Empirical Analysis of the Effects of Macro-Economic Indicators on Economic Growth in Nigeria: An ARDL Model Approach

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Abstract

In Nigeria, the economic landscape is shaped by a complex interplay of domestic and global forces; navigating it successfully requires a clear understanding of its character. This study examines the dynamic relationships between macroeconomic variables and Gross Domestic Product (GDP) growth in Nigeria, exploring them using the Autoregressive Distributed Lag (ARDL) model and other stability tests on time series data from 1972 to 2022. The Augmented Dickey-Fuller unit root test indicates stationarity of the External Reserve, Exchange Rate, and Export at first difference. Import was stationary at the second difference, while money supply became stationary at the fourth difference. The Auto Correlation Function test, used to identify the correlation coefficient at different lags, indicates that no autocorrelation existed in the model. The ARDL results indicated that GDP, Imports, and External Reserves are significant drivers of economic growth in Nigeria. Over the period under study, Imports provide a short-term positive effect but may pose long-term challenges. The influence of the Exchange Rate appears to be ambivalent: in the short term, it contributes to economic growth; in the long term, however, its effect may become detrimental owing to the resource constraints, which show how important it is to maintain stability through effective policies. The Money Supply and Export variables show influence but negatively affect the economic growth in both the short and long run. On the other hand, the External Reserve showed no influence in the short run but positively affects economic growth in the long run.

Keywords: Macroeconomic, variables, Economic growth, Nigeria

1. Introduction

Over the recent years, Nigeria's economy has experienced significant fluctuations driven by a mix of domestic and international factors. There have been periods of economic growth, but persistent challenges like GDP, External Reserve, Exchange Rate, Import, Export, and money supply pressures continue to hinder the nation's sustained development. The influence of macro-economic variables on economic development in the country has remained grossly insufficient to meet the expanding social, political, and public spending required in the fostering of economic growth. These include a steady growth in each macroeconomic variable such as exchange rate, inflation rate, interest rate, money supply, price stability, balance of payment, unemployment rate, foreign direct investment, etc.

There is a lack of consensus on the effectiveness of these variables in promoting economic growth. Antwi. *et al* (2013) argued that macroeconomic policies are necessary for long-term development, while Gatawa. *et al* (2017) asserted that monetary variables are more effective and dependable than fiscal variables in affecting changes in economic activities. According to Aroriode and Ogunbadejo (2014), shifting macroeconomic policies have an impact on prices, national income, interest rates, and currency rates, all of which have an impact on economic development. Therefore, this paper aims to examine the effect of some macroeconomic instruments on economic growth in Nigeria using annual data from 1972 to 2022 by employing an integrated approach to the analysis of the dynamic relationships between Nigeria's GDP growth and other macroeconomic variables.

2. Literature Review

Aremu and Owoye (2018) used the ARDL model to examine the impact of monetary policy on economic growth in Nigeria. The study found that monetary policy has a positive impact on economic growth in the short run, but the impact is limited in the long run. The study suggested that the effectiveness of monetary policy in promoting economic growth is limited by structural factors such as poor infrastructure, corruption, and political instability.

Adeleye and Omonona (2020) used the ARDL model to examine the impact of macroeconomic variables on economic growth in Nigeria. The study found that macroeconomic variables have a positive impact on economic growth in the short run and long run. The study also found that the impact of monetary policy on economic growth is influenced by external factors such as oil price shocks, global economic conditions, and exchange rate volatility.

Anochie *et al.* (2023) examined the effect of macroeconomic variables (exchange rate, interest rate, and inflation rate) on the productivity of Nigeria's manufacturing sector using secondary data collected from annual time series from 1980-2020. The ordinary least squares, cointegration, and regression statistics were used to analyze the data. The study found that the exchange rate and interest rate have a significant effect on the productivity of Nigeria's manufacturing sector, and that the inflation rate has no significant effect on the productivity of Nigeria's manufacturing sector.

Onyeka and Nduka (2022) examined the effect of exchange rate, interest rate, inflation rate, trade openness, foreign direct investment, and money supply on the Nigeria economy. Findings revealed that inflation rate, trade openness, foreign direct investment, and money supply have a positive and significant effect on real gross domestic product in the short run, while exchange rate and interest rate had an insignificant effect on real gross domestic product in the short run. The study therefore concludes that selected macroeconomic variables have been an effective short-run policy instrument that largely affects Nigeria economy.

Ojo (2022) studied the effect of selected macroeconomic variables on the Nigeria economy. The impact of some selected macroeconomic variables on the Nigeria economy was examined using the gross domestic product (GDP) to represent the economy. At 5% significance level, only the exchange rate and population growth rate significantly affect the Nigeria economy within the study period. Unemployment rate (X1) and crude oil exports (X7) were found to be collinear, likewise the exchange rate (X3) and foreign direct investment in Nigeria (X4). The error terms of the fitted model are positively autocorrelated, while the error term of crude oil exports (X7) is not normally distributed. This paper recommends to future researchers, transformation or an increase in sample sizes of those variables that did not conform to multiple regression assumptions.

Obidike et al., (2022) explored the effect of selected macroeconomic variables on the Nigeria economy. The main objective of the study is to examine the effect of selected macroeconomic variables on the Nigerian economy. Specifically, the study examines the effect of exchange rate, interest rate, inflation rate, trade openness, foreign direct investment, and money supply on the Nigeria economy. Time series data covering 34 years, from 1987 to 2020, were analyzed with econometric techniques, including Descriptive Statistics, Augmented Dickey Fuller Tests for Unit Roots, the Autoregressive Distributed Lag (ARDL), and the Diagnostics Tests to determine the reliability of the models in the study. The Diagnostics analyses carried out are the Normality Test, Serial Correlation, Multicollinearity Test, Heteroskedasticity, and Ramsey RESET Tests. Our findings revealed that inflation rate, trade openness, foreign direct investment and money supply have a positive and significant effect on real gross domestic product in the short run while exchange rate and interest rate had an insignificant effect on real gross domestic product in the short run. The study therefore concludes that selected macroeconomic variables have been an effective short-run policy instrument that largely affects Nigeria economy.

Damieibi et al., (2021) evaluated the effect of macro-economic variables on economic growth in Nigeria. The findings showed that inflation rate, unemployment rate, exchange rate, and interest rate had no significant effect on economic growth, but the combination of these variables had a negative effect on economic growth at 5 percent level of significance during the period of the study. A bound test was also conducted to check the co-integration so that the error of the short run could be corrected at the long run, but the result still showed no relationship.

Olokoyo et al., (2021) examined the macroeconomic determinants of bank performance in Nigeria. The results reveal that economic growth, trade, and interest rate stand out as the important macroeconomic predictors of bank performance in Nigeria. We find that growth and trade promote bank performance, whereas high interest rate impedes bank performance.

Jabaru and Jimoh (2020) used unemployment rate, population growth rate, crude oil exports, exchange rate, and foreign direct investment to examine the effect of macroeconomics variables on economic growth in Nigeria. The gross domestic product (GDP) was used as a proxy to economic growth. The study shows that the exchange rate and population growth rate significantly affect the Nigeria economy within the study periods. Unemployment

rate and crude oil exports were found to be collinear, likewise the exchange rate, and foreign direct investment in Nigeria.

Holden and Sparman (2013) studied macroeconomic determinants of economic growth in Nigeria. The study examines the macroeconomic determinants of economic growth in Nigeria measured by real gross domestic product (RGDP). The Augmented Dickey-Fuller (ADF) test was used for the unit root test, and Johansen's co-integration test was also conducted to establish short and long-run relationships between economic growth and its macroeconomic determinants. The result shows six co-integrating equations which establish the existence of long-run relationship among the variables. The Ordinary Least Squares statistical technique was used to assess the degree of influence the variables have on each other. The results show that gross fixed capital formation, foreign direct investment, and total government expenditure are the main determinants of Nigeria's economic output under a stable inflationary rate.

Nwagu (2023) determined the effect that specific macroeconomic factors have on the amount of foreign direct investment (FDI) flowing into Nigeria. The ex post facto research design was adopted, utilized the exchange rate, inflation rate, monetary policy rate (MPR), and gross domestic product growth (GDP) as the macroeconomic variables. The quantity of inflow between 1986 and 2020 was made up of FDI (dependent variable). Because the model variables were integrated in a mixed order of both level and first difference, the autoregressive distributed lag (ARDL) technique was used. The selected macroeconomic variables and FDI were bound by a long-run connection, according to the results of the ARDL bounds test for cointegration. The calculated short-run coefficients showed that GDP growth rate and monetary policy rate were the primary macroeconomic variables that considerably increased FDI inflow in Nigeria, whereas inflation and exchange rate were the major macroeconomic variables that significantly decreased FDI inflow. In the long term, the GDP growth rate and the exchange rate had a beneficial influence on FDI influx, whereas the monetary policy rate had a large negative effect. According to these empirical findings, it is advised that Nigeria's monetary authorities should support strong GDP growth, exchange rate stability, and efficient monetary policy rates in order to draw FDI into the country and create efficient foreign exchange policies that will attract foreign investors

Adeleke, and Sanda, (2018) examined the impact of macroeconomic variables on economic growth in Nigeria using a Vector Error Correction Model (VECM). The study assessed the effects of interest rates, money supply, and exchange rates on economic growth. The findings indicated a long-run relationship between monetary policy instruments and economic growth, suggesting that changes in these variables have a persistent effect on Nigeria's economic performance.

Adaramola and Dada (2020) studied the impact of inflation on economic growth, evidence from Nigeria. The study employs the autoregressive distributed lag on the selected variables, i.e., real GDP, inflation rate, interest rate, exchange rate, degree of the economy's openness, money supply, and government consumption expenditures for the period 1980–2018. The study findings indicate that inflation and real exchange rate exert a significant negative impact on economic growth, while interest rate and money supply indicate a positive and significant impact on economic growth. Other variables in the model depict no influence on the economic growth of Nigeria. The causality result shows the unidirectional relationships between interest rate, exchange rate, government consumption expenditures and gross domestic product. However, inflation and the degree of openness show no causal relationship with gross domestic product. As a result, the study recommends that a more pragmatic effort is needed by the monetary authorities to target the inflation vigorously to prevent its adverse effects by ensuring a tolerable rate that would stimulate the economic growth of Nigeria.

Ehigiamusoe and Lean (2017) examined the effects of macroeconomic variables and investment rate on economic development in Nigeria for the 1980-2014. Findings in the study shows that fiscal deficit relative to GDP and real exchange rate have positive impact on economic development, while inflation rate and government debt relative to GDP have negative impact on economic development. However, real interest rate has no statistically significant impact on economic development in Nigeria.

According to Udeh (2019), money supply has a significant positive impact on economic growth in Nigeria. On the other hand, Anyanwu and Ezihe (2018) found that money supply has a negative impact on economic growth in Nigeria. Adebiyi et al. (2017) also found a positive and significant relationship between the exchange rate and economic growth in Nigeria. Similarly, Oluwasegun and Oyinlola (2017) found that the exchange rate has a positive impact on economic growth in Nigeria. However, some studies have found a negative relationship between the exchange rate and economic growth in Nigeria. For example, Onyeisi et al. (2018) found that the

exchange rate has a negative and significant impact on economic growth in Nigeria.   Generally, these studies highlighted the importance of macroeconomic variables in driving economic growth in Nigeria. While the specific methodologies and variables examined may vary, the overall findings suggest a significant relationship between macroeconomic variables and economic growth, emphasizing the need for effective measures to achieve sustainable economic growth in Nigeria.

3. Data Presentation

The analysis in this study utilizes time series data of macroeconomic variables and economic growth in Nigeria covering the period from 1972 to 2022, sourced from the CBN Statistical Bulletin and Annual Bureau of Statistics Bulletin of Different Editions. The variables include:

i.   Dependent Variable: Gross Domestic Product (GDP)

ii. Independent Variables: a. Import (IMPt), b. Export (EXPt), c. External Reserve (EXTRt), d. Exchange rate (EXRt), and e. Money supply (MSLt)

Table 1: Descriptive Statistics

	Gross Domestic Product	*External Reserve*	*Exchange Rate*	*Import*	*Export*	*Money Supply*
Count	51	51	51	51	51	51
Average	160.347	14895.3	80.9502	22.0257	29.3196	5.55983E6
Standard deviation	165.487	16852.2	103.117	25.1402	34.7914	9.4761E6
Coeff. of variation	103.205%	113.138%	127.383%	114.14%	118.662 %	170.439%
Minimum	9.18	156.58	0.55	1.25	0.99	978.2
Maximum	546.68	53000.4	396.73	88.74	143.7	3.79576E7
Range	537.5	52843.8	396.18	87.49	142.71	3.79566E7
Stnd. Skewness	3.05085	2.75288	4.05901	3.74269	4.85172	5.23113
Stnd. kurtosis	-0.665722	-1.04033	2.13442	0.54874	3.18867	3.4635

Table 1 depicts the results of the descriptive statistics of the study. It indicates that the GDP is relatively low (160.35) compared to the other variables, with the External Reserve and Money Supply. Standard deviations indicate considerable variability, particularly in Money Supply and External Reserve, with coefficients of variation ranging from 103.21% for GDP to 170.44% for Money Supply, reflecting substantial relative variability in these measures. The data also shows that all variables, except GDP and External Reserve, exhibit positive skewness, indicating that their distributions have long right tails. Standard kurtosis values suggest that the distributions of Exchange Rate, Import, Export, and Money Supply are leptokurtic, meaning they are more peaked with heavier tails compared to a normal distribution. In contrast, GDP and External Reserve have platykurtic distributions, characterized by a flatter peak and lighter tails. These insights reveal varying degrees of dispersion and distribution characteristics across the economic variables studied.

3.1 Unit Root Test

The stationarity properties of the variables were examined. According to Gujarati (2004), a stationary test is carried out to ascertain the order of co-integration of the variables under study before the short-run analysis. This study employs the Augmented Dickey-Fuller (ADF) statistical method to determine whether the time series exhibits a unit root. The results of these tests indicate whether the variables are integrated of order zero (I(0)) or order one (I(1)).

Table 2: Unit Root Test

		GDP	Import	Export	External Reserve	Exchange Rate	Money Supply
Augmented Dickey-Fuller test statistic		-4.9766	-3.9360	-6.9200	-5.9493	-4.5134	-2.3558
Test critical values:	1% level	-3.5713	-3.6055	-3.5713	-3.5744	-3.5713	-3.6055
	5% level	-2.9224	-2.9369	-2.9224	-2.9237	-2.9224	-2.9369
	10% level	-2.5992	-2.6068	-2.5992	-2.5999	-2.5992	-2.6068
	Level	I(1)	I(2)	I(1)	I(1)	I(1)	I(2)
	Prob.*	0.0002	0.0042	0.0000	0.0000	0.0007	0.1604

Table 2 showed that all data are stationary at first difference except Import data, which is stationary at the second difference, and the money supply data did not achieve stationarity even after the second difference.

3.2 Model Specification

The Autoregressive Distributed Lag (ARDL) model, which allows for both long-run and short-run dynamics to be captured in a single framework, is employed to examine the relationship between the macroeconomic variables and economic growth in Nigeria. The general form of the model is as follows:

$$\Delta Y_t = \alpha + \beta_1 \Delta Y_{t-1} + \beta_2 \Delta Y_{t-1} + \beta_3 \Delta Y_{t-1} + \ldots + \beta_n \Delta X_{t-n} + \varepsilon_t \qquad 1$$

Where ΔY_t represents the change in real GDP at time t. ΔX_t represents the change in the macroeconomic variable at time t. α is a constant term. β_1 to β_n are the coefficients of the lagged dependent variable and independent variables. ε_t is the error term.

3.3 Estimation of the ARDL Model

According to Erdoğdu and Çïçek (2017), the Autoregressive Distributed Lag (ARDL) models are the standard ordinary least squares regressions that incorporate the lagged value of both the dependent variable and independent variables as regressors. Once the stationarity properties of the variables are determined, the ARDL model can be estimated using appropriate techniques such as Ordinary Least Squares (OLS) or Maximum Likelihood (ML) estimation. The estimated coefficients provide information about the short-run and long-run relationships between the variables.

Table 3: Estimated Coefficient of the ARDL Model

Dependent Variable:

GROSS_DOMESTIC_PRODUCT Method: ARDL

Model selection method: Akaike Info. Criterion (AIC)

Dynamic regressors (4 lags, automatic): IMPORT MONEY_SUPPLY EXTERNAL_RESERVE EXCHANGE_RATE EXPORT

Fixed regressors: C

Selected Model: ARDL(1, 4, 0, 0, 4, 4)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
GROSS_DOMESTIC_PRODUCT(-1)	0.493891	0.136271	3.624331	0.0011
IMPORT	0.902599	0.400935	2.251234	0.0324
IMPORT(-1)	1.137386	0.822673	1.382550	0.1777
IMPORT(-2)	-0.628042	0.806918	0.778322	0.4429
IMPORT(-3)	1.328616	0.953191	1.393862	0.1743
IMPORT(-4)	2.925809	0.889802	3.288158	0.0027
MONEY_SUPPLY	-2.40E-06	2.21E-06	1.085677	0.2869
EXTERNAL_RESERVE	0.000299	0.000652	0.458543	0.6501
EXCHANGE_RATE	-0.240429	0.219250	1.096602	0.2822
EXCHANGE_RATE(-1)	0.310391	0.322099	0.963651	0.3435
EXCHANGE_RATE(-2)	-0.413012	0.392600	1.051990	0.3018
EXCHANGE_RATE(-3)	0.115054	0.403676	0.285015	0.7777
EXCHANGE_RATE(-4)	0.577494	0.365786	1.578778	0.1256
EXPORT	-0.064182	0.446063	0.143885	0.8866
EXPORT(-1)	-0.122937	0.460092	0.267201	0.7913
EXPORT(-2)	1.017935	0.394396	2.580994	0.0154
EXPORT(-3)	-1.203659	0.392534	3.066383	0.0048
EXPORT(-4)	-0.962374	0.307291	3.131804	0.0040
C	4.819366	6.466478	0.745285	0.4623
R-squared	0.992849	Mean dependent var		172.9477
Adjusted R-squared	0.988253	S.D. dependent var		166.4287
S.E. of regression	18.03848	Akaike info criterion		8.913459
Sum squared residual	9110.830	Schwarz criterion		9.661391
Log likelihood	-190.4663	Hannan-Quinn criterion.		9.194911
F-statistic	215.9857	Durbin-Watson stat		2.003370
Prob(F-statistic)	0.000000			

Table 3 is the estimated coefficient of the ARDL Model. It provides a summary of the model, including the dependent variable (GDP), the method used (ARDL), the sample period, the number of observations, and the model's goodness-of-fit measures. The R-squared value indicates that approximately 99.28% of the model's variation in the dependent variable is explained. The adjusted R-squared value of 98.82% accounts for the

number of variables and observations. The F-statistic and p-value of 0.0000 show that the model is significant.

3.4 Short Run and Long Run Effects

Based on the estimated coefficients, the short-run and long-run effects of macroeconomic variables on economic growth can be analyzed. The short-run effects refer to the immediate impact of a change in the macroeconomic variables on economic growth, while the long-run effects capture the sustained impact over time.

Table 4: Short Run Effect

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
IMPORT	0.902599	0.400935	2.251234	0.0324
MONEY_SUPPLY	-2.40E-06	2.21E-06	-1.085677	0.2869
EXTERNAL_RESERVE	0.000299	0.000652	0.458543	0.6501
EXPORT	-0.064182	0.446063	-0.143885	0.8866
EXCHANGE_RATE	-0.240429	0.219250	-1.096602	0.2822
C	4.819366	6.466478	0.745285	0.4623

The short-run test output provides insights into the immediate impact of the independent variables on the dependent variable in an Autoregressive Distributed Lag (ARDL) model. The short-run test p-values for the coefficients of the independent variables show that if the p-value is below the significance level, then you can conclude that the short-run coefficient is statistically significant. This indicates that the independent variable has an immediate impact on the dependent variable. However, if the p-value is above the significance level, then you fail to reject the null hypothesis of no short-run impact. This suggests that the independent variable does not have a significant immediate effect on the dependent variable. From Table 4, we can see that only the import has a p-value less than 0.05. A positive coefficient implies that an increase in the independent variable leads to an increase in the dependent variable in the short run. A negative coefficient indicates that an increase in the independent variable leads to a decrease in the dependent variable in the short run. Again, the magnitude of the coefficient indicates the strength of the immediate impact.

Table 5a: Co-integration and Long Run Effect

ARDL Cointegrating And Long Run Form

Dependent Variable: GROSS_DOMESTIC_PRODUCT

Selected Model: ARDL(1, 4, 0, 0, 4, 4)

Cointegrating Form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(IMPORT)	0.902599	0.400935	2.251234	0.0324
D(IMPORT(-1))	0.628042	0.806918	0.778322	0.4429
D(IMPORT(-2))	-1.328616	0.953191	-1.393862	0.1743
D(IMPORT(-3))	-2.925809	0.889802	-3.288158	0.0027
D(MONEY_SUPPLY)	-0.000002	0.000002	-1.085677	0.2869
D(EXTERNAL_RESERVE)	0.000299	0.000652	0.458543	0.6501
D(EXCHANGE_RATE)	-0.240429	0.219250	-1.096602	0.2822
D(EXCHANGE_RATE(-1))	0.413012	0.392600	1.051990	0.3018
D(EXCHANGE_RATE(-2))	-0.115054	0.403676	-0.285015	0.7777
D(EXCHANGE_RATE(-3))	-0.577494	0.365786	-1.578778	0.1256
D(EXPORT)	-0.064182	0.446063	-0.143885	0.8866
D(EXPORT(-1))	-1.017935	0.394396	-2.580994	0.0154
D(EXPORT(-2))	1.203659	0.392534	3.066383	0.0048
D(EXPORT(-3))	0.962374	0.307291	3.131804	0.0040
CointEq(-1)	-0.506109	0.136271	-3.713998	0.0009

Cointeq = GROSS_DOMESTIC_PRODUCT – (11.1959*IMPORT -0.0000
  *MONEY_SUPPLY + 0.0006*EXTERNAL_RESERVE + 0.6906
  *EXCHANGE_RATE -2.6382*EXPORT + 9.5224)

Table 5b: Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
IMPORT	11.195933	3.518438	3.182074	0.0036
MONEY_SUPPLY	-0.000005	0.000005	-1.041861	0.3064
EXTERNAL_RESERVE	0.000591	0.001235	0.478731	0.6358
EXCHANGE_RATE	0.690557	0.404753	1.706121	0.0991
EXPORT	-2.638198	1.696793	-1.554814	0.1312
C	9.522379	12.211853	0.779765	0.4421

Table 5a is the result of co-integration. The co-integration test determines whether a long-term relationship exists between the variables in the model. Since the test statistic exceeds the critical value at 5% and the p-value of CointEq(-1) = 0.0009 is below the significance level, then we can conclude that there is evidence of co-integration. This suggests that the variables are integrated of the same order and have a long-run equilibrium relationship.

Table 5b also presents the ARDL model results for the long-run model. The positive coefficient of Imports indicates a positive and statistically insignificant effect on the real gross domestic product in Nigeria. By implication, if Imports rise by a single digit, the real gross domestic product will decrease by 1% in the long run, all things being equal. The positive coefficient of Money Supply indicates a negative and statistically significant effect on the real gross domestic product in Nigeria; this means that when Money Supply increases by N1, the real

gross domestic product in Nigeria will decrease by 0.0005%. The positive coefficient of the External Reserve and Exchange rate shows a positive and statistically significant effect on the real gross domestic product in Nigeria. This means that when the External Reserve and Exchange rate increase by N1 respectively, the real gross domestic product in Nigeria will increase by N0.006 and N69 respectively. Exports show a negative and statistically significant effect on the real gross domestic product in Nigeria.

3.5 Diagnostic Test

To ensure the validity and reliability of the estimated ARDL model, various diagnostic tests can be conducted. These tests include assessing the model's goodness of fit, checking for autocorrelation, heteroscedasticity, and normality of residuals. The results of these tests provide insights into the robustness of the estimated model.

Table 6: Autocorrelation Test

S/N	AC	PAC	Q-Stat	Prob*
1	-0.037	-0.037	0.0695	0.792
2	-0.006	-0.007	0.0712	0.965
3	-0.009	-0.010	0.0758	0.995
4	-0.031	-0.032	0.1273	0.998
5	-0.004	-0.006	0.1281	1.000
6	-0.042	-0.043	0.2294	1.000
7	-0.026	-0.030	0.2673	1.000
8	-0.013	-0.017	0.2776	1.000
9	0.025	0.022	0.3147	1.000
10	-0.017	-0.019	0.3334	1.000
11	-0.014	-0.018	0.3456	1.000
12	0.012	0.008	0.3556	1.000
13	-0.019	-0.021	0.3811	1.000
14	-0.006	-0.010	0.3832	1.000
15	-0.017	-0.018	0.4034	1.000
16	0.016	0.014	0.4221	1.000

*Probabilities may not be valid for this equation specification.

The correlogram output from Table 6 provides information on the autocorrelation in the data. The ACF plot shows the correlation coefficients at different lags, indicating positive or negative relationships that persist over time. The Autocorrelation Test is important because if autocorrelation is present in the model, it can lead to inefficient parameter estimates, inflated standard errors, and unreliable hypothesis tests.

4. Discussion of the Result

The result of the study shed light on the short-run and long-run effects of various macroeconomic variables on economic growth. The p-value of CointEq(-1) = 0.0009 is below the significance level, which leads us to conclude that there is evidence of co-integration. This suggests that the variables are integrated of the same order and have a long-run equilibrium relationship. The findings also show that only import has a p-value less than 0.05. This suggests that the independent variable "import" has a significant immediate effect on the dependent variable in the short run, while other independent variables do not have an immediate significant impact on the dependent variable in the short run. Based on the model with the least AIC, the ARDL(1, 4, 0, 0, 4, 4) model was adjudged the best model for our data. The findings indicate that money supply (MS) has a Negative and statistically significant long-run effect on economic growth, suggesting that increasing the money supply cannot stimulate economic growth in Nigeria. Exports exhibit a negative and statistically significant long-run effects on economic growth, implying that higher exports may hinder economic growth in Nigeria, as there is no mechanism in place to support such growth. The Exchange rate (EXR) shows a mixed effect on economic growth, with the direction and significance depending on the specific model specification and time period considered. The External Reserve has a positive and statistically significant long-run effect on economic growth, implying that a high External Reserve can positively impact economic growth in Nigeria.

5. Conclusions

This study examines the relationship between macroeconomic variables and economic growth in Nigeria using the Autoregressive Distributed Lag (ARDL) model. Through our empirical analysis, only the independent variable "import" has a significant immediate effect on the dependent variable in the short run. In contrast, other independent variables do not have an immediate significant impact on the dependent variable in the short run. In contrast, there is a stable long-run relationship between macroeconomic variables and economic growth, suggesting the presence of a sustainable equilibrium. This highlights the potential for macroeconomic variables to play a crucial role in promoting sustained economic development in Nigeria. The study also provides insights for policymakers in Nigeria to design and implement effective measures for macroeconomic variables to stimulate economic growth. Policymakers must consider the dynamics of macroeconomic variables and their potential impact on economic growth when formulating strategies for macroeconomic stability and sustainable development.

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