills respectively caused about 0.300 and 0.013 billion Naira decreases in external reserves.

Short-Run Autoregressive Distributed Lag (ARDL) Analysis
The short run dynamic estimates of external economic uncertainty quantities and external reserves in Nigeria are presented in Table 4.6:

Similar to the long run results, the above short run analyses outputs indicate that Eurobond deal, oil price and exchange rate had direct significant influences on external reserves in Nigeria. This is manifest by the positive coefficient values of 0.360813, 0.519862 and 0.395328 respectively, and their p-values of 0.0452, 0.0093 and 0.0277 which are separately less than 0.05 percent. By implications, the results suggest that one billion Naira increase in Eurobond deal, a Dollar increase in oil price per barrel and one Naira appreciation in the value of the Niara relative to the US Dollar, improved external reserves in the short-run by about 0.36, 0.52 and 0.40 billion Naira respectively within the data period.

Table 4.6: Result of Short-Run ARDL Coefficients

Dependent Variable = $InER_t$				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.***
$D(InER_{t-1})$	0.229125	0.120335	1.904055	0.0690
$D(InEB_t)$	0.360813	0.155256	2.323992	0.0452
$D(InOP_t)$	0.519862	0.183766	2.828940	0.0093
$D(InFI_t)$	-0.197254	0.180293	-1.094071	0.2848
$D(InDS_t)$	-0.133372	0.165386	-0.806430	0.4270
$D(InEXR_{t-1})$	0.395328	0.168688	2.343552	0.0277
CointEqM(-1)*	-0.554173	0.111477	-4.971187	0.0000
Adjusted R-squared = 0.587750; Durbin-Watson stat = 1.756286				

Source: *Researcher's Computation (EViews 12), 2025.*

On the flip side, the short-run analyses displayed in Table 4.6 above indicate that food imports and debt service bills palpably had negative and insignificant impacts on external reserves in Nigeria. This is evidential by the variables' coefficients being negative with values as -0.197254 and -0.133372 respectively. Their respective p-values of 0.2848 and 0.4270 are separately greater than 0.05 percent. This implies that a billion Naira increase in food imports and debt service bills respectively triggered about 0.20 and 0.13 billion Naira diminution in the country's external reserves.

Moreso, the Adjusted R-squared (Adj. R^2) value of 0.587750 indicates that 59 percent of the systematic variation in external reserves is due to changes in the selected international economic uncertainty indicators while the remaining 41 percent of the variation in the model is captured by the error term (unknown factors outside the model). The error correction term as shown in its coefficient indicated as CointEq(-1)* with -0.554173 value, means that the speed of adjustment to long run equilibrium is 55% when any past deviation will be corrected in the present period. This means that Nigeria's external reserve adjusts rather speedily to changes in Eurobond, oil price, food imports, debt services and exchange rate.

Post-Estimation Tests
The conducted post-diagnostic tests to determine reliability and validity of the model results are presented below in Table 4.7:

Table 4.7: Post-Estimation Test Results

| Test	Null Hypothesis	Test Type	F-stat.	Prob.
Serial correlation Test	Serial correlation does not exist	Breusch-Godfrey LM Test	1.494071	0.2438
Heteroscedasticity Test	Homoscedasticity exists	Breusch-Pagan-Godfrey	0.659683	0.7215
Functional form Test	Model is stable	Ramsey RESET	0.110655	0.7421

Source: *Author's Computation (E-views 12) 2025*

The Breusch-Godfrey Serial Correlation LM, the Breusch-Pagan-Godfrey heteroskedasticity and the Ramsey RESET tests' results shown in Table 4.7 indicated that since the respective probability values as 0.2438, 0.7215 and 0.7421 are exclusively greater than 0.05 level of significance, the null hypotheses of no serial correlation problem, homoscedasticity and correct specification of the model are necessarily accepted, having exhibited normal distribution character in the variables of the model as evident in Figure 4.2 below.
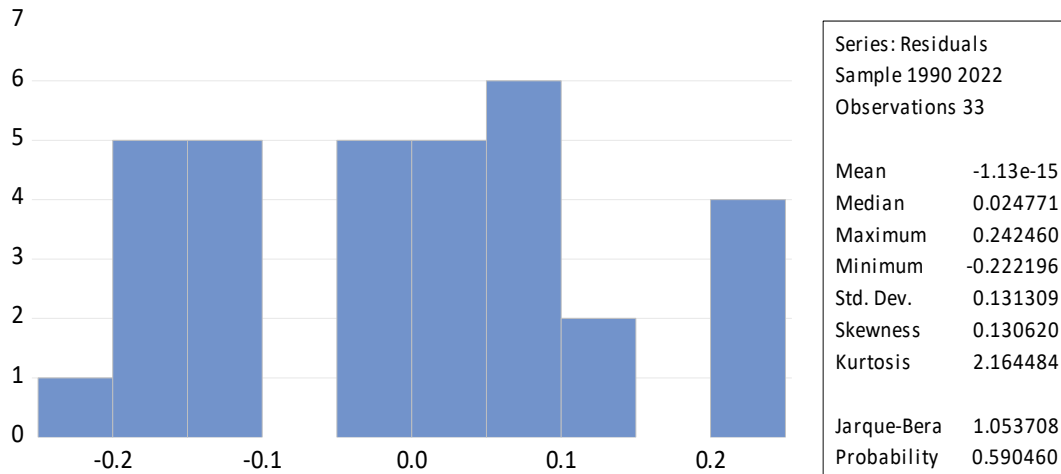
Source: *Author's Computation (E-views 12), 2025*
Figure 4.2: Normality Test

The Jarque Bera (Normality) test result shown in Figure 4.2 with probability value of 0.863556 greater than 0.05 levels of significance implies that the null hypothesis of Normal distribution is accepted, hence, concluded that the variables in the model are all jointly normally distributed.
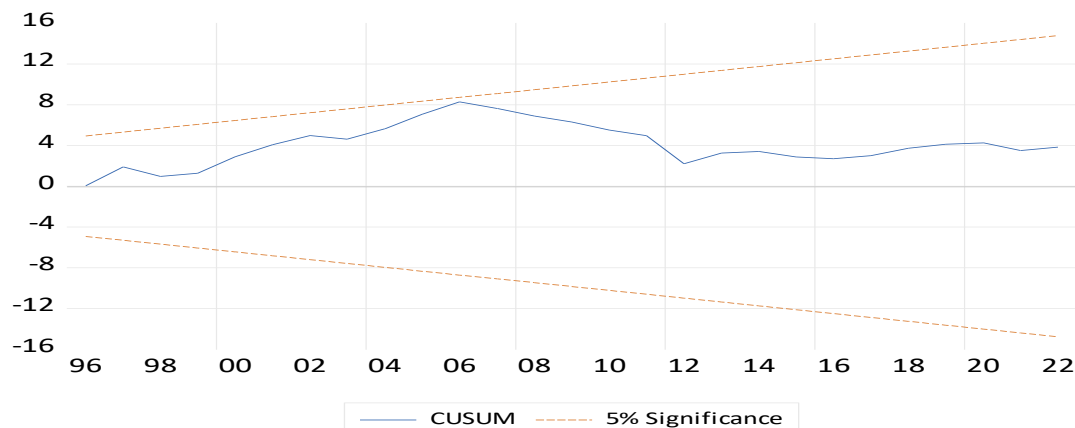
Source: *Author's Computation (E-views 12), 2025*
Figure 4.3: Stability CUSUM Test

The cumulative sum (CUSUM) test for stability of the long-run results with the short-run dynamics presented in Figure 4.3 below indicates that the CUSUM line stayed within the 5 percent critical bounds. This suggests that the estimated model results are stable.

The researchers therefore surmise that, the post-diagnostic tests' results as shown are reliable because it has passed all the major tests in the forms of serial correlation, heteroscedasticity, function form, normality and stability. Thus, the model estimated has a good fit and is adequate for inferential conclusion and policy recommendation.

Discussion of Findings
Having empirically analysed the time series data for the utilized variables of external economic uncertainty indicators and Nigeria's foreign reserves, the generated outcomes are discussed here.

The empirical results revealed that Eurobond deals had positively significant effects on external reserves in Nigeria. The implication is that, increase in Eurobond investment returns contributed significantly to raising the country's external reserve in both short run and long run. The finding is related to the findings of Bukola (2022) who found that Eurobonds can help Nigeria attract foreign investors and hence, stimulate economic growth. The result also agrees with that of Whitehouse, (2021), who stated that Eurobonds may be the cheapest option for foreign reserves accumulation. Also, in both long and short terms, oil price had significant positive influence on foreign reserves in Nigeria. This implies that an increase in oil price per barrel led to improved reserves accumulation for Nigeria. The result showed inconsistency with the earlier findings of Shafi and Hua, (2014) and Elder and Serletis (2010), who reported contradictory outcomes, highlighting the complexity of this relationship. The divergence in findings underscores the multifaceted nature of the relationship between oil proceeds and external reserves. The Naira/Dollar exchange rate also positively and significantly impacted on the country's foreign exchange reserve in both long and short runs. The implication of this is that improved international value of the domestic currency relative to the US Dollar with more exports contributed to more foreign reserves accumulation for Nigeria. This outcome aligns with the research conducted by Kalu *et al*., (2019), which explored the correlation between exchange rates and foreign reserves in Nigeria, concluding that the exchange rate exhibits a positive and significant correlation with foreign reserves.

However, food imports bills had negative and non-significant long-run and short-run effects on external reserves in Nigeria. This by implication suggests that high food imports bill exerted inverse reducing impact on external reserves. The result showed consistency with the earlier findings of Big Ben (2016) whose study contributed existence of an underlying long-run steady-state relationship between import demand and various factors such as external reserves, world price index, and disposable income. Similarly, debt services had negative and non-significant long-run and short-run effects on external reserve in Nigeria. The implication of this is that high debt services obligation undermined the country's external reserve accumulation. The finding is related to the result of Efuntade, *et al*., (2021), reporting that burden of high debt servicing costs can exacerbate fiscal imbalances within the government's budget and hence, plunge foreign exchange reserves.

CONCLUDING REMARKS AND RECOMMENDATIONS
Drawing from the empirical outcomes of external economic uncertainty on foreign reserves, Eurobond, oil price and exchange rate had a positive and significant effects on accumulation of foreign reserves for Nigeria in both short run and long run while food imports bill and debt services cost were negative and not significant in their effects on Nigeria's reserves over the sampled period

of this study. It is therefore concluded that external economic uncertainties indicator as captured in this study had growth contribution and plunging implications on reserves accumulation for Nigeria. Based on the findings and conclusion drawn, the following policy recommendations are put forward:

1. Government should implement policies to diversify the economy, reducing reliance on oil proceeds as well as encourage and incentivize sectors like agriculture, technology, and manufacturing to enhance foreign reserves accumulation.
2. There is need to develop prudent debt management strategy, focusing on sustainable borrowing to avoid excessive debt servicing costs, which will reduce pressure on the country's foreign reserves.
3. There is also the need to consider issuing Eurobonds strategically to raise funds for critical infrastructure projects that will boost investment and in the long run enhance reserves.
4. Government should take frantic efforts at promoting all season food production activities as well as investing in modern farming techniques, and supporting farmers, which will reduce dependence on food imports and ease pressure on Nigeria's foreign reserves.
5. Nigeria's apex monetary institution should ensure strengthening the domestic value of the Naira relative to the US Dollar, as well as ensure relative competitiveness of domestically produced goods in the international market; these steps would transmit to enhance value of the nation's international reserve and maintain financial stability.

REFERENCES

Abdullahi, S. A. (2021). Estimating the determinants of food import demand in Africa. Izvestiya *Journal of Varna University of Economics*. 2(65):238-252.

Abere, S. S. and Akinbobola, T. O. (2020). External uncertainty, institutional quality and macroeconomic performance in Nigeria. SAGE Open. 1-18.

Adarov, A. (2021). Dynamic interactions between financial cycles, business cycles and macroeconomic imbalance.

Akpan, A. U. (2016). Foreign reserves accumulation and macroeconomic environment: The Nigerian experience, 2004–2014. *International Journal of Economics and Finance Studies*. 8(1): 26-47.

Ani, W., Ugwunta, D., Inyiama, O. and Ike-Ekweremadu, N. (2014). Oil Price Volatility and Economic Development: Stylized Evidence in Nigeria. *Journal of Economics and International Finance.* 6(6). 524-538.

Audu, I. (2004). The impact of external debt on economic growth and public investment: the Case of Nigeria. Dakar, Senegal: African Institute for Economic Development and Planning (AIEDP).

Augustine C. O. (2015) Exchange rate fluctuations, oil prices and economic performance: Empirical evidence from Nigeria. *International Journal of Energy Economics and Policy*. 5(2):502-506.

Baridam, D. M. (2012). *Research Method in Administrative Sciences*. Port Harcourt: Para Graphic Publishers.

Batabyal, S. and Killins, R. (2021). Economic policy uncertainty and stock market returns: Evidence from Canada. *The Journal of Economic Asymmetries*. 24.

Big Ben, C. O. (2016). Estimating Aggregate Import-Demand Function for Nigeria Revisited. *Journal of Business and Management*. 18(3): 64 – 72.

Bukola, A. (2022). The Eurobond: A Critique of Its Increasing Utility as a Global Debt Instrument in Nigeria. *The Journal of Sustainable Development Law and Policy.* 13(2):146-166.

Burnett, K., & Murphy, S. (2014). What place for international trade in food sovereignty? The Journal of Peasant Studies, 41(6), 1065 – 1084.

CBN, (2007), Building and Managing External Reserves for Economic Development. The CBN Bullion. 31(2).

Chinn, M., D. and Prasad, E. S. (2003). Medium-term determinants of current account in industrial and developing countries; an empirical exploration. *Journal of international economics.* 59(1):47-76.

Dickey, D. A. & Fuller, W. A. (1981). Likelihood ratio statistics for autoregressive time series with a unit root. *Econometrica, 49*, 1057-1072.

D'Odorico, P., Carr, J. A, Laio, F., Ridolfi, L. and Vandoni, S. (2014). Feeding humanity through global food trade. *Earth's Future*. 2:458–469.

Efuntade, A. O., Olaniyan, N. O. and Efuntade, O. O. (2021). Impact of Debt Service in Stimulating Economic Growth in Nigeria: Mediating on its Role on Public Sector Financial Management. *AUDOE.* 17(1):315-329.

Elder J. and Serletis A (2010) Oil price uncertainty. *Journal of Money, Credit and Banking*. 42: 1137-1159.

Fossong, D., Ndamsa, D.T. and Mofor, G.Z. (2021), An empirical analysis of the modulating effect between oil and non-oil revenue in explaining economic growth in Cameroon. EuroEconomica. 40(1):1-10.

Francis, A., E. & ThankGod O. A. (2016). External reserve management and economic growth in Nigeria. *International Journal of Empirical Finance.* 5(2):101-111

Ghosh, A., R. Kim, J., I., Mendoza, E. G., Ostry, J., D. & Qureshi, M., S. (2013). Fiscal fatique, fiscal space and debt sustainability in advanced economies. *Economic Journal.* 123(566):44-30.

Ifeanyi O. N., Ayenajeh M. E. (2016). Impact of Crude Oil Price Volatility on Economic Growth in Nigeria (1980 - 2014). *Journal of Business and Management*. 18(6) (I): 10-19.

Kalu, E. U., Ugwu, O. E., Ndubuaku, V. C. & Ifeanyi, O. P. (2019). Exchange Rate and Foreign Reserves Interface: Empirical Evidence from Nigeria. The Economics and Finance Letters. 6(1): 1–8.

Kinnunen, P., Guillaume, J. H., Taka, M., D'Odorico, P., Siebert, S., Puma, M. J. and Kummu, M. (2020). Local food crop production can fulfill demand for less than one-third of the population. Nature Food, 1(4):229-237.

Marwa, I., Mika, S., Miriam, T., Sampawende, J. T. and Andrew, S. (2017). The impact of the oil price decline on Nigeria. International Monetary Fund, IMF Country Report No. 17/81.

Mwang, E. N. (2021). Determinants of agricultural imports in Sub-Saharan Africa: A Gravity Model. *African Journal of Economic Review, IX, (II),* 271-287.

Oluwatomisin, M., Ogundipea, P. O., Adeyemi, A. O. (2018). Oil price and exchange rate volatility in Nigeria. *IOSR Journal of Economics and Finance (IOSRJEF)* 5: 01-09.

Onifade, S.T., Alagöz, M., Erdoğan, S. and Obademi, O. (2020), Inflation, oil revenue, and monetary policy mix in an oil-dependent economy: Empirical insights from the case of Nigeria. *International Journal of Business Economics and Management.* 7(2):96-109.

Osuji, C., C. & Ebiringa, O.T. (2012). Analysis of Effect of External Reserves Management on Macroeconomic Stability of Nigeria. *International Journal of Business, Humanities and Social Science.* 1(2):49-53.

Pesaran, M. H., Shin, Y.& Smith, R. J. (2001). Bound Testing Approaches to the Analysis of Level Relationships. *Journal of Applied Econometrics, 16(3), 289-326.*

Porkka, M., Guillaume, J. H. A., Siebert, S., Schaphoff, S. and Kummu, M. (2017). The use of food imports to overcome local limits to growth, *Earth's Future*. 5:393–407.

Punzi, M. T. (2019). The impact of energy price uncertainty on macroeconomic variables. *Energy Policy*. 129:1306–1319.

Shafi K. and Hua L (2014) Oil Prices Fluctuations and Its Impact on Russian Economy: An Exchange Rate Exposure. Asian Journal of Economic Modeling 2: 169-177.

Shi, X. and Shen, Y. (2021). Macroeconomic uncertainty and natural gas prices: Revisiting the Asian premium. Energy Economics. 94.

Suweis, S., Carr, J. A., Maritan, A., Rinaldo, A. and P. D'Odorico, (2015). Resilience and reactivity of global food security. PNAS, 112(220 6902 – 6907.

Udo A. B. and Antai A. S. (2014). Opportunity cost of Nigeria's external reserves. *Journal of Economics and Finance.* 3(5): 7-16.

Umar, G. and Abdulhakeem, K. (2010). Oil Price Uncertainty and Nigerian Economy: A Vector Autoregressive (VAR) Model. *International Journal of Business and Management*. 5(8) 231-248.

Whitehouse, D. (2021). 'Nigeria's Eurobond sale weakens public finances as debt service swallows resources'.

World Bank (2023): World Development Indicators, The World Bank, Washington DC., USA.

Yusuf, M. (2015). An Analysis of the Impact of Oil Price Shocks on the Growth of the Nigerian Economy, 1970-2011. *African Journal of Business Management,* 9(3), 103-115.