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An Analysis of the Effect of Macroeconomics Variables on Economic Growth in Nigeria

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ABSTRACT: The prime objective of any country in the world is to achieve 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. The study the examines the long-run asymmetric effect of macroeconomics variables on economic growth in Nigeria using quartly data from 2000Q1 to 2021Q4. The study employed nonlinear ARDL model. The Zivot-Andrew unit root test indicates that real gross domestic product, interest rate, exchange rate and crude oil price are integrated of order one in other words are stationary at first difference while inflation rate is integrated of order zero in other word it is stationary at level. The results of nonlinear ARDL model show that interest rate has a positive effect on the real gross domestic product in Nigeria. The variable real exchange rate has a negative effect on the real gross domestic product in Nigeria, inflation rate has a negative effect on the real gross domestic product in Nigeria and crude oil price has a positive effect on the real gross domestic product in Nigeria. Therefore, the current study concludes that there exist an asymmetry effect in the long-run of macroeconomics variables such as interest rate, exchange rate, inflation rate, and crude oil price in the Nigerian economy. The study recommends that Nigerian government should endeavor to bring macroeconomics variables such as interest rate, exchange rate, inflation rate and crude oil price under control in order to boast the economic growth by managing interest rate to its lowest level, stabilizing forex market in a way that the Nigerian currency will not depreciate and increase the production of crude oil in order to the demand.

KEYWORDS: Macroeconomics variables, Economic growth, JEL Classification: E00, O40

1 INTRODUCTION

The prime objective of any country in the world is to achieve 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. Macroeconomic variables such as inflation rate, unemployment rate, exchange rate and interest rate affect the economy directly and/or indirectly. These variables need to be managed in order to achieve the goal of every economy. The goal of every economy is to ensure full employment of resources, exchange rate stability, price stability, maintenance of economic growth and development, balance of payment equilibrium, maintenance of external reserve etc (Ihenetu, 2021). Nigeria's government uses fiscal and monetary policies, such as altering tax rates, expenditure, and the availability of credit or money for the economy, to try and affect how well the country's economy is doing. 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. There have been significant changes in the macroeconomic variables. Nigeria had a decrease in inflation from 18% in 2005 to approximately 12% in 2012, 11.92% in 2014, and 8.5% in 2013. Nonetheless, Nigeria's interest rate, which can affect the amount of investment and credit availability in the nation, averaged roughly 10.24% between 2010 and 2015 after hitting a record low of 6% in July 2009 (Trading Economics, 2016). The country saw an influx of foreign capital due to the hike in interest rates. The prolonged reliance on foreign funding has been identified as one of the primary factors contributing to the depreciation of the Naira, the country's currency. Inflation rose as a result of the import reliance on machinery, consumables, and spare parts. The unemployment rate rose from 7.8% in 2014 to 9.0% in due to a lack of synergy between the rate of inflation and borrowing costs indicated, as well as the value of the local currency (Trading Economics, 2016). Due to the unpredictability of the nation's economic climate, numerous corporations across a range of industries have undertaken large layoffs, which has resulted in an increase in the unemployment rate. Variations in the interest rate, inflation, unemployment, and currency rates have an effect on the environmental conditions that affect households, businesses, and the government. The consequence of Nigeria's increased reliance on imports and foreign money was a reduction in household purchasing power due to high commodity prices, which in turn affected the ability of households to purchase

products and services. Increasing interest rates and its accompanying features discouraged spending, which had an influence on the level of earnings of the enterprises as profit declined and resulted in a mass layoff of workers in 2015. This also had an impact on the level of savings of the domestic household. The Central Bank of Nigeria (CBN), which oversees monetary policy, raised interest rates in an attempt to reduce inflation by limiting the amount of money that the financial sector could lend, which had a detrimental effect on growth. In a similar line, because Nigeria's economy depends heavily on imports, rising interest rates have not been able to contain inflation. The monetary authority's attempts to boost the value of the Naira by raising interest rates haven't been very successful in drawing foreign capital into the Nigerian economy. The main objective of the study is to examine the effect of long run long-run asymmetric of macroeconomics variables on Economic growth in Nigeria using quartly data from 2000Q1 to 2021Q4. The rest of the paper is organized as follows: literature review which is the second part of the paper, methodology which discussed the model employed in the study and is the third part of the paper, part four of the paper is presentation and analysis of the empirical findings and the part five discussed the conclusion and recommendations of the study.

2 LITERATURE REVIEW

2.1 Conceptual Review

Macro-economic Variables

According to Adekunle, Alalade, and Okulenu (2016), macroeconomic variables are key indications or markers of the present economic developments. Keynes recognized the following as important macroeconomic variables: money supply, interest rate, GDP, exchange rate (EXR), and inflation. These variables all have an impact on the overall state of the economy. The most comprehensive quantitative measure of a country's overall activity is its gross domestic product, or GDP. Keynes contended that only a recurrent, large rise in government expenditure would be necessary to support investment at full employment levels since the market cannot produce enough savings, or capital, on its own. Like all professionals, the government needs to research, evaluate, and comprehend the key factors influencing the macroeconomy's current behavior in order to manage it effectively. The government must therefore comprehend the factors driving economic growth, the causes of recession and inflation, the timing of these trends, and the combination of policies that will best address these issues. It represents the monetary worth of all products and services produced, over a given length of time, particularly a year, inside a country's borders (Aroriode & Ogunbadejo, 2014). What matters is that the production happens within the nation's borders. The rate at which one country's currency is exchanged for that of another is known as the exchange rate. The purchasing power of a country with a lower exchange rate is impacted by the higher exchange rate of that nation. For instance, if the naira is worth less than the US dollar, Americans will have more purchasing power than Nigerians. Interest rates are what you pay when you borrow money. Rising interest rates are an indication of a growing economy, and they indicate the beginning of inflation when already high interest rates start to rise even quicker and higher. In the event that aggregate demand rises in an economy without matching increases in aggregate supply, inflation may develop. Government initiatives aimed at reducing economic fluctuations through monetary policy, fiscal policy, and supply-side economics have an impact on macroeconomic variables (Hunjra, Chani, Javed, Nacem, & Ijaz, 2014).

2.2 Empirical literature

Anochie, Okereafor, and Bashir (2023) examined the effect of macroeconomic variables (exchange rate, interest rate and inflation rate) on 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 analyse the data. The study found that exchange rate and interest rate has significant effect on the productivity of Nigeria’s manufacturing sector; and that 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 in economy. Findings revealed that inflation rate, trade openness, foreign direct investment and money supply have positive and significant effect on real gross domestic product in the short run while exchange rate and interest rate had 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 in economy.

Damieibi, Ihenetu, and Amadi (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 negative effect on economic growth at 5 percent level of significance during the period of the study. 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, Oyakhilome Abiola and Chika (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 as against high interest rate which impedes bank performance.

Olalekan and Kamoru (2021) examined the impact of some selected macroeconomic variables on the Nigeria economy for a period of thirty – eight years (1980 – 2017). The study shows that exchange rate and population growth rate significantly affects the Nigeria

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

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 proxy to economic growth. The study shows that exchange rate and population growth rate are significantly affects the Nigeria economy within the study periods. Unemployment rate and crude oil exports were found to be collinear, likewise exchange rate, and foreign direct investment in Nigeria.

Etale and Imbazi (2020) examined the influence of selected microeconomic variables (MEVs) on economic growth in Nigeria between 1999 and 2018. The study employed the following variables; gross domestic product, Interest rate, Exchange rate, Inflation and Broad Money Supply. Findings in the study shows that Interest rate, Exchange rate, and Inflation are insignificant effect on the economic growth only money supply indicated significant effect economic growth. The study therefore concluded that macroeconomic decision is not enough to bring about economic growth.

Danladi, Nneka, Ayokanmi and Rotimi (2019) examined the effect of selected macroeconomic variables on stock performance in Nigeria for the periods of 1983 to 2018 using Autoregressive Distributed Lag technique to analyse the data. The study proxy stock performance with total market capitalisation while selected macroeconomic determinants used are foreign workers remittance, foreign portfolio, broad money supply and Gross Domestic Product growth rate. The study found out that foreign workers remittance, foreign portfolio and broad money supply have significant positive effect on stock performance while Gross Domestic Product growth rate has an insignificant effect on stock performances.

Emenuga (2019) examined the impact of macroeconomic variables on foreign direct investment flow in Nigeria from 1986 to 2017, variables used in the study includes; foreign direct investment, gross domestic product, government size, exchange rate, inflation rate and interest rate. The finding of the ARDL revealed that exchange rate, interest rate, gross domestic product and government size were all significantly related to foreign direct investment in Nigeria. The study concluded that there exists a long-run relationship between macro-economic variables and foreign direct investment in Nigeria.

Solomon, Babatunde, and Olufemi (2018) examined the relative significance of macroeconomic factors (inflation rate, interest rate, exchange rate and unemployment rate) on current national income using Johansen Cointegration test. The result findings revealed that inflation contributes negatively to economic growth. Interest rate, exchange rate and unemployment impact economic growth positively. The entire explanatory variables have no short-run effect.

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.

Mohammed and Ehikioya (2015) examined the macroeconomics determinants of economic growth in Nigeria from 1986 to 2012 using Ordinary Least Square statistical technique. The results show that gross fixed capital formation, foreign direct investment and total government expenditure are the main determinants of Nigeria economic output under a stable inflationary rate. The study recommended that there is need for government to consciously develop the business environment by provision of necessary infrastructure, which will lower the cost of doing business in Nigeria.

Akanbi (2015) employed Vector Autoregressive (VAR) approach and Vector Error Correction Model (VECM) to examine the macro-economic variables on unemployment rate in Nigeria. The result revealed that positive shocks to Gross Domestic Product (GDP) increased unemployment rate, which is not consistent with received economic theory. Shocks to Foreign Direct Investment (FDI), Inflation Rate (INF) and Money Supply (M2) reduce unemployment as expected, while shocks to Lending Rate (LR) reduces unemployment rate contrary to received economic theory. The Forecast Error Variance Decomposition (FEVD) showed that shocks to unemployment rate remain the predominant source of variation in the forecast of unemployment rate. Inflation rate is linearly informative in forecasting unemployment rate in Nigeria as shown by the result of the Granger causality test.

Obayori, Nwogwugwu, and Omozuawo (2015) examined Macroeconomic policies and economic growth in Nigeria was determined through error correction modeling techniques. The result shows that monetary rather than fiscal policy exerts a great positive impact on economic growth in Nigeria. Also, the granger causality results show bidirectional causation between GDP, total government expenditure and broad money supply. But a unidirectional causation between total government expenditure and broad money supply.

3 METHODOLOGY

3.1 model specification

The model of the study is adopted from the work of Anochie et al (2023) and Onyeka et al (2022), the model is shown below

$$RGDP = F(INTR, EXRATE, INFL, TOP, MS) \quad \text{.....(3.1)}$$

The model is modified by including crude oil prices and is specified as

$$RGDP = F(INTR, EXRATE, INFL, COILP) \quad \text{.....(3.2)}$$

Where $RGDP$ is the real gross domestic product proxy to economic growth which is the dependent variable in the model, $COILP$ oil price measured as crude oil price and it is expected to have a positive sign with the dependent variable, $EXRATE$ is the real exchange rate measured as official exchange rate, $INTR$ is the interest rate measured as MPC rate and $INFL$ is the inflation rate measured as consumer price percentage.

3.2 Non-linear Auto Regressive Distributed Lag (NARDL) Model

Shin et al. (2014) have presented the Non-linear Autoregressive Lagged (NARDL) Model, which incorporates asymmetric interactions in both the short and long term. Furthermore, the model incorporates the asymmetry in the dynamic modification. Additionally, according to Ibrahim (2015), the model can be applied in both the combined order of level and the first difference. Economic factors are commonly used to practice asymmetries. Since nonlinearity is frequently noticed in the social sciences, asymmetry is actually a fundamental aspect of the human experience (Shin et al., 2014).

$$\Delta y_t = \mu + \sum_{i=1}^{n-1} a_i \Delta y_{t-i}\_p + \sum_{i=1}^{n-1} a_i \Delta y_{t-i}\_N + \sum_{i=0}^{m-1} \Upsilon_i \Delta x_{t-i}\_p + \sum_{i=0}^{m-1} \Upsilon_i \Delta x_{t-i}\_N - \pi \hat{e}_{t-1} + \varepsilon_t \quad \text{..... (3.3)}$$

Where Δ is the difference operator, y_t is a vector of dependent variable, $x_{t-1}$is the matrix of lag values of explanatory variables and π is the adjustment effect or error correction coefficient which is expected to be negative for the error to be corrected. Specifically, the ECM model to be tested is specified in equation while _P and _N represents the partial sum of positive and negative changes in the independent variables respectively.

$$\Delta RGDP_t = \varphi + \eta_0(RGDP_{t-1}) + \eta_1(INTR_{t-1}) + \eta_2(EXRATE_{t-1}) + \eta_3(INFL_{t-1}) + \eta_4(COILP_{t-1}) + \sum_{j=1}^{p} \beta_{ij} \Delta(RGDP)_{t-j} + \sum_{j=0}^{p} \beta_{ij} \Delta(INTR)_{t-j} + \sum_{j=0}^{p} \beta_{ij} \Delta(EXRATE)_{t-j} + \sum_{t=0}^{p} \beta_{ij} \Delta(INFL)_{t-i} + \sum_{j=0}^{p} \beta_{ij} \Delta(COILP)_{t-i} + \varepsilon_t \quad \text{.....(3.4)}$$

The partial sum of positive and negative changes in the independent variables is presented below

$$\Delta RGDP_t = \mu + \sum_{i=1}^{n-1} a_i \Delta RGDP_{t-1} + \sum_{i=0}^{m-1} \beta_i \Delta INTR_{t-i}\_P + \sum_{i=0}^{m-1} u_i \Delta\, INTR_{t-i}\_N + \sum_{i=1}^{n-1} a_i \Delta EXRATE_{t-i}\_P + \sum_{i=0}^{m-1} \Upsilon_i \Delta EXRATE_{t-i}\_N + \sum_{i=0}^{m-1} \beta_i \Delta INFL_{t-i}\_P + \sum_{i=0}^{m-1} u_i \Delta\, INFL_{t-i}\_N + \sum_{i=0}^{n-1} a_i \Delta COILP_{t-i}\_P + \sum_{i=0}^{m-1} \Upsilon_i \Delta COILP_{t-i}\_N - \pi \hat{e}_{t-1} + \varepsilon_t \quad \text{……(3.5)}$$

4. EMPIRICAL RESULTS AND DISCUSSION

Table 4.1 Descriptive statistics

Statistics	LRGDP	INTR	EXRATE	INFL	LCOILP
Mean	11.20916	6.282724	184.1973	26.30521	1.766393
Median	11.56467	6.014484	152.9713	13.74000	1.790426
Maximum	11.75891	18.18000	374.3481	99.16000	1.979047
Minimum	4.597858	-5.627970	101.6973	8.800000	1.439333
Std. Dev.	1.281252	4.884976	78.07359	23.47604	0.159047
Skewness	-0.745986	-0.266727	0.107914	0.149338	-0.359168
Kurtosis	24.66241	2.882375	2.791117	6.801235	1.980736
Jarque-Bera	2027.671	1.081730	17.95652	119.3640	5.636536
Probability	0.000000	0.582244	0.000126	0.000000	0.059709
Sum	975.1973	546.5970	16025.16	2288.553	153.6762
Sum Sq. Dev.	141.1781	2052.217	524211.8	47396.70	2.175464
Observations	87	87	87	87	87

Source: Researcher computation using E-views 10.

Table 4.1 depicts the result of descriptive statistics of the study, it indicates that the standard deviations of the variables of used in the study are not far away from their means except for exchange rate (184.1973), this means that there is a minimum chance to have an error in the study. The Skewness of the distribution in the table shows that real gross domestic product, interest rate, and crude oil price are skewed to the left but less than one while exchange rate and inflation rate are skewed to the right and less than one, by implication all the variables employed are normally distributed. The Kurtosis shows that real gross domestic product and inflation rate are greater than 3, this means that real gross domestic product and inflation rate are not normally distributed while interest rate, exchange rate and crude oil price are less than 3, by implication by implication interest rate, exchange rate and crude oil price are normally distributed. The Jarque-Bera test for normality is also estimated. It indicates that real gross domestic product, exchange rate and inflation rate are not normally distributed while interest rate crude oil price are normally distributed as its p-values is greater than 5%.

4.2 Zivot and Andrew Unit Root Test

The study used Zivot and Andrew unit root test in order to confirm the order of integration among the variables employed, because ignoring unit root test with break may lead the acceptance of null hypothesis where is supposed to be rejected.

Table 4.2 Zivot-Andrew Unit Root Test

	Level		First difference	
Variables	**Statistics**	**Break point**	**Statistics**	**Break point**
LRGDP	-3.912221	2018q2	-10.80898	2018q1
INTR	-3.669581	2006q2	-5.214799	2009q2
EXRATE	-2.203475	2015q4	-10.03810	2015q2
INFL	-6.958965	2010q1	-	-
LCOILP	-2.569629	2010q2	-9.322354	2016q2

Source: Researcher computation using E-views 10.

Table 4.2 presents the Zivot-Andrew unit root test indicates that real gross domestic product, interest rate, exchange rate and crude oil price are integrated of order one in other words are stationary at first difference i.e. they are I(1) process, the break dates are 2018q3, 2006q2, 2015q4 and 2010q2 respectively. The variable inflation rate is integrated of order zero in other word it is stationary at level i.e. it is I(0) process, the break date is 2010q1.

4.3 NARDL Bound Test for Long run

The test is conducted in order to ensure the existence of long run association among the variables employed.

Table 4.3 Result of Cointegration Bounds test of NARDL

Statistics	**Value**		**Critical bounds**			
F-statistics	6.643699		1%	2.5%	5%	10%
		I(0) Bound	3.31	2.98	2.69	2.38
		I (1) Bound	4.63	4.16	3.83	3.45

Source: Researcher computation using E-views 10.

From table 4.3, the result of co-integration bound test indicates a higher value of F-statistics than any of the critical values of all bounds 6.643699. Therefore, there is a strong evidence of long run nonlinear equilibrium relationship between dependent and independent variables in the model. Furthermore, this means that the null the hypothesis claiming no asymmetric Cointegration among the variables in the model is rejected. This indicates strong evidence for asymmetric cointegration among the variables employed.

4.4 Results of Nonlinear Autoregressive Distributed Lag (NARDL) model

As a result of unit root and bound tests conducted in the study which suggests the use of the ARDL model. The appropriate model (number of lags) is selected automatically using Akaike Information Criterion (AIC) which is seen as a more robust model. Below, both short-run and long-run parameters of the model are presented.

4.4.1. Short-run Relationship

Below the result of short-run parameters of the NARDL model is presented. AIC suggests a (3, 4, 0, 1, 2, 2, 0, 0) model after testing for up to 2500 different models.

Table 4.4 Short run parameters of the NARDL Model and ECM result

Variables	**Coefficient**	**Std error**	**t- statistics**	**Prob.**
Δ(LRGDP(-1))	0.329709	0.080883	4.076362	0.0001
Δ(LRGDP(-2))	0.236507	0.027597	8.570015	0.0000
ΔD(INTR_POS)	-0.012379	0.001164	-10.63126	0.0000
Δ(INTR_POS(-1))	0.007219	0.001421	5.081652	0.0000
Δ(INTR_POS(-2))	0.000389	0.001269	0.306492	0.7603
Δ(INTR_POS(-3))	0.004032	0.001184	3.404619	0.0012
Δ(EXRATE_POS)	-0.001393	0.000229	-6.078435	0.0000
Δ(EXRATE_NEG)	0.039573	9.13E-05	433.4599	0.0000
Δ(EXRATE_NEG(-1))	-0.021456	0.002387	-8.989259	0.0000
Δ(INFL)	0.479305	6.902305	0.503881	0.6162
Δ(INFL(-1))	-0.000242	7.10E-05	-3.406816	0.0012
ECM	-0.221545	0.028782	-7.697319	0.0000
C	-2.370963	0.309105	-7.670414	0.0000
@TREND	-0.001507	0.000194	-7.748323	0.0000

R-squared	0.999975			
Adjusted R-squared	0.999966			
S.E. of regression	0.007631			
Sum squared resid	0.003552			
Log likelihood	295.5716			
F-statistic	120638.2			
Prob(F-statistic)	0.000000			
2.214363	2.214363			

Source: Researcher computation using E-views 10.

The result from table 4.4 non-linear ARDL, it indicates a positive autoregressive and statistically significant effect of the dependent variable (real gross domestic product) at all lag, this means that real gross domestic product is largely depends itself in the short run. The positive coefficient of interest rate shows negative but statistically significant effect on the real gross domestic product Nigeria in the short run, at lag 1 and 3 indicates positive effect on the real gross domestic product. The positive coefficient of real exchange rate shows negative and statistically significant effect on the real gross domestic product while the negative coefficient indicates positive and statistically significant effect on the real gross domestic product, at lag 1 shows negative effect on the real gross domestic product. Variable inflation rate shows positive but statistically insignificant effect on the real gross domestic product, at lag 1 indicates negative effect on the real gross domestic product. The error correction term meets all its condition, that is negative, less than one and statistically significant, if there is any disequilibrium in the system, it takes an average of 22% of this NARDL model to adjust back from short run to long run. The R-squared and its adjusted value are very high 0.999975 this implies that 99% change in the real gross domestic product is explained by interest rate, exchange rate, inflation rate, and crude oil price in Nigeria. The p-value of f-statistics indicates (0.000000), this means that interest rate, exchange rate, inflation rate, and crude oil price have 100% significance influence on the real gross domestic product.

4.4.2 Long-run and Error Correction Result

As a result of the NARDL bound test which confirms the existence of a long-run relationship among the variables of interest.

Table 4.5 NARDL Long run Form Results

Variables	Coefficient	Std error	t- statistics	Prob.
INTR_POS	0.011275	0.004252	2.651543	0.0102
INTR_NEG	0.005280	0.002950	1.789932	0.0784
EXRATE_POS	-0.072583	0.000379	-6.824223	0.0000
EXRATE_NEG	0.032533	0.006397	0.395978	0.6935
INFL	-0.050442	0.000305	-1.446672	0.1531
LCOILP_POS	0.577904	0.224254	2.577008	0.0124
LCOILP_NEG	-0.214765	0.181195	-1.185273	0.2405

Source: researcher computation using E-views 10.

Table 4.5 present the nonlinear auto regressive distributed lag model results long run model, the positive coefficient of interest rate indicates positive and statistically significant effect on the real gross domestic product in Nigeria and the negative coefficient shows positive and statistically insignificant effect on the real gross domestic product in Nigeria, by implication if interest rate raise up by single digit the real gross domestic product will increase by 1% in the long run all thing being equal. The positive coefficient of exchange rate indicates negative and statistically significant effect on the real gross domestic product in Nigeria; this means that when exchange increases by N1 the real gross domestic product in Nigeria will decrease by 7%, the negative coefficient of exchange rate indicates positive and statistically insignificant effect on the real gross domestic product in Nigeria. Variable inflation rate shows negative but statistically insignificant effect on the real gross domestic product in Nigeria, this means that single digit increase in inflation will result 5% decrease in the real gross domestic product in Nigeria all things being equal. The positive coefficient of crude oil price shows positive and statistically significant effect on the real gross domestic product in Nigeria, this means that $1 increase in crude oil price will bring about 57% increase in the real gross domestic product in Nigeria, the negative coefficient of crude oil price shows negative and statistically insignificant effect on the real gross domestic product in Nigeria.

4.4.3 Wald Test

An asymmetry test investigates whether the coefficients are equal or not. If they are not identical, there is evidence of asymmetry; otherwise, it would not be. To test the long run asymmetry in using Wald test.

Table 4.6 NARDL Wald test

Test Statistic	Value	Df	Probability
F-statistic	71.07664	(8, 67)	0.0000
Chi-square	568.6132	8	0.0000

Source: researcher computation using E-views 10.

Table 4.6 indicates that the null hypothesis of symmetry is rejected because the p-value is less than 5%. The result of the Wald test reveals an asymmetry impact exist in the long-run of macroeconomics variables such as interest rate, exchange rate, inflation rate, and crude oil price in the Nigerian economy. It means that positive and negative changes of macroeconomics variables are not equal i.e are asymmetric. It is shown that the growth rate is more influenced by positive change than the negative change in economic growth.

4.4.4 Post estimation tests

Table 4.7 Post estimation tests

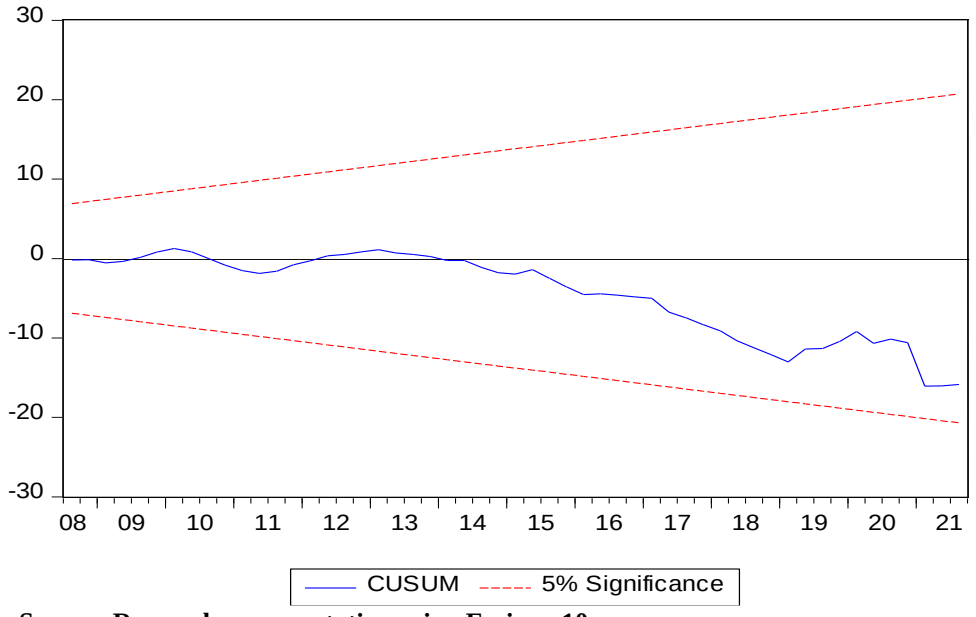
Tests	P-value
Serial correlation	0.1961
Heteroscedastics	0.0058
Normality	0.017949
Ramsey test	0.8452

Source: Researcher computation using E-views 10.

The nonlinear ARDL model estimated passed the post estimation tests such as serial correlation and Ramsey and failed the Heteroscedasticity and normality test because their probability values are less than 5%.

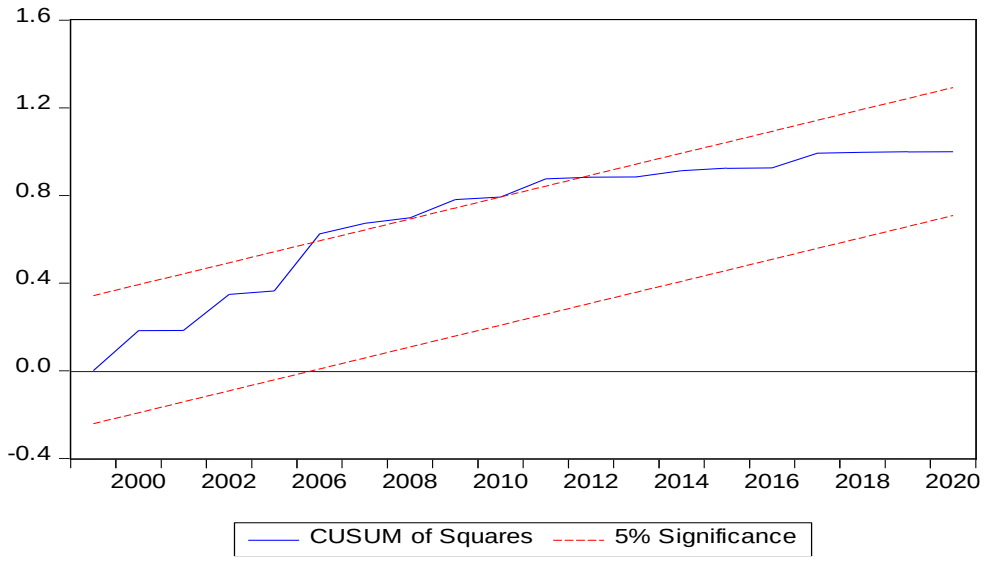
4.4.5 Structural Stability test

To check the structural stability test, recursive estimation has been applied. There are two types of tests in recursive estimation. The Cumulative Sum and Cumulative Sum of squares test are used to detect the structural stability of the nonlinear ARDL model.



Source: Researcher computation using E-views 10.

Figure 4.2 Cusum Square Plot Recursive Residual of ARDL Model



Source: Researcher computation using E-views 10.

The decision rule is that we cannot reject the null hypothesis if the Cumulative Sum (CUSUM) and Cumulative Sum of squares test line lies between two critical lines at a 5% significance level. Otherwise, the null hypothesis would be accepted. In this case the current study cannot reject the null hypothesis, which implies that the NARDL model is structurally stable over study time.

4.4.6 DISCUSSION OF THE RESULT

The results of nonlinear ARDL model shows that interest rate has a positive effect on the real gross domestic product in Nigeria, by implication if interest rate raise up by single digit the real gross domestic product will increase by 1% all thing being equal, the positive finding counter with the economic apriori expectation which assumed a negative relationship between interest rate and economic growth in Nigeria, furthermore, the positive finding in line with the Babatunde, and Olufemi (2018). The variable real exchange rate has a negative effect on the real gross domestic product in Nigeria, this means that when exchange increases by N1 the real gross domestic product in Nigeria will decrease by 7%, this in line with the economic apriori expectation which assumed a negative relationship between exchange rate and economic growth in Nigeria, the negative finding counter with the finding of Babatunde, and Olufemi (2018) and Ehigiamusoe and Lean (2017). Furthermore, inflation rate has a negative effect on the real gross domestic product in Nigeria, this means that single digit increase in inflation will result 5% decrease in the real gross domestic product in Nigeria all things being equal, the negative finding countered with the finding Onyeka and Nduka (2022) and concurred with the finding of Babatunde, and Olufemi (2018). Crude oil price has a positive effect on the real gross domestic product in Nigeria, this means that $1 increase in crude oil price will bring about 57% increase in the real gross domestic product in Nigeria.

5. CONCLUSIONS AND RECOMMENDATIONS

The study the examined the long-run asymmetric effect of macroeconomics variables on economic growth in Nigeria using quartly data from 2000Q1 to 2021Q4. The Zivot-Andrew unit root test indicates that real gross domestic product, interest rate, exchange rate and crude oil price are integrated of order one in other words are stationary at first difference while inflation rate is integrated of order zero in other word it is stationary at level. The results of nonlinear ARDL model show that interest rate has a positive effect on the real gross domestic product in Nigeria. The variable real exchange rate has a negative effect on the real gross domestic product in Nigeria, inflation rate has a negative effect on the real gross domestic product in Nigeria and crude oil price has a positive effect on the real gross domestic product in Nigeria. Therefore, the current study concludes that there exist an asymmetry effect in the long-run of macroeconomics variables such as interest rate, exchange rate, inflation rate, and crude oil price in the Nigerian economy. The study recommends that Nigerian government should endeavor to bring macroeconomics variables such as interest rate, exchange rate, inflation rate and crude oil price under control in order to boast the economic growth by managing interest rate to its lowest level, stabilizing forex market in a way that the Nigerian currency will not depreciate and increase the production of crude oil in order to the demand.

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