



IMPACT OF SELECTED MACROECONOMIC VARIABLES ON FOREIGN RESERVES IN NIGERIA

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Abstract

This study empirically examined the impact of selected macroeconomic variables on Nigeria's foreign reserves. Quarterly time series data spanning from 1981Q1 to 2021Q4, covering both the pre-democracy 1981Q1 -1998₄ and democratic 1999Q1 -2021Q₄ periods, were utilized for the analysis. The econometric model incorporates variables such as interest rate (INT), inflation rate (INF), exchange rate (EXR), oil export (OEP), non-oil export (NOE), and gross domestic product (GDP) as independent variables, with foreign reserves as the dependent variable. The ARDL bounds methodology for co-integration analysis was employed. The unit root test results indicate that most variables are stationary at the first difference, suggesting 1(1) integrations, except for the exchange rate (EXR), which is stationary at level 1(0). Co-integration analysis confirms long-run relationships between the macroeconomic variables and foreign reserves in both periods. The findings revealed that in the pre-democratic period, exchange rate, oil export, oil price, and non-oil export significantly impacted Nigeria's foreign reserves positively, while inflation rate had an inverse but insignificant effect in the long run. Similar results were observed in the democratic

period, with the exchange rate, interest rate, and oil price impacted on Nigeria's foreign reserves. In conclusion, the study underscores the significance of exchange rate, GDP, oil and non-oil exports, and oil price fluctuations as

Keywords: Foreign Reserves, Gross Domestic Product, Inflation Rate, Interest Rate, Oil Export, Non-Oil Export, Oil Price

major determinants of Nigeria's foreign reserves in both pre-democratic and democratic periods. Based on the findings, the study recommends among others, the government and monetary authority should initiate macroeconomic policies like lowering interest rate to promote and encourage economic activities through increased investments which will improve Nigeria's GDP to enhance the performance of the country's reserves.

Introduction

Many countries around the world expect foreign reserves to have a favorable exchange rate, particularly in order to stabilize it and sustain greater economic growth. There has been debate about whether nations' foreign reserves should be increased or reduced, and this argument is growing increasingly interesting, particularly in developing countries like Nigeria. Some people believe that putting scarce resources in reserve when there are a number of domestic challenges to address, such as agriculture, infrastructure, education, and health, may not be a prudent move (Osabuohien & Egwakhe, 2008; Irefin & Yaaba, 2012). According to Charles (2012), the country's rating in the global competitive market is determined by its foreign reserve position. In other words, scholars such as Alasan and Shaib (2011), Kruskovic and Tina (2014), Nwosa (2017) and Akamobi and Ugwunna (2017) believe that having a strong level of foreign reserves will make the country appear financially responsible and creditworthy to other countries, creditors, and donors.

The fear of a financial catastrophe has forced developed and developing countries to maintain a specific level of foreign reserves in order to intervene in foreign exchange markets and decrease volatility while also protecting the international value of their currency. It is also worth noting that foreign exchange reserves are important for meeting macroeconomic objectives such as maintaining currency stability and smoothing the normal functioning of the domestic and external payment systems for government expenditures abroad, particularly those with known import bills for the authorities to meet (Osabuohien & Egwakhe, 2008).

The continuing depletion of the country's reserves has prompted severe concerns among researchers and policymakers. Some argued that foreign reserves are an invaluable reservoir of assets that monetary authorities can utilize to affect the exchange rate of their own currency (Nugee, 2008). According to these researchers, foreign reserves help increase international community confidence in a country's policies and creditworthiness while also acting as a buffer against unforeseen financial instability (Soludo, 2005; Nda, 2006; Osabuohien & Egwakhe, 2008). On the opposing side are those who believed that such amount of foreign assets could have been employed to finance infrastructural development and investment to stimulate economic productivity (Archer & Halliday, 2008). It is argued that although a good level of reserves contribute to confidence in the nation by guaranteeing the availability of foreign exchange to domestic borrowers to meet international debt servicing and enhance its credit rating, the confidence is, however, influenced by the soundness of a nation's economic policies and overall business climate (UNCTAD, 2007; Osabuohien & Egwakhe, 2008). The development of the concept of foreign reserve assets accumulation, which includes currency, securities, deposit, special drawing rights, monetary gold, and so on, originated due to the introduction of central banks and the need to trade in the integrated global economy (Molapo, 2016).

Nigeria's foreign reserve holdings have been unpredictable due to its over-reliance on crude oil prices. According to the CBN (2015), Nigeria's foreign reserve is mostly derived from crude oil production and sales, and it is particularly exposed to the volatility that characterizes crude oil prices on the international market. The size of this reserve is inextricably related to crude oil price

levels, which have proven difficult to manage and forecast over time. This has posed a significant hindrance to effective and adequate planning and investment of excess reserves in the country's infrastructure, as well as impacting the country's exchange rate stability.

According to Gosselin and Parent (2005), the long-run reserve demand function was reasonably constant and was determined by five categories of explanatory variables: economic size, current account vulnerability, capital account vulnerability, exchange rate flexibility, and opportunity cost. According to Akims (2016), declining international oil prices are a major source of concern, forcing the Federal Government of Nigeria to reconsider its budgeted crude oil benchmarks of US\$75 and US\$73 per barrel, which were recommended in the 2014 and 2015 budgets. Similarly, the exchange value of the Nigerian naira has steadily declined, prohibiting traders from engaging in import and export transactions because their rate of return is endangered. This decline has triggered a chain reaction that undermines Nigeria's macroeconomic stability (Akims, 2016). According to Aizenman and Marion (2004), the quantity of foreign transactions, as well as their volatility, exchange rate arrangements, and political stability, are important factors of international reserve holdings. Given Nigeria's present economic downturn, is it still realistic to retain an external reserve or deplete the reserve in order to tackle the current national challenge?

Aluko (2007) remarked that external reserves have recently played an important role in Nigeria's economy. It has boosted the level of money supply, which has had a favorable influence on economic activity because more funds are now accessible for productive investment. As a result, employment was created, output increased, and consumption rose. With their multiplier effects on the economy, combined with smart financial resource management, people's standard of living improved significantly (Charles, 2012). However, Akpan (2016) indicated that the continuing depletion of Nigeria's reserves has prompted major concerns among scholars and policymakers about the relevance of foreign reserve building to the nation's macroeconomic environment. Whereas Alasan and Shaib (2011); Kruskovic and Tina (2014); Nwosa (2017); Akamobi and Ugwunna (2017) contended that foreign reserves are an irreplaceable store of assets that monetary authorities can utilize to affect the exchange rate of their home currency. Again, there is a disagreement over the importance of building big foreign reserves while the economy is nearly in a depression and inflation, exchange, and unemployment rates are fast rising. It is suggested that the reserves are a waste of resources that could be reinvested in infrastructure development and job creation for the nation's unemployed youth. Furthermore, there is a scarcity of research on the macroeconomic implications of foreign reserves. While other available studies are focused on the determinants and composition of foreign reserves and its impact on economic growth, very few studies exist on the impact of foreign reserves on Nigeria macroeconomic variables.

Statement of the Problem

Macroeconomic stability is essential for the accumulation of external reserves and growth of the economy at large. An adequate and stable level of foreign exchange reserve is a precondition for the attainment of macroeconomic performance. Various studies have been done on the impact of macroeconomic factors on foreign reserves (Miszta, 2021; Kaphle, 2021; Lin and Wang, 2010; Kashif, Singh, Thiyagarajan & Maheshwari, 2020). However, these studies were conducted for countries outside Africa and the studies obtained varying results. In the case of Nigeria, studies conducted on

macroeconomic factors and foreign reserves include among others, Abere and Akinbobola (2020); Ojiako (2020); Nwosa (2017); Akamobi & Ugwunna (2017) and Oligbi & Iyoha (2020). Most of these studies did not capture the periods after the global financial crises and the periods of undemocratic and democratic regime when motivations for the production of more barrels of oil were in force on foreign reserves in Nigeria. Conceptually, we created a model to explain how macroeconomic factors and Nigeria's foreign reserves relate to one another in pre-democracy and democratic regime.

Objectives of the Study

The overall aim of the study is to examine the impact of selected macroeconomic variables on foreign reserves in Nigeria. The specific objectives are to:

- a. examine the effect of gross domestic product on foreign reserves in Nigeria;
- b. evaluate the effect of exchange rate on foreign reserves in Nigeria;
- c. examine the effect of inflation rate on foreign reserves in Nigeria;
- d. explore the relationship between exports (oil and non-oil) on foreign reserves in Nigeria;
- e. investigate the effect of interest rate on foreign reserves in Nigeria;
- f. determine the effect of crude oil price fluctuation on Nigeria foreign reserves.

Hypotheses of the Study

Based on the objectives of the study with respect to impact of selected macroeconomic variables on Nigeria's foreign reserves, the following hypotheses are generated:

- a. H_{01} : Gross domestic product has no significant effect on foreign reserves in Nigeria;
- b. H_{02} : Exchange rate has no significant effect on foreign reserves in Nigeria;
- c. H_{03} : Inflation rate has no significant effect on foreign reserves in Nigeria;
- d. H_{04} : Exports (oil and non-oil) have no significant relationship with foreign reserves in Nigeria;
- e. H_{05} : Interest rate has no significant effect on foreign reserves in Nigeria; and
- f. H_{07} : Crude oil price fluctuation has no significant effects on Nigeria foreign reserves.

Literature Review

Conceptual Review

Foreign Reserves

Foreign reserves, also known as reserve assets, consist of foreign banknotes, foreign bank deposits, foreign treasury bills, short and long-term foreign government securities, special drawing rights (SDRs) and gold reserves (International Monetary Fund, 2012). Foreign reserves are also cash and other reserve assets, such as gold, held by a central bank or other monetary authority and are primarily available to the country's balance of payments, influence the foreign exchange rate of its currency, and serve to maintain financial market confidence. Foreign exchange reserves assets can be banknotes, bank deposits, and government securities of the reserve currency, such as bonds and treasury bills (Rodrik, 2019).

Foreign reserves are external assets kept by a country and comprise cash, securities, deposits, special drawing rights, monetary gold, and so on (Molapo, 2016). A central bank holds these assets in foreign currencies as reserves.

Aizenman (2005) was of the view that external reserves are the liquid external assets under the control of the central bank. In general reserves have been defined as liquid financial assets that a country holds to meet obligations arising out of balance of payments transactions as well as intervening in the country's foreign exchange market. They are also seen as the stock of foreign exchange acquired from international transactions and available to the monetary authorities.

Macroeconomic Variables

According to Akims (2016), macroeconomic variables serve as indicators of economic performance. They are referred to as variables because they are aggregate items on national accounting that vary over time and as a result of economic activity, and can take on any value with each succeeding period. Macroeconomic variables are indications or primary signposts of the economy's current tendencies. To conduct a successful job of macro-management, the government, like other experts, must study, analyze, and grasp the primary variables that define the macro-economy's current behavior. Some of the main macroeconomic variables that policymakers should try and manage to influence foreign reserves are exchange rate, inflation rate, gross domestic product, interest rate, export etc.

Theoretical Framework

The theoretical framework of this study is hinged on the Optimal Reserves Theory. According to Ben-Bassat and Gottlieb (1992), reserves are retained at levels where the additional benefits and costs of maintaining reserves are equal. They proposed that reserve accumulation has the advantage of signaling a low default risk on sovereign debt, resulting in an improved sovereign risk rating and a lower compensatory interest premium to compensate international investors for absorbing the risk of investing in the country's sovereign debt instrument.

Furthermore, there is an opportunity cost to holding reserves, which includes the income lost by not investing the reserves in higher interest income earning instruments, output losses, and interest expense from financing expenditure through taxes and debt rather than depletion of the reserves. Intrinsically, the approach ascertains that level of optimal reserves that either minimizes the cost or maximizes the benefit of keeping reserves, by solving the Central Bank's optimization problem.

The Ben-Bassat and Gottlieb model uses a cost-benefit analysis to determine optimal reserves. Theoretically, optimality is attained by balancing the marginal cost of retaining reserves against the marginal benefits. The cost of holding reserves is defined as the potential income foregone by holding foreign exchange in reserves rather than using it for other purposes, while the benefit is the avoidance of output losses caused by Balance of Payments (BOP) and exchange rate volatility. Because of international trade and finance, economies are vulnerable to global economic shocks, which affect their foreign reserves and the international value of their currency.

Empirical Review

Sula and Oguzoglu (2021) investigated the relationship between international reserves and economic growth in 120 developing and developed economies from 1981 to 2010. Using dynamic

panel data models, they discovered that reserves have a considerable positive effect on economic growth. However, this effect is dependent on the interest rate differential between the relevant country and the United States. Their studies revealed that, when the interest rate differential is equal to the sample average, a 1% increase in the reserves/GDP ratio improves the annual growth rate by 0.007%.

Kaphle (2021) examined the impact of foreign exchange reserves on Nepal's economic growth from 1975 to 2018. The study's findings revealed a cointegrating relationship between the variables, implying that foreign exchange reserves helped Nepal's economy grow during the study period.

Miszta (2021) investigated the size of China's Central Bank's foreign exchange reserves and the primary drivers of fluctuations in China's foreign reserves. The study tried to prove two hypotheses. According to the first thesis, China's present foreign exchange reserves level exceeds the optimal level recommended by the adequacy ratios. However, consistent with the second premise, the most important factors determining China's foreign exchange reserves were variations in the value of imports and fluctuations in the level of China's short-term foreign debt. The research approach employed in the study was based on literature studies in banking and international finance, as well as econometric methods. The author's approach to the subject of determining the optimal amount of foreign exchange reserves in China includes the selection and application of these research approaches. According to research, China's foreign exchange reserves were valued higher than ideal values for practically the whole period 1990-2019, as indicated by currency reserve adequacy ratios. The exceptions were the ratio of the optimal level of foreign currency reserves, estimated as 20% of the M2 money supply, and the ratio computed using the IMF approach for nations with stable exchange rates. China's relatively significant foreign exchange reserves were properly hedged against the potential consequences of economic crises, but their comparatively high level resulted in low profits. The analysis found that variations in the value of China's foreign exchange reserves were mostly affected by the inflow of foreign direct investment and changes in import expenditure.

Abere and Akinbobola (2020) examined the impact of exogenous shocks and institutional quality on Nigeria's macroeconomic performance between 1986 and 2016. Using Structural Vector Autoregressive (SVAR), the study discovered that exogenous shocks dominated macroeconomic performance in Nigeria. Given the varied results of previous research, this study investigates the effect of external reserves on Nigerian economic growth.

Ojiako (2020) examined the relationship between external reserves and economic performance in Nigeria from 1981 to 2018. The study employs the boundaries test approach to co-integration, utilizing the ARDL model. As a result, the study concluded that there is a long-term association between economic performance and external reserves. In addition, the study discovered that fluctuations in Nigeria's external reserves had a large and negative impact on economic performance.

Elijah (2020) used the ARDL technique to study the relationship between trade and Nigeria's foreign reserves from 1981 to 2017. Their findings found that Nigeria's foreign reserves were positively impacted by non-oil exports, oil exports, and the currency rate, while negatively impacted by non-oil and oil imports. However, the Granger-causality finding revealed a

unidirectional relationship between oil exports, exchange rate, non-oil exports, oil imports, and external reserves, with a bidirectional relationship only between external reserves and non-oil imports. They suggested discouraging the import of items that could be produced domestically and effectively managing the country's reserves.

Adekunle (2020) used the ARDL technique to study the relationship between Nigeria's external reserves and economic development from 1986 to 2018. The cointegration result suggested that there was co-integration between the variables. The ARDL results showed a positive association between exchange rate and economic growth, but a negative relationship between trade openness, inflation, and economic growth. The Granger-causality test also indicated a bidirectional association between economic growth and the exchange rate.

Model Specifications

This study adapts the empirical model used by Akpan (2016) by disaggregating the period into pre-democracy (1981- 1999) and the democracy period (1999-2021). The interest rate was also included in the model to replace unemployment, foreign investment and export proxied for trade between Nigeria and other countries. The system of government was divided into pre-democracy and democratic system of government of Nigeria. Therefore, the model for this study is specified as follows:

Model 1 (Prodemocracy Period 1981-1998)

$$FR = f(GDP, EXR, INF, OEP, NOE, INT, OIP) \quad (1)$$

The above functional relationship can be expressed econometrically as follows:

$$FR = \beta_0 + \beta_1 GDP + \beta_2 EXR + \beta_3 INF + \beta_4 OEP + \beta_5 NOE + \beta_6 INT + \beta_7 OIP + \mu_t \quad (2)$$

$$\beta_1, \beta_2, \beta_4, \beta_5 > 0; \beta_3, \beta_6, \beta_7 < 0$$

Model II (Democracy period 1999-2021)

$$FR = f(GDP, EXR, INF, OEP, NOE, INT, OIP) \quad (3)$$

The above functional relationship can be expressed econometrically as follows:

$$FR = \beta_0 + \beta_1 GDP + \beta_2 EXR + \beta_3 INF + \beta_4 OEP + \beta_5 NOE + \beta_6 INT + \beta_7 OIP + \mu_t \quad (4)$$

A priori expectations:

$$\beta_1, \beta_2, \beta_4, \beta_5 > 0; \beta_3, \beta_6, \beta_7 < 0$$

Where:

GDP = Real Gross Domestic Product; FR = Foreign reserves; EXR= exchange rate; INF= inflation rate; INT = interest rate; OEP= Oil Export; NOE = Non-Oil Export and OIP = Crude oil price and μ_t = error terms

Techniques of Estimation

The study adopts the bounds testing cointegration procedure to estimate the long-run and short-run relationships and dynamic interaction among the variables of interest. Pesaran, Shin and Smith (2001) proposed the Autoregressive Distributed Lag (ARDL) bounds testing approach to investigating the existence of cointegration relationships among variables. The choice of this modeling approach is based on the followings:

Results and Discussion

Unit Root Test

The results of the ADF unit root test are presented in Table 1 below:

Table 1: Results of Augmented Dickey-Fuller (ADF) Unit Root Test

Variable	ADF Calculated Value at Level	ADF Calculated Value At 1st Difference	Mckinnon 5% Critical Value	Order Of Integration
LOG(EXR)	-3.2529*	-0.3456	-2.8792	1(0)
LOG(FR)	-0.3842	-3.1483*	-2.8792	1(1)
LOG(GDP)	-2.6024	-6.7890	-2.8792	1(1)
INF	-1.4020	-3.0255*	-2.8792	1(1)
INT	-2.1678	-6.0526*	-2.8792	1(1)
LOG(NOE)	-1.1623	-15.6106*	-2.8792	1(1)
LOG(OEP)	-1.7692	-3.6257*	-2.8792	1(1)
LOG(OIP)	-0,0873	-3.0999*	-2.8792	1(1)

*Significant at 5 percent

Source: Author’s Estimation Results, 2024 using Eviews 12

The unit root test in Table 1 shows that interest rate (INT), inflation rate (INF), foreign reserves (FR), oil export (OEP), non-oil export (NOE), oil price (OIP) and gross domestic product (GDP) are stationary at first difference 1(1) since the calculated ADF is greater than the McKinnon 5% critical values while exchange rate (EXR) is stationary at a level 1(0).

Lag Length Criteria

The step that follows is, therefore, determining the appropriate lag. The lag-length selection criteria such as sequential modified LR test statistic (LR), Final Prediction Error (FPE), Akaike Information Criterion (AIC), Schwarz Information Criterion (SC), and Hanna-Quinn information criterion (HQ) were employed to determine the appropriate lag length of model one and two. The test results of the different lag selection methods are reported in Tables 4 and 5. After a thorough examination of the different lag lengths by estimating the VAR at each lag length and diagnosing the whiteness of resulting residuals, three (3) lag lengths, as recommended by Akaike Information Criteria (AIC) statistic, lag four (4) were selected for model one and two respectively.

Table 4: Lag Order Selection Criteria (Mode one)

VAR Lag Order Selection Criteria

Endogenous variables: LOG(FR) LOG(EXR) LOG(GDP) INT INF LOG(NOE) LOG(OE...)

Exogenous variables: C

Date: 03/29/24 Time: 03:18

Sample: 1981Q1 1998Q4

Included observations: 68

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-635.9538	NA	0.023210	18.93982	19.20093	19.04328
1	217.3391	1480.714	1.95e-12	-4.274679	-1.924612	-3.343511
2	651.3057	650.9499	3.94e-17	-15.15605	-10.71703	-13.39718
3	832.8528	229.6037	1.52e-18	-18.61332	-12.08535	-16.02674
4	1014.660	187.1547*	7.27e-20*	-22.07824*	-13.46133*	-18.66396*

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Source: Author's Estimation Results, 2024 using Eviews 12

Table 5: Lag Order Selection Criteria (Model Two)

VAR Lag Order Selection Criteria
Endogenous variables: LOG(FR) LOG(EXR) LOG(GDP) INT INF LOG(NOE) LOG(OE...
Exogenous variables: C
Date: 03/29/24 Time: 03:21
Sample: 1999Q1 2021Q4
Included observations: 88

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-401.0071	NA	1.50e-06	9.295615	9.520828	9.386348
1	1094.385	2684.909	1.13e-20	-23.23603	-21.20911	-22.41943
2	1607.440	827.8845	4.30e-25	-33.44183	-29.61321	-31.89937
3	1911.115	434.8071	2.03e-27	-38.88898	-33.25867*	-36.62067*
4	1985.733	93.27228*	1.90e-27*	-39.13029*	-31.69828	-36.13612

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Source: Author's Estimation Results, 2024 using Eviews 12

Bounds Test for Co-Integration

After determining the order of integration and lag length of the variables, we apply the bound F-test to establish the existence or otherwise of the long-run relationship among the variables. The summary results of the bound test for co-integration for models one and two are shown in Table 4.6 below alongside critical values. The computed F-statistic from the bound test for models one and two are 17.0147 and 12.8390 respectively. These values exceed the upper bounds critical value of 3.21 at a 5% significance level for Models one and two respectively. This implies that the alternate hypothesis of the existence of a unique co-integration (long run) relationship between the explanatory variables of exchange rate, interest rate, inflation rate, oil export, non-oil export and gross domestic product and Nigeria's foreign reserves are accepted while null hypothesis of no co-integration is rejected.

Table 6: Summary of ARDL Bound Test Results

Model	Test statistic	Computed statistic	F- Lag	Significance level	Bound Critical values	
					Lower Bounds	Upper Bounds
					I(0)	I(1)
One	F-statistic	17.0147	4	5%	2.17	3.21
Two	F-statistic	12.839	4	5%	2.17	3.21

Source: Author’s Estimation Results, 2024 using Eviews 12

Long Run ARDL Regression Results

The results of the estimated long-run coefficients of models one and two using the ARDL approach are presented in Table 7 below.

Table 7. Summary of the Long Run ARDL Regression Results

	Model One (1981Q1 – 1998Q4)	Model Two (1999Q1 – 2021Q4)
Independent Variable	Dependent Variable LOG(FR)	Dependent Variable LOG(FR)
Constant	-5.6494* (-3.6645)	24.5423* (14.4996)
LOG(EXR)	-6.1172* (-5.6352)	0.3003* (1.0000)
LOG(GDP)	0.1172 (0.7797)	-1.7262* (-8.1224)
INF	-0.0066 (-0.52220)	-0.2742 (-1.6960)
INT	-0.1015* (-6.1409)	-2.2063* (-3.0341)
LOG(NOE)	-0.3846* (-4.1464)	-0.8189* (-2.1071)
LOG(OEP)	2.3692* (12.1612)	1.6327* (3.4368)
LOG(OIP)	-1.7233* (-6.4785)	-4.5535* (-5.7460)

The values in parenthesis are t-statistic

Note: * is significant at a 5% level of significance.

Source: Author’s Estimation Results, 2024 using Eviews 12

From Table 7 above, it could be observed that the entire variables in model one met their expected signs except for inflation (INF) and non-oil export (NOE). Furthermore, in model 2, which is democratic period, the exchange rate LOG(EXR) has a direct and insignificant impact on the foreign reserves LOG(FR) in Nigeria. One percent increase in LOG (EXR) leads to a 30 percent increase in Nigeria’s foreign reserves. This is consistent with the apriori expectation. This result supports the fact that in the long run, the exchange rate enhances the growth of Nigeria's foreign reserves. This

finding is in line with the position of Izekor and Aigbovo (2018) and Oyeniran and Alamu (2020) which held that the exchange rate is not the main depleting factor of Nigeria's foreign reserves. The coefficient of gross domestic product LOG (GDP) shows an inverse and significant relationship with Nigeria's foreign reserves. One percent increase in the gross domestic product leads to a 173 percent decrease in Nigeria's foreign reserves. This is not consistent with the apriori expectation. This result suggests that the performance of the Nigerian economy (GDP) has not contributed to the growth of the country's foreign reserves in the long run during the democratic period. Furthermore, the inverse nature and significance of this variable pointed to the fact that the country's economic activity has not promoted the growth of the Nigerian foreign reserves which is not in conformity with Nwokoye, Adibe, Uzoechina and Aduku (2022) who revealed that GDP has a positive relationship with the Nigerian foreign reserves.

The inflation rate has an inverse and insignificant relationship with Nigeria's foreign reserves such that one percent increase in (INF) leads to 0.2742 percent decrease in Nigeria's foreign reserves. The inverse nature of this variable is consistent with the apriori expectation. This is in agreement with Egbulonu and Akamike (2018) who held that inflation rate had an inverse and insignificant relationship with Nigeria's foreign reserves. The result further reveals that interest rate (INT) has an inverse and significant impact on Nigeria foreign reserves. One percent increase in INT leads to about 221 percent decrease in Nigeria's foreign reserves. This is consistent with the a priori expectation. The inverse nature of this result supports the fact that a well-managed low-interest rate can induce the growth of the country's foreign reserves in the long run during the democratic period. This is in line with the findings of Pina (2017) and Oligbi and Iyoha (2020) who held that interest rates had a negative impact on foreign reserve.

The non-oil export LOG (NOE) from the model one estimation has an inverse and significant impact on Nigeria's foreign reserves such that one percent increase in LOG (NOE) leads to 82 percent decrease in Nigeria's foreign reserves. This is not in conformity with the apriori expectation. This result showed that non-oil exports had not contributed to Nigeria's foreign reserves during the pre-democratic period. This result is not in line with Elijah (2020) whose empirical results showed that non-oil exports contributed positively to Nigeria's foreign reserves. The coefficient of oil export LOG (OEP) has a direct and significant impact on Nigeria's foreign reserves. One percent increase in LOG (OEP) leads to 163 percent increase in Nigeria's foreign reserves. This is consistent with the a priori expectation. This result supports the fact that in the long run, oil export has enhanced the growth performance of Nigeria's foreign reserves despite the decline in oil prices and the pre-democratic period of the country this is consistent with the findings of Elijah (2020) who showed that oil export has a direct and significant impact on Nigeria foreign reserves. The coefficient of crude oil price LOG (OIP) has an inverse and significant impact on Nigeria's foreign reserves. One percent increase in LOG (OIP) leads to 455 percent decrease in Nigeria's foreign reserves. This is consistent with the a priori expectation. This result supports the fact that in the long run, oil price has not induced the growth of Nigeria's foreign reserves during the pre-democratic period in Nigeria. This is not consistent with the findings of Akims, Abdul, and Maimako (2023) who reported that international oil prices had a significant positive relationship with the external reserves of Nigeria.

The regression result of the model one estimation showed an inverse and significant relationship between the exchange rate LOG (EXR) and the foreign reserves in Nigeria. One percent increase in LOG (EXR) leads to a 612 percent decrease in Nigeria's foreign reserves. This is not consistent with the a priori expectation. This result supports the fact that in the long run, the exchange rate has not enhanced the growth of Nigeria's foreign reserves during the pre-democratic period of the country. This finding is not in line with the position of Nkire, Atayi, Ibukun and Olayinka (2021) which held that exchange rate granger cause Nigeria's foreign reserves. This finding is not in line with the result in model two.

The coefficient of gross domestic product LOG (GDP) shows a direct and insignificant relationship with Nigeria's foreign reserves. One percent increase in gross domestic product leads to 12 percent increase in Nigeria's foreign reserves. This is consistent with the a priori expectation. This result suggests that the performance of the Nigerian economy has contributed to the growth of the country's foreign reserves in the long run during the democratic period. Furthermore, the insignificance of this variable points to the fact that the country's economic activity has not significantly promoted the country's foreign reserves. These findings are consistent with Nwokoye, Adibe, Uzoehina and Aduku (2022) who revealed that GDP had a direct impact on Nigeria's foreign reserves.

The inflation rate has a direct but insignificant relationship with Nigeria's foreign reserves such that a one percent increase in (INF) leads to a 0.7 percent increase in Nigeria's foreign reserves. The direct and insignificant nature of this variable is not consistent with the a priori expectation comparing the result with Akpan 2016 who held that inflation had an inverse but significant impact on Nigeria's foreign reserves. Furthermore, the result revealed that interest rate (INT) has an inverse and significant impact on Nigeria's foreign reserves. One percent increase in INT leads to about 1 percent decrease in Nigeria's foreign reserves. This is consistent with the a priori expectation. The inverse nature of this result supports the fact that a well-managed low-interest rate can induce the growth of the country's foreign reserves in the long run during the pre-democratic regime. Furthermore, the inverse and the significance of this variable is as a result of the robust interest rate policy in granting credit facilities to the various economic agents which have a spillover effect on the country reserves. This is not in line with the findings of Oligbi and Iyoha (2020) which held that interest rate is not statistically significant to the growth of the country's foreign reserves.

The non-oil export LOG (NOE) from the model two estimation has an inverse and insignificant effect on Nigeria's foreign reserves such that one percent increase in LOG(NOE) leads to 82 percent decrease in Nigeria's foreign reserves. This conforms to the apriori expectation. This result showed that non-oil exports had not significantly contributed to Nigeria's foreign reserves. This result is not in line with Ekesiobi, Maduka, Onwuteaka and Akamobi (2016) whose empirical results showed that non-oil exports contributed positively to Nigeria's foreign reserves. While the coefficient of oil export LOG (OEP) had a direct and significant impact on the Nigeria's foreign reserves. One per cent increase in LOG (OEP) leads to 2 percent increase in Nigeria's foreign reserves. This is consistent with the a priori expectation. This result supports the fact that in the long run, oil export has enhanced the performance of Nigeria's foreign reserves. This is not

consistent with Ekésiobi, Maduka, Onwuteaka and Akamobi (2016) but in line with Elijah (2020) who showed that oil export has a direct impact on Nigeria's foreign reserves.

Short Run Parsimonious Estimation

To capture the short-run deviations that might have occurred in estimating the long-run co-integration equation, a dynamic parsimonious error correction estimate is presented in

Table 8: Summary of Short Run Parsimonious Estimations

	Model 1 (1981Q1- 1998Q4)	Model 2 (1999Q1-2021Q4)
Independent Variable	Dependent Variable DLOG(FR)	Dependent Variable D(FR)
DLOG(FR(-1))	0.8180* (13.4526)	0.7089* (26.8713)
DLOG(FR(-2))	-0.2953* (-6.0962)	
DLOG(EXR)	-0.4954* (-5.4194)	-1.4233* (-4.8139)
DLOG(EXR(-1))	0.3861* (2.5886)	1.3073* (2.5843)
DLOG(EXR(-2))	-0.2828* (-2.7536)	-0.4953 (-1.9456)
DLOG(GDP)	-0.8136 (-0.9800)	-1.4957* (-3.5170)
DLOG(GDP(-1))	1.8422 (0.9588)	1.2007 (1.3369)
DLOG(GDP(-2))	1.0978 (0.5612)	0.0012 (0.0015)
DLOG(GDP(-3))	-3.1926* (-3.4899)	-1.2614* (-3.7541)
D(INF)	-0.2390* (-5.7445)	-0.0049* (-3.5920)
D(INT)	-0.7261* (-5.8520)	0.0007 (0.3030)
D(INT(-1))	0.4258* (3.0549)	
D(INT(-2))	0.3812* (2.7235)	
D(INT(-3))	0.6992* (5.1172)	
DLOG(NOE)	0.0939* (4.9468)	-0.0192 (-1.3557)
DLOG(NOE(-1))	0.2377 * (9.0091)	0.0206 (1.1501)
DLOG(NOE(-2))	0.1857* (7.9160)	0.0321 (1.9459)
DLOG(NOE(-3))	0.1254* (6.1991)	0.0506* (3.4551)
DLOG(OEP)	-0.2345 (-2.3253)	0.8300* (8.3155)
DLOG(OEP(-1))	-0.4234 * (-2.3120)	-0.4883* (-5.2592)
DLOG(OEP(-2))	-0.1960 (-1.1290)	
DLOG(OEP(-3))	-0.5582* (-5.1566)	
DLOG(OIP)	0.07068 (0.4202)	-0.3779* (-4.8481)
DLOG(OIP(-1))	0.1053 (0.3146)	0.1428 * (3.8917)
DLOG(OIP(-2))	1.0124* (3.1040)	
DLOG(OIP(-3))	0.6538* (2.7679)	
ECM(-1)	-0.2568* (-13.7932)	-0.0857* (-11.4326)
R ²	0.9931	0.9879

R ²	0.889	0.9847
D.W Statistic	2.9168	1.0128

The values in parenthesis are t-statistic

Note: * is significant at 5% level of significance.

Source: Author's Estimation Results, 2024 using Eviews 12

From Table 8, the ECM estimation of model one indicates that the exchange rate LOG (EXR) in the current year has an inverse and significant impact on the Nigerian foreign reserves. This is not consistent with the apriori expectation. It indicates that the depreciation of currency in the short run does not induce an increase in the country's foreign reserves. But the difference in one year's lag period of exchange rate DLOG (EXR(-1)) has a direct and also significant impact on Nigeria's foreign reserves while lag two DLOG(EXR(-2)) has an inverse but significant impact on Nigeria's foreign reserves. This does not conform to the apriori expectation and indicates that continuous depreciation of currency in the short run does not induce Nigeria foreign reserves.

The difference in GDP DLOG (GDP) in the current year has an inverse and insignificant impact on the Nigerian foreign reserves. This is not in line with the aprior expectation, though, not significant points to the fact that most economic activities in Nigeria do not improved the country's foreign reserves in the short run. The difference in lag one and two years of GDP DLOG (GDP(-1)) and DLOG (GDP(-2)) has a direct and insignificant impact on the Nigerian foreign reserves. This is in line with a prior expectation, these findings revealed that continuous increases in economics activities tend to improve Nigeria's foreign reserves in the short run.

Furthermore, the difference in inflation at the current period D(INF) has an inverse and significant impact on the Nigerian foreign reserves in the short run. This is consistent with a priori expectations. The difference in interest rate D(INT)) has an inverse and significant impact on the Nigerian foreign reserves in the short run. This is consistent with a priori expectations. Lag one D(INT(-1)), lag two D(INT(-2)) and lag three D(INT(-3)) had a direct and significant impact on Nigeria's foreign reserves in the short run during the pre-democratic era in Nigeria. This is not consistent with a priori expectation, as it implies that a well-managed interest rate enhances the performance of the country's foreign reserves.

The results also show that the difference in the Nigeria non-oil export DLOG(NOE), lag one-year DLOG(NOE(-1)), lag two-year DLOG(NOE(-2)), and lag three-year DLOG(NOE(-3)) have a direct and significant impact on Nigeria's foreign reserves on the short run. This indicates that earnings from non-oil exports enhanced the country's foreign reserves. The difference in oil export DLOG(OEP) in the current year had an inverse and insignificant impact on Nigeria's foreign reserves at lag one-year DLOG(OEP(-1)), lag two-year DLOG(OEP(-2)) at lag three-year DLOG(OEP(-3)) have an inverse and significant impact on the country foreign reserves in the short run. This indicates that continuous oil export has not induced the performance of the Nigerian foreign reserves in the short run. Furthermore, the difference in oil price DLOG(OIP) and at lag one-year DLOG(OIP(-1)) has a direct but insignificant impact on Nigeria's foreign reserves but at lag two and three DLOG(OIP(-2)) and DLOG(OIP(-3)) have a direct and significant impact on the Nigeria foreign reserves. This is not consistent with the theoretical expectation. This indicates that continuous

increase oil prices favour the country's foreign reserves during undemocratic rule in the country in the short run.

The coefficient of $ECM(-1)$ for model one was negatively and correctly signed and found to be statistically significant at 5% level while the speed of adjustment to the equilibrium was more than 25%. This further confirms the existence of a long-run relationship between the variables. The significance of the ECM is a confirmation of the existence of a long run relationship between the foreign reserves and the explanatory variables. The coefficient of determinations R^2 of estimation of model one is 0.9931 which indicates that about 99 per cent of the total variations in Nigeria foreign reserves are explained by the variations in the explanatory variables. Finally, The Durbin Watson statistic value is 2.0168. This test value shows the absence of positive serial autocorrelation among the independent variables since the DW statistics is greater than 2.

From Table 4.8. The estimation of model two coefficients of the difference exchange rate $LOG(EXR)$ in the current year has an inverse and significant impact on the Nigerian foreign reserves. This is not consistent with the apriori expectation. It indicates that the depreciation of currency in the short run does not induce an increase in the country's foreign reserves during the democratic period. However, the difference in lag one-year $DLOG(EXR(-1))$ has a direct and significant impact on foreign reserves. While lag two $DLOG(EXR(-2))$ exchange rate has an inverse and significant impact on Nigeria's foreign reserves. This does not conform to the apriori expectation and indicates that continuous depreciation of currency in the short run does not induce Nigeria's foreign reserves.

The difference in GDP $DLOG(GDP)$ in the current year has an inverse and significant impact on the Nigerian foreign reserves. This is not in line with a prior expectation, though, significant and this pointed to the fact that most economic activities do not improve the country's foreign reserves in the short run. The difference in lag one and two years of GDP $DLOG(GDP(-1))$ and $DLOG(GDP(-2))$ respectively have direct and insignificant impact on the Nigerian foreign reserves. While lag three of GDP $DLOG(GDP(-3))$ has an inverse but significant impact on Nigeria's foreign reserves. This is not in line with a prior expectation, these findings revealed that continuous increases in economic activities in Nigeria has not induce improved the country foreign reserves in the short run.

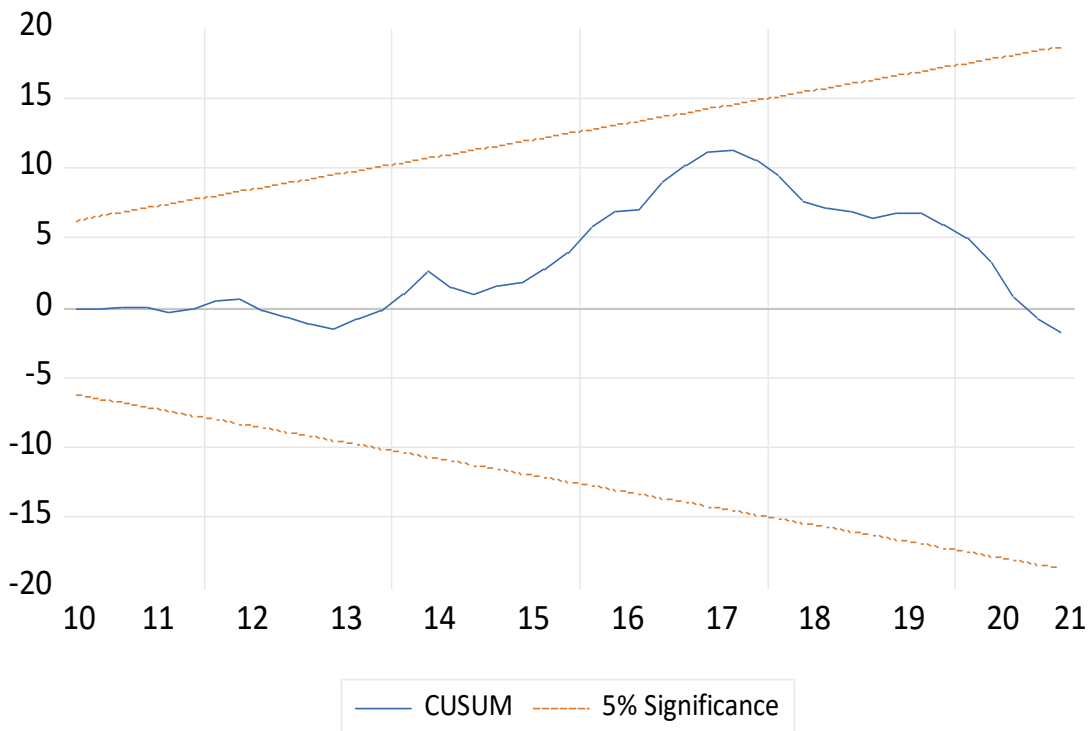
Furthermore, the difference in inflation rate at the current period $D(INF)$ has an inverse and significant impact on the Nigerian foreign reserves in the short run. This is consistent with the apriori expectation. The difference in interest rate $D(INT)$ at the current period has a direct and insignificant impact on Nigeria's foreign reserves in the short run. This is not consistent with a priori expectations. This finding implies that a well-managed interest rate enhances the performance of the country's foreign reserves. The results also showed that the difference in the current Nigeria non-oil export $DLOG(NOEX)$ had an inverse and insignificant impact on Nigeria's foreign reserves in the short run. This indicates that earnings from non-oil exports had not improved the country's foreign reserves during the democratic era. The results also showed that the difference in current Nigeria's non-oil export at lag one $DLOG(NOEX(-1))$, lag two $DLOG(NOEX(-2))$ and lag three $DLOG(NOEX(-3))$ had a direct and significant impact on the Nigeria's foreign reserves in the short run. The fluctuation in the findings is an indication that earning from non-oil exports can enhance the country's foreign reserves. Oil export $DLOG(OEX)$ has a direct and significant impact on the country's foreign reserves but at lag one-year $DLOG(OEX(-1))$ it had an inverse and significant

impact on Nigeria's foreign reserves in the short run. This indicates that continuous oil export has not induced the performance of the Nigerian foreign reserves in the short run during the country's democracy. Furthermore, the Oil price $DLOG(OIP)$ has an inverse and insignificant impact on the country's foreign reserves but at the lag of one-year $DLOG(OIP(-2))$, it had a direct and significant impact on Nigeria's foreign reserves in the short run. This indicates that the stable crude oil price induced the performance of the Nigerian foreign reserves in the short run during the country's democratic era.

The coefficient of $ECM(-1)$ for model two is negative and it was found to be statistically significant at 5% level while the speed of adjustment is 9 percent. This further confirms the existence of a long-run relationship between the variables. The significance of the ECM is a confirmation of the existence of a long-run relationship between the foreign reserves and the explanatory variables. The coefficient of determinations R^2 of estimation of model two is 0.9879 which indicates that about 99 percent of the total variations in Nigeria's foreign reserves are explained by the variations in the explanatory variables during the country's democratic period. Finally, The Durbin Watson statistic value is 1.0128. This test value showed the presence of positive serial autocorrelation among the independent variables since the DW statistics is less than 2.

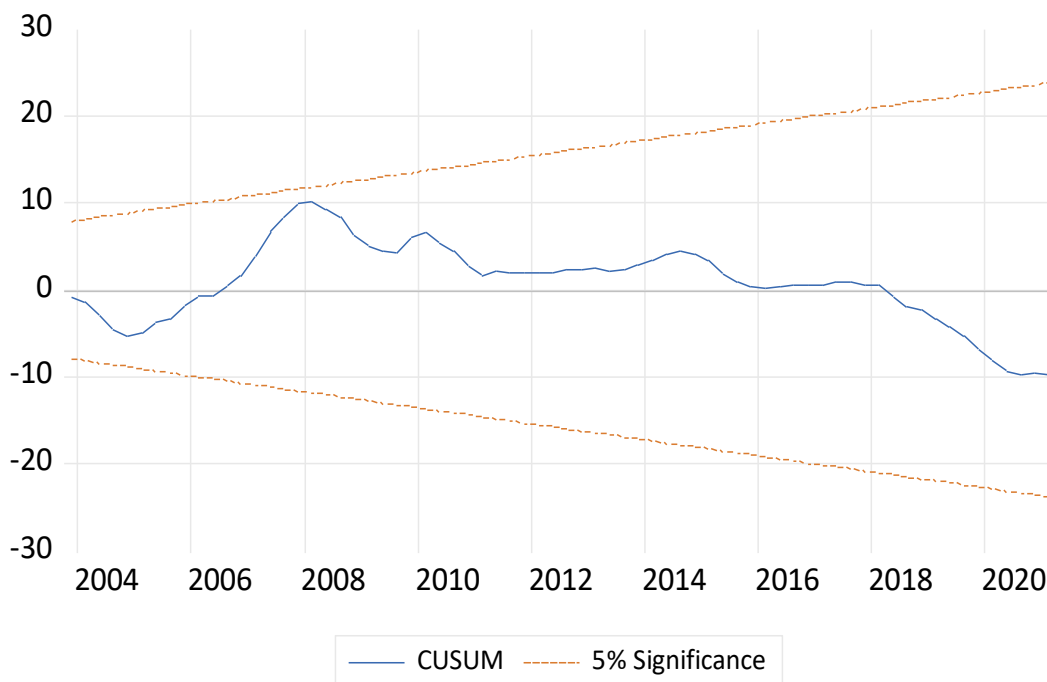
Stability Test

Stability test was also performed using Cumulative Sum (CUSUM) of residual of the ARDL for models one and two as shown in figure's I and II



Source: Author's Estimation Results, 2024 using Eviews 12

Figure I: Plot of Cumulative Sum of Recursive Residual for Model One



Source: Author’s Estimation Results, 2024 using Eviews 12
Figure II: Plot of Cumulative Sum of Recursive Residual for Model Two

The existence of parameter instability is established if the Cumulative Sum of the residual goes outside the area between the critical (dotted bounded) lines. It is estimated at 5 per cent critical level. From Figures I and II it can be inferred that models one and two estimation at 5 percent level of significance have been stable over time.

Chow break Point Test

The structural breakpoint test was done with the research chosen 1999 as the structural break year when the military government handed over power to the democratically elected government in Nigeria. The result of the chow test is shown below in Table 4.9.

Table 9: Chow Breakpoint Test Results

Chow Breakpoint Test: 1999Q1
Null Hypothesis: No breaks at specified breakpoints
Varying regressors: All equation variables
Equation Sample: 1981Q1 2021Q4

F-statistic	5.007743	Prob. F(8,148)	0.0000
Log likelihood ratio	39.28770	Prob. Chi-Square(8)	0.0000
Wald Statistic	40.06194	Prob. Chi-Square(8)	0.0000

Source: Author’s Estimation Results, 2024 using Eviews 12

The investigation was extended further by testing for structural breaks in the period of the sample, the F-statistics has a coefficient of 5.008 with a corresponding probability value of 0.0000. The Log Likelihood coefficient was 39.2877 with a Chi-square value of 0.0000. Similarly, the Wald statistics is 40.0619 with a probability Chi-square value of 0.0000. The result of the F-statistic, Log likelihood ratio and Wald Statistic tests in Table 4.9 above showed the existence of breaks at the specified breakpoints that we cannot accept the null hypothesis of the absence of breakpoints in 1999. The above results showed that foreign reserves did not remain the same after the implementation of the democratic system of government era in Nigeria. This, however, implies that the economic reform package implemented during democracy significantly influence the growth of foreign reserves in Nigeria.

Conclusion and Recommendations

Conclusion

The fear of financial crisis has necessitated countries, both developed and developing to maintain a certain level of foreign reserves to intervene in the foreign exchange markets and reduce foreign exchange volatility while also safeguarding the international value of their currencies. Foreign reserves are the official public sector foreign assets that are readily available to, and controlled by monetary authorities for direct financing of payment imbalances, through intervention in the exchange market to affect the currency or assets of central banks or other monetary authorities held in different reserves countries. Foreign reserves are used by countries to support monetary and foreign exchange policies, among other uses, in order to meet the macroeconomic objectives of safeguarding currency stability and to smoothen the normal functioning of domestic and external payment systems. It also serves as a veritable source of funds for the payment of government expenditures overseas, especially those with known import bills for the authorities to meet.

It is against this backdrop that this study analyzes some selected macroeconomic variable determinants of Nigeria's foreign reserves during the pre-democratic and democratic government in Nigeria. In conclusion, the results from the empirical studies and their analyses revealed that macroeconomic variables of oil price, GDP, interest rate, and inflation rate are the major determinants of Nigeria's foreign reserves during the pre-democratic period while macroeconomic variables of exchange rate, oil export, non-oil export and oil price are the determinants of Nigeria foreign reserves during the country's democracy. Finally, it can be reasonably concluded that macroeconomic variables of exchange rate, GDP, oil and nonoil export, and fluctuation in crude oil price are major determinants of Nigeria's foreign reserves during pre-democratic and democracy periods.

Recommendations

Based on the findings of this study, the following recommendations were made.

- a. The government and monetary authority should initiate macroeconomic policies like lowering interest rate to promote and encourage economic activities through increased investments which will improve Nigeria's GDP to enhance the performance of the country's reserves.

- b. The government and relevant monetary authorities should seek to employ and implement policies such as adequate supply of foreign currency to the foreign exchange market (FOREX) to stabilize the exchange rate given its significant impact on Nigeria's foreign reserves. There is also a need to ensure effective foreign exchange management measures particularly in terms of meeting the high demands for foreign currency for international transactions. Also, the Federal Government of Nigeria should put in place measures that will boost exports and discourage imports especially imports of luxury goods.
- c. Monetary authority should device a single digit or creeping inflation rate that can directly impact on the country's foreign reserves in the future. Monetary authority should also ensure price stability. Effective monetary and fiscal policies should be vigorously pursued to ensure price stability. Price stability will bring a positive effect on foreign reserves in Nigeria
- d. There is need to increase exports (oil and non-oil) which will increase foreign exchange earnings and in turn impact positively on Nigeria's foreign reserves. In addition, such foreign exchange earnings can be invested into other areas of the economy.
- e. Nigeria's monetary authority should ensure a significant interest rate differential among similar interest rates as a way of increasing the country's foreign reserve. If the intention is to increase foreign reserves in the long run, then, monetary policy rate and treasury bill rate instruments should be considered. On the other hand, if the intention is to increase foreign reserves in the short run, then, federal government bond rate should be considered.
- f. Finally, there is an immediate need for the government to diversify the economy with special focus on the non-oil sector. This is expected to effectively open up the sector with foreign exchange earning potential to serve as a buffer to fluctuation in international oil prices.

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