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External Reserves Implication on the Economy Performance of Nigeria (1980-2023): An Empirical Evidence

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Abstract

This study examined the External Reserves Implication on the Economy Performance of Nigeria (1980-2023) using the OLS method of estimation. Descriptive statistics, trend analysis, ADF unit root were first done, and it was indicated that the variables were stationary at (I(0) and I(1)) level and first difference. The ARDL cointegration revealed that lagged one year of external reserves has significant relationship with Real Gross Domestic Product and positively related (0.0928) in short-run and (0.1066.) in the long-run. Exchange rate lagged for two years (-0.1513) was significant, negatively related to Real Gross Domestic Product in short-run, but positively related in the long-run (1.0254). Inflation rate (0.0039) and (0.0734) has positive impact of growth of Nigeria's economy both in short and long-run and statistically significant in the short-run. Also, Money supply (MS_2) was positive related (0.0074) and (0.0959) in both short-run and long-run respectively. ARDL model reparameterised into Error Correction Model revealed the long-run equilibrium was corrected in the current period at an adjustment speed of 8%, statistically significant and negatively signed. Based on the findings, it was recommended that so far, the gross domestic product growth improves and increases the level of external reserves of an economy, thus, federal government is expected to implement anat the same time to raise the level of the nation's external reserves. Money supply also influences and enhances increases in external reserves; therefore, monetary authorities should endeavour to keep the rate at a competitive level which will inspire economic growth through the actions of the local investors. Accumulated reserves will prevent interest and thereafter affect the movement or instability in exchange rate. Hence, optimal reserves are recommended in order to encourage more domestic investment.

Keywords: Economic Growth, External Reserve, Exchange Rate, Money Supply, Inflation Rate.

I. Introduction

The importance of external reserves to any country cannot be overemphasized consedering its role in economic performance. External reserves can be said to be the official public sector foreign assets controlled by the central bank of a country. External reserves consist 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. The reserve position of Nigeria at any given time reflects the circumstances prevailing in the international oil market (George, 2007; Ayukun and Markjackson, 2020). Conservatively, countries hold external reserves in foreign currencies in order to maintain a desirable exchange rate policy by interfering significantly in foreign exchange markets (Sanusi, Hassan & Meyer, 2019). Given the global integration of markets, external reserves are needed to guard against possible financial crisis, especially a global one (Iwueze, Eleazar, and Nlebedim, 2013). It also serves as a store of assets that Central Banks could use to influence the exchange rate of their domestic currency (Nugee, 2000; Williams, 2003; International Monetary Fund, 2004).

External reserves, overtime, has helped many countries to secure international creditworthiness recognition and it also makes obtaining external debt easier; hence the international community places confidence on any country with adequate foreign reserves. This confidence is often influenced by the soundness of a nation's economic policies and overall investment climate. The accumulation of foreign reserves is believed to play stability role in the economy through the creation of cushion against external and internal shocks. Import dependent countries like Nigeria have relied on external reserves accumulation to balance both internal and external economy with the aim of achieving economic

growth (Awonusi, 2022). Nzotta (2014) sees foreign reserves as balances of foreign exchange surpluses of a country that accumulated over time. And these international reserves could be held in license under foreign currencies and international financial assets.

Though, many nations of the world keep some of their assets as foreign reserves for certain reasons. IMF (2018) describes foreign reserves as official public foreign assets that are readily available to and controlled by the monetary authorities for direct financing of imbalances, and directly regulating the magnitude of such imbalances, through the intervention in the international markets to affect the currency exchange rate or for other purposes. Kashif, Sridharan and Thiyagarajan (2017) believe that external reserves are the country's external assets that include gold, special drawing right, foreign currency deposits and bonds by the apex banks and monetary authorities. According to Omolola and Ajayi (2018), external reserves are assets that are manage by monetary authority to finance deficit balance of payment, manage exchange rate fluctuation, finance government foreign investments and mitigate against macroeconomic instability.

Akaninyene (2016) claims that foreign reserves serve as a means of assisting the monetary and foreign exchange policies, among other several uses in order to meet the macroeconomic objectives in safeguarding the currency stability and to smoothen the normal functioning of the domestic and external payment system. Proper management of international reserves could be a key to economic growth and development. Akinwunmi and Adekoya (2016) maintains that no nation will allow its currency to float in the foreign exchange market without an adequate intervention. Several times, the monetary authorities in Nigeria have influenced the country's exchange rates by buying and selling currencies in order to manage the exchange rates. This is because currency rates affect the economy through the trade balances which automatically determine the value and quality of exchange reserves holding of a country.

However, Nigeria's external reserves have been fluctuating over the years. The stock of external reserves, which was US$ 9.91 billion in 2000, rose by 5.09% in 2001 and later dropped to US$7.47 billion at the end of December 2003 but increased by 127.00% to US$16.96 billion in 2004. In 2005, the stock of external reserves increased further by 66.80% to US$28.28 billion, and in 2006, reserves rose to an all-time high of US$42.20 billion (Osuji and Ebringa, 2012; Udo and Antai, 2014). The external reserves continued to move in an upward trend until 2009 when the economy witnessed another fall in reserves to the tune of 20% from 2008 reserves position of US$53.00 billion and it continued in that direction till 2013 when the external reserves position was reduced to US$42.8billion. Thus, the external reserves continued in the same trend of reducing to US$39.4 billion till 2017. It started increasing in 2018, to US$42.6 billion and later dropped to US$38.1 billion in 2019, Reserves declined to $23 billion by October 2016 following a crash in oil prices and then rose again, reaching around $36.47 billion and US$40.23 billion in 2020 and 2021 respectively then dropped again to US$ 36.73 billion and US$33.22 billion in 2022 and 2023 respectively (CBN, 2024). As of October 2024, Nigeria's external reserves stood at approximately $39.12 billion, having shown an increase from earlier in the year due to new FX policies and financial commitments (IMF 2024).

There is dearth of studies on the effect of external reserves on economic growth in Nigeria (Meshak, 2013; Eniekezimene & Apere, 2016; Nwosa, 2017; Awoederu, Ochalibe & Obekpa, 2017; Adegboyo, 2019; Awonusi, 2022; Nwamuo, 2023; Ojomo, 2024). These studies did not however capture some important macroeconomic variables like exchange rate, inflation rate, and money supply which are major factors of external reserves. Also, Meshak (2013); Nwosa (2017) did not consider the time series properties of variables employed which may result in spurious regression. Based on the gaps, this investigated the effect of foreign reserves on Nigerian economic performance. Nevertheless, managing the foreign reserve is one of the essential fundamental duties of the central bank of any country, including Nigeria. As such, Nigerian government over the years has keen into maintaining foreign reserve to achieve sustainable economic growth. Thus, the study analyzes the implications of external reserves on economic performance with some other macroeconomic variables (such as gross domestic product growth, exchange rate, Foreign Direct Investment, money suply and inflation rate) in Nigeria.

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II. Literature Review

A. Conceptual Review

(a) External Reserve

Ojomo (2024) observes that external reserves have, in recent times, played significant role in the Nigerian economy. It has increased the level of money supply and therefore impacted positively on the level of economic activities as more funds became available for investment in productive activities. Employment was in turn generated, output increased and consumption boosted. With their multiplier effects on the economy coupled with the efficient management of the financial resources, standard of living of the people improved considerably. Also, the contribution of the manufacturing sector to Gross Domestic Product (GDP), which has continued to dip, witnessed a boost.

An external reserve is a means of upsetting payments for international transactions. The process of maximizing a country's external resources to suit its economic demands is known as foreign reserves management. The Central Bank of Nigeria is the only entity in charge of managing foreign reserves. Foreign exchange that is convertible into other currencies, gold reserves, holdings of Special Drawing Rights (SDRs), and reserve positions at the International Monetary Fund (IMF) are all included in the definition of foreign reserves (Oyeniran, & Alamu 2020). When external expenditure is lower than external exchange incomes, the gain gives rise to external reserves. Nwafor (2017) also pointed out that the importance of using foreign reserves cannot be overstated. In essence, payments for external commitments must be made in foreign currency. As a result, reserve stocks start to matter when it comes to funding external imbalances. External reserves can also be used to protect against unanticipated volatility, safeguard natural riches for future generations, and interfere in the foreign exchange market (Falade, 2023 and Adegboyo, 2019). Foreign reserve accumulation is actually a complex phenomenon, as several recent empirical studies and policy reports highlight; the underlying causes may vary over time and be unique to a nation or a set of nations.

According to the monetary aggregates' rules, the reserves must cover a given proportion of an indicator of monetary volume, the so-called monetary aggregate. The indicator captures the foreign exchange reserve requirement arising from the potential flight of capital by resident actors in a crisis situation, when the domestic actors' confidence in the national currency decreases and they start to liquidate their savings held in bank deposits or cash, by converting them into foreign instruments. This approach assumes that, in a crisis, it is not only external funding that may stop, but that domestic investors may also transfer assets abroad. This "internal drain" may be higher in magnitude than that originating from the current account deficit or from short-term external debt (Oniyide & Ogunjinmi, 2021).

The central bank of Nigeria presently holds the country's foreign reserves in major currencies such as the U.S dollar, the euro, the Japanese yen, the British pound, the Swiss franc and those of other trading partners. However, over 90% of Nigeria's foreign reserves is denominated in the U.S dollar, mainly due to the fact that its crude oil exports are invoiced in the US dollar while most of its obligations such as external debt service, foreign exchange intervention, as well as other service obligations are also denominated in the US dollar (Nda, 2006). Since the introduction of SAP in 1986, the Central Bank has implemented different techniques in the management of the exchange rate. Under SAP, the exchange rate strategy was to float the naira and establish an institutional framework for its trading in a market determined environment (Fapetu and Oloyede, 2014).

(b) Economic Performance

The performance of any economy is traceable to its growth level. Growth is the most powerful instrument for reducing poverty and improving the quality of life in developing countries. Both cross-country research and country case studies provide overwhelming evidence that rapid and sustained growth is critical to making faster progress towards the Millennium Development Goals – and not just the first goal of halving the global proportion of people living on less than $1 a day. Growth can generate virtuous circles of prosperity and opportunity. Strong growth and employment opportunities improve incentives for parents to invest in their children's education by sending them to school. This

may lead to the emergence of a strong and growing group of entrepreneurs, which should generate pressure for improved governance. Strong economic growth therefore advances human development, which, in turn, promotes economic growth. But under different conditions, similar rates of growth can have very different effects on poverty, the employment prospects of the poor and broader indicators of human development. The extent to which growth reduces poverty depends on the degree to which the poor participate in the growth process and share in its proceeds. A successful strategy of poverty reduction must have at its core measures to promote rapid and sustained economic growth.

The challenge for policy is to combine growth-promoting policies with policies that allow the poor to participate fully in the unleashed opportunities and so contribute to that growth. This includes policies to make labour markets work better, remove gender inequalities and increase financial inclusion. Asian countries are increasingly tackling this agenda of 'inclusive growth'. India's most recent development plan has two main objectives: raising economic growth and making growth more inclusive, policy mirrored elsewhere in South Asia and Africa. Future growth will need to be based on an increasingly globalised world that offers new opportunities but also new challenges (Rodrik, 2007). Poongothai and Kalaipriya (2017) posits that it is the increase in market value of the goods and services produced by an economy over time which is conventionally measured by the percentage rate of increase in real gross domestic product or real GDP. Economic growth comprises sustained, concerted actions of communities and policymakers that improve the people's standard of living and economic health of every individual in the country at large.

B. Theoretical Review

There are therories that are associated with external reserves such as Micro/Macro theory of foreign reserves, macroeconomic stabilization theory, simple open economy model. This study premised on macroeconomic stabilization theor/view on foreign reserves.

(a) Micro/Macro Theories of Foreign Reserves

This theory was postulated based on the controversies of Monetarists and Keynesians. The monetarists say that accumulation of reserves is because of the excess demand for the domestic currency and the growth of world trade. Keynesian view also relates to external reserve based on the accumulation of foreign reserves. Thus, it is to improve the current account and thereby positively impact on the aggregate input. This impact is in the short run and will affect nominal exchange rates (Nwafor, 2017). Keynesian macroeconomics analytical framework shows how foreign reserves affect economy. Thus, price of oil multiplies with quantity of oil equal to international reserves which in turn leads to import, investment and gross domestic product. However, international reserves also lead to money supply (M_2), and money supply, in turn, leads to inflation and exchange rate.

(b) Simple Open Economy Model

A simple open-economy model is where increased foreign reserves reduce costs of liquidity risk. Given the number of foreign reserves, the utility-maximizing representative agents decide consumption and the amounts of liquid and illiquid foreign debts. The equilibrium values of these macro variables depend on the number of foreign reserves. When the government increases its foreign reserves, not only liquid debt but also total debt increases, while the debt maturity becomes shorter. The increased foreign reserves also lead to permanent decline of consumption, depreciation of real exchange rate, and temporal improvement of current account (Fukuda and Kon, 2007).

(c) Macroeconomic Stabilization Theory

Macroeconomic stabilization theory remains at the frontage of national economic policy making in order to aid conditionality in developing countries. Its goal is to achieve internal balance (full emplyment and price stability) and external balance (sustainable payments) for sustainable growth. This has induced developing countries (such as Nigeria) to hold reserves to allow monetary authorities to intervene in markets to influence the exchange rate and inflation. Many African

countries, including Nigeria, argue that adequate foreign reserves may allow them to borrow abroad, attract foreign capital and promote domestic private investment as a result of strengthened external position and reduced vulnerability to external shocks. Thus, it is believed that maintaining adequate reserves can boost investors' confidence and enhance investment and growth (Elhiraika and Ndikuman, 2007).

(d) Emipirical Review

Ojomo (2024) examined the impact of foreign external reserve on economic growth in Nigeria from 1986-2022. This study used secondary data with Augmented Dickey Fuller (ADF) unit root test, Johansen Co-integration test and Fully Modified Ordinary Least Squares (FMOLS). The FMOLS estimate confirmed that external reserves and trade openness were significant and directly related to real-GDP; while effective exchange rate and inflation rate were significant also and negatively related to it. Suggesting that higher rate of external reserve assets increases aggregate output that directly promotes economic growth. The study concluded that higher external reserve promotes economic growth.

Awonusi (2022) investigated the effect of foreign reserves on economic growth. It was concluded that external reserves have simulating effect on economic growth in Nigeria through the creation of foreign exchange stability and shock absorption in the economy. The implication of this finding is that the holding of large number of reserves in foreign currencies would create cushion to maintain internal stability to the economy during the period of shock thereby enhancing economic growth.

Oyeniran and Alamu (2020) study estimates the optimal level of foreign reserves for Nigeria from 2002:1 to 2016:12. The results show that the Nigeria's optimal reserves level responds to adjustment cost of holding reserves and exchange rate volatility, and that import and opportunity cost of reserves holding have insignificant impact on Nigeria's optimal foreign reserves. The short run and long run estimates of the buffer stock model support the theory that foreign reserves holding in Nigeria is more sensitive to the precautionary than mercantilist motives of holding reserves.

Nelson and Wilberforce (2018) examine the relationship between external reserve and economic growth in Nigeria from 1980 to 2016. The study used three explanatory variables (real gross domestic product, market capitalization and agricultural output) and one explained variable (external reserve). Test carried out include unit root test, co-integration test, ordinary least square and Granger causality test. The study revealed that: There is positive and significant relationship between external reserve and real gross domestic product in Nigeria; there is positive and significant relationship between external reserve and market capitalization in Nigeria; and there is negative and insignificant relationship between external reserve and agricultural output in Nigeria.

Nwosa (2017) study examines the relationship between external reserves and economic growth in Nigeria from 1981 to 2014. The study used the Ordinary least squares econometric method of analysis. The result of the study showed that external reserves had positive and significant influence on the economic growth in Nigeria. Based on the major finding of this study, it was concluded that external reserve in Nigeria has, over the period of study, contributed positively and significantly to the growth of the economy.

Csávás and Csom-Bíró (2016) examine the usage of the foreign currency reserve adequacy indicators applied by the International Monetary Fund (IMF). The results of the analysis performed based on the IMF's country assessments show that there is a positive relation between the use of short-term external debt and monetary aggregates, and the increase in income. In the low-income group, the IMF hardly examines the reserve adequacy based on the short-term external debt indicator (the value around 6 per cent represents 1 country) and the use of the indicator also does not reach 25 per cent in the lower middle-income category. However, the results of the study also show that IMF tends to use the short-term external debt and monetary aggregate indicators more often with the increase in income, while the role of the import rule gradually decreases as a function of income. There is a positive relation between the import rule and use of capital controls, while it is the other way round in the case of short-

term external debt and the monetary aggregate indicators. For countries with a fixed exchange rate regime, the monetary aggregate and import indicators are used more often than for those with a floating exchange rate regime, while the use of short-term external debt is less frequent.

Michael (2017), in his study, focuses on external reserve as a solution to economic growth in Nigeria. Two hypotheses were tested with data spanning from 2004 to 2015 using Ordinary Least Squares (OLS) regression technique. The study revealed that external reserves have no positive significant impact on economic growth in Nigeria within the period under review and that external reserves have no positive significant influence on exchange rate in Nigeria. Other findings deduced from data description reveal that foreign reserves of Nigeria have been declining marginally within the period under study and that it was occasioned by the 2007-2008 global financial crisis supported by the nonchalant attitude of the government towards accumulation of international reserves.

Akinwunmi and Adekoya (2016) investigates the relationship between external reserves management and its effect on Nigeria's economic growth, with external reserves, exchange rate, monetary policy rate, inflation rate, gross domestic product and foreign direct investment from 1985 to 2013. With the aid of the multiple regressions, the results found a significant relationship among the variables. Gross domestic product, monetary policy rate and foreign direct investment were highly statistically significant, while inflation rate and exchange rate were statistically insignificant.

Osuji and Ebiringa (2012) examine analysis of effect of external reserves management on macroeconomic stability of Nigeria from 1981-2010. Secondary data were sourced and analyzed using multiple regressions, granger casualty test, VAR model and unit root test. The study revealed a direct relationship between external reserves and explanatory variables and was inversely related to macroeconomic instability.

Alasan and Shaib (2011) examine the management of external reserves and economic development in Nigeria between 1980 and 2008. The study employed ordinary least square (OLS) estimation technique. The empirical result of the data analysis revealed that there is statistical significant relationship in the management of Nigerian external reserves. Also, Irefin and Yaaba (2011) study used an Autoregressive Distributed Lag (ARDL) approach to run a slightly modified econometrics 'Buffer Stock Model' of Frenkel and Jovanovic (1981) to estimate the determinants of foreign reserves in Nigeria with focus on income, monetary policy rate, imports and exchange rate. The results debunked the existence of buffer stock model for reserves accumulation and provide strong evidence in support of income as the major determinant of reserves holdings in Nigeria.

III. Materials and Methods

A research design has been described as a program, which guides the researcher in the process of collecting, analyzing and interpreting observation. It also connotes the structuring of investigation aimed to identify variables and their relationships to one another (Amos, 2025). Therefore, the methodology was based on the *ex post facto* research design and Ordinary Least Squares (OLS) statistical technique was used.

In order to establish the implication of external reserves on the Nigerian economy perforamnce, the study adopted Awosusi (2022). Though, the present study is different from that of Awosusi (2022) in the sense that both studies considered different time period. That of Awosusi considered the period 1986 – 2019 while the current study considered the period 1980-2023. It was expected that the findings from the current study would provide somewhat different policy insights on the implication of external reserves on Nigeria economy performance.

$$RGDP = f(EXTR, EXGT, MS_2, INF) \quad 2.1$$

The above implicit function in equation could be presented in a linear functional form as follows:

$$LnRGDP_t = \beta_0 + \beta_1 LnEXTR_t + \beta_2 LnEXGT_t + \beta_3 INF_{2t} + \beta_4 LnMS_{2t} + \varepsilon_t \quad 2.2$$

Where:

$RGDP_t$ = Real Gross Domestic Product
$EXTR_t$ = External Reserves

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$EXGT_t$ = Exchange Rate
INF_t = Inflation Rate
MS_t = Money Supply
Ln = Log Linear
ε_t = Error term
β_0 = Constant or intercept term
β_1, β_2, β_3, and β_4, = Parameters to be estimated

From the specified model equations above, the dependent variable is RGDP while exogenous variables are EXTR, EXGT, INF and MS_2. The parameters of the respective functions are βi where i = 0,1,2,3,4… n.

The short-run relationship model is specified in below:

$$\Delta LnRGDP_t=\beta_0+\sum_{i=1}^{n_1}\beta_{1i}\Delta LnEXTR_t+\sum_{i=1}^{n_2}\beta_{2i}\Delta LnEXGT_t+\sum_{i=1}^{n_3}\beta_{3i}\Delta INF_t+\sum_{i=1}^{n_4}\beta_{4i}\Delta LnMS_t+\lambda ECT_{t-1}+\varepsilon_{1t} \quad 2.3$$

Conversely, for the long-run relationship model;

$$\Delta LnRGDP_t=\beta_0+\sum_{i=1}^{n_1}\beta_{1i}\Delta LnEXTR_t+\sum_{i=1}^{n_2}\beta_{2i}\Delta EXGT_t+\sum_{i=1}^{n_3}\beta_{3i}\Delta INF_t+\sum_{i=1}^{n_4}\beta_{4i}\Delta LnMS_t+\varepsilon_{1t} \quad 2.4$$

Data was analyzed using both quantitative and qualitative approach. In the case of qualitative approach, descriptive statistics were used to compare variable numerically and to ascertain pattern in the data set. For quantitative analysis, Autoregressive Distributed Lag Model, Error Correction Model, and Unit Root were used to analyze the data.

IV. Result and Discussion

A. Result

The analysis started with the descriptive statistics which are shown below using E-Views 9.0, see appendixes.

B. Descriptive Statistics of Data

Table 1. Descriptive Statistics

	RGDP	EXTR	EXGT	INF	MS_2
Mean	44920.83	19372.94	132.6170	18.89364	2778896.
Median	9867.972	9197.605	115.1250	12.94500	148011.2
Maximum	234425.9	53000.40	647.2700	72.84000	21246341
Minimum	138.4100	224.4000	0.550000	5.400000	15100.00
Std. Dev.	62259.82	17453.04	141.2430	16.15820	5247513.
Skewness	1.448726	0.417985	1.538603	1.895413	2.048089
Kurtosis	4.154192	1.551614	5.585196	5.599418	6.138794
Jarque-Bera	17.83355	5.127223	29.61280	38.73345	48.82295
Probability	0.000134	0.077026	0.000000	0.000000	0.000000
Sum	1976517.	852409.2	5835.150	831.3200	1.22E+08
Sum Sq. Dev.	1.67E+11	1.31E+10	857832.4	11226.76	1.18E+15
Observations	44	44	44	44	44

Source: Computed using E-view 9.0

Table 1 shows the descriptive statistics and revealed that all variables exhibited moderate dispersion, indicating stable series suitable for regression analysis. All were skewed to the right. Money supply has the highest maximum value while inflation rate has the lowest maximum value, likewise, has highest and lowest value around the mean respectively.

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C. Stationarity Result

Table 2. Unit Root Stationarity Results

Variables	ADF Statistics	Critical Value	P-Value	PP Statistics	Critical Value	Order of Integration
LnRGDP	-3.6321	-3. 5966 (1%) -2.9332 (5%) -2.6049 (10%)	0.0091	-3.5579	-3. 5966 (1%) -2.9332 (5%) -2.6049 (10%)	I(1)
lnEXTR	-5.9301	-3.6010 (1%) -2.9350 (5%) -2.6058 (10%)	0.0000	-7.2884	-3. 5966 (1%) -2.9332 (5%) -2.6049 (10%)	I(1)
lnEXTG	-6.1114	-3.5966 (1%) -2.9332 (5%) -2.6049 (10%)	0.0000	-6.1359	-3.5966 (1%) -2.9332 (5%) -2.6049 (10%)	I(1)
INF	-3.1747	-3.5925 (1%) -2.9314 (5%) -2.6079 (10%)	0.0285	-3.0344	-3.5925 (1%) -2.9314 (5%) -2.6079 (10%)	I(0)
$LnMS_2$	-6.5156	-3. 5966 (1%) -2.9332 (5%) -2.6049 (10%)	0.0000	-6.5156	-3. 5966 (1%) -2.9332 (5%) -2.6049 (10%)	I(1)

Source: Computed using E-view 9.0

Applying both the Augmented Dickey–Fuller (ADF) and Phillips-Perron (PP) unit root test to LnRGDP, LnEXTR, LnEXTG, and $LnMS_2$, (stationary at first difference and statistically significant at the 1% level) and INF (stationary at level and statistically significant at 5% level). Notably, the ADF and PP stationary tests were all in the same order of integration.

D. ARDL Bounds Test for Co-integration

Table 3. ARDL Bounds Test for Co-integration

Null Hypothesis: No long-run relationships exist		
Test Statistic	Value	K
F-statistic	6.256455	4
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	2.45	3.52
5%	2.86	4.01
2.5%	3.25	4.49
1%	3.74	5.06

Source: Computed using E-view 9.0
Note: indicates significant at 0.05 level (that is, F-Statistic>5.06 Critical Value)*

The results reported in the table above indicate that the computed F-statistics exceed the upper-bound critical value of 5.06 at the 1% significance level. Consequently, the null hypothesis of no cointegrating relationship among the variables is rejected.

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E. ARDL Test Equation Analysis

Table 4a. Model: Short-run Model Result

Variables	Coefficient	Standard Error	T-statistics	Prob.
C	0.360105	0.145057	2.482501	0.0204
ΔLnEXTR(-1)	0.092789	0.033557	2.765132	0.0108
ΔLnEXTG(-2)	-0.151269	0.060912	-2.483419	0.0204
ΔINF	0.003914	0.000935	4.186052	0.0003
$\Delta LnMS_2$	0.007403	0.006484	1.141611	0.2649
ECM_{t-1}	-0.077209	0.026016	-2.967820	0.0067

Source: Computed Using E-View 9.0

R^2 = 0.99963
Adj. R^2 = 0.99939
Standard Error = 0.056900
F-Statistics = 4325.89
Durbin Watson = 2.2969

Table 4b. Model: Long-run Model Result

Variables	Coefficient	Standard Error	T-statistics	Prob.
C	4.663996	2.285750	2.040466	0.0525
Ln(EXTR)	0.106590	0.314428	0.338996	0.7376
Ln(EXTG)	1.025428	0.179420	5.715228	0.0000
INF	0.073406	0.024070	3.049684	0.0055
$Ln(MS_2)$	0.095877	0.099396	0.964604	0.3444

Source: Computed Using E-View 9.0

R^2 = 0.834101
Adj. R^2 = 0.730414
Standard Error Estimates = 0.057853
F-Statistics = 8.044426
Durbin Watson = 2.2925

The ARDL cointegration revealed that lagged one year of external reserves has significant relationship with Real Gross Domestic Product and positively related (0.0928) in short-run and (0.1066.) in the long-run. Exchange rate lagged two years (-0.1513) was significant, negatively related with Real Gross Domestic Product in short-run, but positively related in the long-run due to sustained demand for foreign currency and exchange rate misalignment. (1.0254). Inflation rate (0.0039) and (0.0734) has positive impact of growth of Nigeria's economy both in short and long-run and statistically significant in the short-run. Also, Money supply (MS_2) was positive related (0.0074) and (-0.0959) in both short-run and long-run respectively. ARDL model reparameterized into Error Correction Model revealed the long-run equilibrium was corrected in the current period at an adjustment speed of (0.077209) i.e. approximately 8%, statistically significant and negatively signed showing the rate at which the economy is converging to equilibrium in the long-run.

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F. Trends Analysis

The trend analyses are shown below graphically:

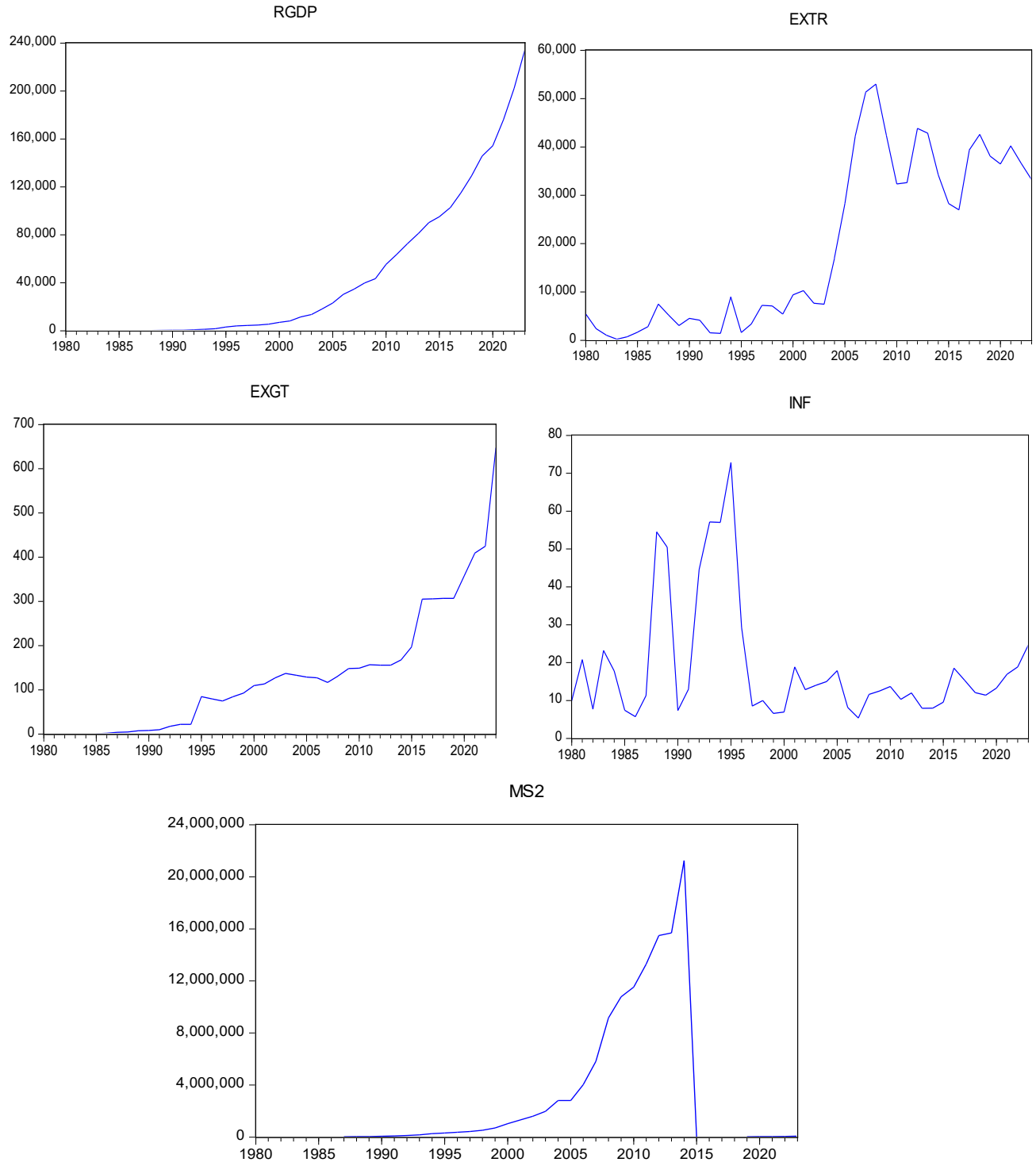

Figure 1: Trends Analysis
Source: Computed from E-View 9.0

Explicitly, the trend analyses showed that there was instability in all the variables under study at one point or the other during the period under review. This was attributed to the level of external reserves that would have had consequent impact on some of the variables.

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G. Classical Assumption Test

(a) Normality Test

The probability of normality test in figure 2 below shows that the probability value is 0.351218 which is greater than 0.05. That means, the table is normally distributed.

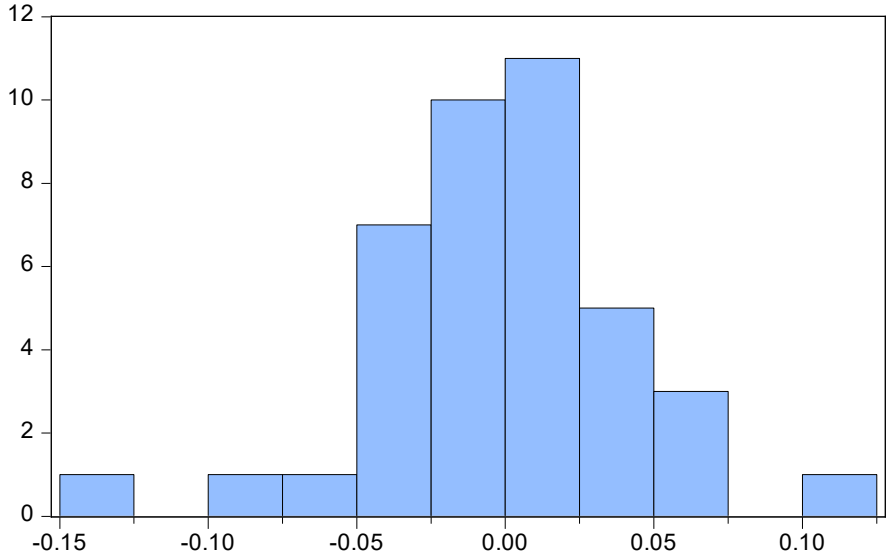

Figure 2: Normality Test

Source: Computed from E-View 9.0

(b) Multicollinearity

Table 5. Multicollinearity Test

	Ln(RGDP)	Ln(EXTR)	Ln(EXGT)	INF	Ln(MS_2)	VIF
Ln(RGDP)	1.000000	0.879312	0.945179	-0.253241	0.433832	0.027202
Ln(EXTR)	0.879312	1.000000	0.801812	-0.378158	0.464622	0.001126
Ln(EXGT)	0.945179	0.801812	1.000000	-0.112358	0.480368	0.003710
INF	-0.253241	-0.378158	-0.112358	1.000000	-0.176671	8.74E-07
Ln(MS_2)	0.433832	0.464622	0.480368	-0.176671	1.000000	4.20E-05

Source: Computed Using E-View 9.0

The above table 5 indicated that there is no multicollinearity based on the value derived. None of the values are greater than 10. LnRGDP VIF is 0.0272, Ln(EXTR) VIF is 0.0011, Ln(EXGT) VIF is 0.0037, INF VIF is 8.74E-07, and Ln(MS_2)VIF is 4.20E-05.

(c) Heteroscedasticity Test

Table 6. Heteroscedasticity Test: Breusch-Pagan-Godfrey

F-statistic	1.319453	Prob. F(15,24)	0.2646
Obs*R-squared	18.07808	Prob. Chi-Square(15)	0.2586
Scaled explained SS	9.565148	Prob. Chi-Square(15)	0.8462

Source: Computed Using E-View 9.0

From Table 6, considering the prob. Chi-Square values of 0.3 which was greater than 0.05 level, the decision is to reject the null hypothesis of no serial correlation in the model. Heteroscedasticity test shows that the variance of the analysis is constant over time with t he F-probability of 0.3.

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(d) Granger Causality Test

Table 7. Pairwise Granger Causality Tests

Null Hypothesis:	Obs	F-Statistic	Prob.
LOG(EXTR) does not Granger Cause LOG(RGDP)	42	2.38610	0.1060
LOG(RGDP) does not Granger Cause LOG(EXTR)		6.43091	0.0040
LOG(EXGT) does not Granger Cause LOG(RGDP)	42	2.41146	0.1036
LOG(RGDP) does not Granger Cause LOG(EXGT)		0.13782	0.8717
INF does not Granger Cause LOG(RGDP)	42	1.60061	0.2154
LOG(RGDP) does not Granger Cause INF		1.92990	0.1595
LOG(MS2) does not Granger Cause LOG(RGDP)	42	0.10225	0.9031
LOG(RGDP) does not Granger Cause LOG(MS2)		0.56362	0.5740

Table 7 shows that there are unidirectional causes between variables considered. The coefficient were not jointly equal to zero, this shows that there was causality of variables, e.g. log of external reserves granger cause log of real gross domestic product at F = 6.43. Therefore, the null hypothesis that external reserves do not granger cause economic growth was rejected. Also, the P-value of 'F' does not tend towards zero which was the evidence that external reserve cannot implicate or not relevant to predict increase in economic growth. This gives credence to the use of the variables in the model.

V. Discussion

This study examined the implications of external reserves on the economic performance in Nigeria. Finding indicated that external reserves had positive and significant effect on economic growth in Nigeria both in short-run and in the long-run. The implication of this finding is that the holding of large number of reserves in foreign currencies would create cushion to maintain internal stability to the economy during the period of shock thereby enhancing economic growth. It also implies that high rate of external reserve assets outside Nigeria held by monetary authority boosts local currency, which in turns induce local production that increases aggregate output. This is conformed with Ojiako (2020) who found that there is positive relationship between economic growth and external reserves. Also, Adegboyo, Efuntade and Efuntade (2019) who opined, that foreign reserves accumulation is important to support and sustain monetary and foreign exchange policies for the purpose of protecting instability of currency and ensure effective running of foreign exchange market and international payment system.

Furthermore, the study revealed that lagged one year of exchange rate had negative and significant effect on economic growth in the short run but positive in the long run which implies that stable exchange rate would be achieved in the long run through building up of external reserves, thereby promote economic growth. This is in accordance with Amos (2025), and Oniyide & Ogunjinmi (2021) who examined the the relationship between exchange rate and economic growth in Nigeria to be significant and positively related. Meanwhile, not in line with the work of Ojonugwa and Musa (2019) who examined the direction of causality between real exchange rates on economic growth in Nigeria and found positive relationship between exchange rate and economic growth in Nigeria.

Inflation rate has positive impact of growth of Nigeria's economy both in short and long-run and statistically significant in the short-run. In addition, inflation rate is found to exert negative and significant effect on economic growth, which indicates inflationary pressure will contribute negatively to the growth of the economy. This is contradictory to Oniyide & Ogunjinmi (2017) who discovered inflation was found to be negatively related in the long run to economic growth consistently across the

three models. Though, it is expected that the price level will reduce with the expansion in the manufacturing sector output in the long run.

Also, Money supply (MS_2) was positive related and in both short-run and (significant in) long-run respectively. This is in line with Oluseyi, Olasehinde, and Ewewke (2017) who examined the long and short run relationship between broad money supply on Nigeria real aggregate output (real GDP) from 1981 to 2015. The result affirms the existence of long and short run relationship between real GDP and broad money Supply. It as well conformed to Opeta and Obasikene (2021) who examined the impact of money supply on economic growth in Nigeria from 1986 to 2019 and to determine the impact of ratio of private sector credit to GDP on economic growth in Nigeria. The study found out that broad money supply and ratio of Private sector credit to GDP has positive and significant impact on economic growth in Nigeria. Money supply also influences and enhances increases in external reserves; therefore, monetary authorities should endeavour to keep the rate at a competitive level which will inspire economic growth through the actions of the local investors.

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