Journal of Applied Econometrics and Statistics
Vol. 2, No. 1, 2023, pp. 63-77
https://DOI:10.47509/JAES.2023.v02i01.04

ARF INDIA
Academic Open Access Publishing
www.arfjournals.com

An Appraisal of the Relationship Amongst Some Macroeconomic Variables in Nigeria Using Autoregressive Distributed Lag Model

Ejukwa, Justin Odadami[1], Onu, Obineke Henry[2] and Nwanneako, Sabinus Nnamdi[3]

[1&2]Department of Mathematics/Statistics, Ignatius Ajuru Universty of Education, Porthacourt. Rivers State
[3]Department of Mathematics Rivers State University, Portharcourt. Rivers State.
Corresponding E-mail:onuobinekehenry@gmail.com, ejukwa.iaue@gmail.com

Received: 20 March 2023; Revised: 12 April 2023;
Accepted 22 April 2023; Publication: 26 June 2023

Abstract: This paper presented autoregressive distributed lag method in gross domestic product, agriculture and industry interaction in Nigeria. The study tries to examine trend and causal relationship between gross domestic product, agriculture and industry in Nigeria over the period 1981 to 2022. The data for the study was from National Bureau of statistic. To analyze the data, the autoregressive distributed lag (ARDL) model was introduced involving the unit root test, bounds test and standard diagnostic test for serial correlation and stability. From the results obtained, agriculture and industry contributed significantly to gross domestic product growth in Nigeria in the short run. While in the long run only gross domestic product had significant influence on agriculture. It was recommended that more innovations should be channel to agriculture and industry in Nigeria.

Keyword: Autoregressive Distributed Lag, Gross Domestic Product, Industry, Agriculture, Interaction.

1. INTRODUCTION

Most countries in Africa and Nigeria in particular are still faced with the challenge of improved monetary measure of the market value of all goods and services produced and sold over a period of time. This is owing to a number of underlying factors like corruption, tribalism and poor economic policies. Some countries with high gross domestic product (GDP) are still unattractive. We perceive a high gross domestic product as a plus because

for citation :

Ejukwa, Justin Odadami, Onu, Obineke Henry and Nwanneako, Sabinus Nnamdi (2023). An Appraisal of the Relationship Amongst Some Macroeconomic Variables in Nigeria Using Autoregressive Distributed Lag Model. *Journal of Applied Econometrics and Statistics*, Vol. 2, No. 1, pp. 63-77. https://DOI: 10.47509/JAES.2023.v02i01.04

it is linked with improved economic opportunities. However, a country's gross domestic product could be high at the same time have a low per-capita gross domestic product, suggesting that significant wealth of the country exist but solely in the hands of very few people. The Gross Domestic Product (GDP) is one of the macroeconomic indicator used to measure the health status of a country's economy and the living standard of the citizenry and therefore, remains a crucial area for risk and portfolio management. According to Todaro and Smith (2003), export of agricultural products and industry account for a major share in the income of most developing countries. Nigeria in recent years have experienced volatility in the relationship between gross domestic product, industry and agriculture. The dynamism in the relationship between gross domestic product, agriculture and industry play a major role in determining the future of Nigeria's economy both in the short and long-run and has drawn the attention of numerous researchers.

Therefore, the causality amongst gross domestic product, Agriculture and Industry should be statistically evaluated to enable users of the results plan and predict certain outcome accurately. To evaluate this relationship, we apply the autoregressive distributed lag (ARDL) approach introduced by Pesaran (2001) because of its difference in the ability to identify long and short-run relationships. The ARDL offers flexibility in the integration of the variables (Frimpong & Oteng 2006). Therefore, this study examines trend in the movement of the variables under investigation. It also examines the short and long-run impact of agriculture and industry on gross domestic product in Nigeria using the ARDL model. The study will also provide some suggestions.

2. LITERATURE REVIEW

The literature review consists only of empirical studies which are related to this paper. A number of researches have been carried out within the past few years using the autoregressive integrated moving average model to establish causality amongst variables in Nigeria and they include;

Zafar, K. M (2019) investigated ARDL-Analysis of the relationship among exports, foreign direct investment, current account deficit and economic growth in Pakistan. The data used for this study is the annual time series data for the period 1975-2016 from Pakistan economic survey and State Bank of Pakistan annual reports. The autoregressive distributed lag approach to co-integration together with ECM technique was employed. The result depict that current account deficit is negatively and significantly correlated to economic growth in the long-run and short-run.

3. METHODOLOGY

This section covers the source and type of data, model specification and methods of data analysis

3.1. Source and Type of Data

This study used annual time series data of Industry (IND), Gross Domestic Product (GDP) and Agriculture (GRIC) from 1981 to 2021. The data was taken from the National Bureau of statistics bulletin 2021.The software used for data analysis is Eviews 10.

3.2. Method of Data Analysis

This section explains the structure of autoregressive distributed lag (ARDL) model. When analyzing the possible relationship between two or more variables postulates of the model specifications are inevitable where Y is the dependent variable and X is a vector of independent variables and f is some function.

$$Y = f(x) \quad (1)$$

In other to establish the correlation between Gross Domestic Product, Agriculture and Industry it is important to apply a model that is widely accepted and fits the characteristics of the variables. In line with this, the autoregressive distributed lag (ARDL) model introduced by Pesaran (2002) will be applied. The ARDL model tries to capture the relationship in f(x) in equation (1). The unit root test, bounds test for cointegration and model specification were also captured in this section. Worthy of note is the fact that ARDL model accommodates mixed order of integration.

3.2.1. Unit Root Test

Most times series or macroeconomic variables are characterized by the problem of unit root. A time series with a unit is said to be nonstationary and for time series data to be useful for analysis, the data must first purge itself of unit. According to brooks (2014), if a time series has a constant mean, constant variance and auto covariance over time, that time series is said to be stationary, that mean it does not have unit root. A nonstationary time series Y_t that is stationary at level said to be integrated of order zero denoted by $Y_t \sim I(0)$. If it is stationary at first difference then it is said to be integrated of order one denoted as $Yt \sim I(1)$. The Augumented Dickey further (ADF) test is to be applied to test for stationarity of the time series. There are other methods to test for unit root like the phillip-perron test. The ADF test the null hypothesis by calculating a t-statistic for $\sigma = 0$ in the regression.

$$\Delta Y_t = \theta + \alpha T + \delta Y_{t-1} + \Sigma_{i=1}^{p} \varphi_i Y_{t-1} + \mu_t \quad (2)$$

θ and αT – deterministic elements
Y_t – Variable at time t
μ_t - Disturbance at time t

3.2.2. Bounds Test for Cointegration

One method of testing for cointegration is the autoregressive distributed lag (ARDL) bounds test. To decide the existence of long run relationship among variables an F-Test is performed. The test involves analyzing if the coefficient for the one period lagged variables b_1 and b_2 are jointly zero.

Null hypothesis $H_0 : b_1 = b_2 = b_3 = 0$ (No cointegrating relationship)

Alternative hypothesis $H_1 : b_1 \neq b_2 \neq b_3 \neq 0$ (there is cointegrating relationship)

The hypothesis test has upper and lower bounds of critical values involving three different scenarios. If the F- statistics is greater than the upper bound, the null hypothesis is rejected and the existence of a long run relationship established regardless of the order of integration. If the F-statistic is less than the lower bound, the null hypothesis is upheld and no cointegration or no long run relationship between the variables is evident. If the F-statistic falls between the lower and upper bound, then the test is inconclusive.

3.2.3. Causality Test

To ascertain the direction of causality among the variables the Granger causality test proposed by Granger (1969) will be used The Granger causality is a statistical concept of causality that is based on prediction for determining whether one variable is a factor and offers useful information in forecasting another variable.

3.2.4. Post Estimation Test

The ARDL model tries to find the best linear unbiased estimator(BLUE) and to achieve this some diagnostic test must be conducted to check if the model is best fit. We will introduce the serial LM test for serial correlation, Breusch-Pegan test for heteroscedasticity and CUSUM stability test. If the model is free from the above listed biases, then the result obtained can be relied upon and used for analysis.

3.3. Model Specification

The ARDL approach is appropriate for generating short-run and long-run elasticities. The short run ARDL model specification is given in equation 3.

$$\Delta \ln gdp_t = \alpha_o + \Sigma_{i=1}^{p} \varphi \Delta \ln gdp_{t-1} + \Sigma_{i=1}^{q_1} \pi \Delta \ln gric_{t-1} + \Sigma_{i=1}^{q_2} \partial \ln ind_{t-1} + \varepsilon_t \quad (3)$$

Where φ, π and ∂ are the short run dynamic coefficients of the model's convergence to equilibrium. α_o is the constant.

Long Run ARDL Model specification is given as

$$\Delta \ln gdp_t = \alpha_o + \Sigma_{i=1}^{p} \varphi \Delta \ln gdp_{t-1} + \Sigma_{i=1}^{q_1} \pi \Delta \ln gric_{t-1} + \Sigma_{i=1}^{q_2} \partial \ln ind_{t-1} + \eta ECT_{t-1} + \varepsilon_t \quad (4)$$

Where η = speed of adjustment

ECT_{t-1} = Error correction term

4. RESULTS AND DISCUSSION

4.1. Descriptive Analysis

Before engaging into regression analysis it is important to have a feel of the data set in terms of normality, measures of central tendency and dispersion and the presence of outliers. Table 1 represents the descriptive statistic of GDP, GRIC and IND.

Table 1: Summary Statistics of GDP, GRIC and IND

	GDP	*GRIC*	*IND*
Mean	37550.91	8511.762	9688.897
Median	8234.494	2015.422	2388.835
Maximum	176075.5	41126.06	55300.97
Minimum	139.3105	17.05218	50.32998
Std. Dev.	50434.86	11183.50	13619.00
Skewness	1.284324	1.378496	1.687094
Kurtosis	3.459285	4.007211	5.258523
Jarque-Bera	11.63186	14.71810	28.16371
Probability	0.002980	0.000637	0.000001
Sum	1539587.	348982.2	397244.8
Sum Sq. Dev.	1.02E+11	5.00E+09	7.42E+09
Observations	41	41	41

From the result obtain, the mean of GDP, GRIC and IND are 37550.91, 8511.76 and 9688.90 respectively. The median for gross domestic product is 8234.50, agriculture is 2015.42 and Industry is 2388.84. Maximum value for gross domestic product, Agriculture and Industry are 176075.5, 41126.06 and 55300.97 respectively. While the least value for gross domestic product is 139.31, agriculture is 17.05 and Industry 50.33. Gross domestic product

mirrors normal skewness and leptokurtic because kurtosis = 3.46 is greater than 3. Agriculture has a long right tail (positive skewness) and leptokurtic since kurtosis 4.01 is greater than 3 and Industry also have a long right tail (positive skewness) and leptokurtic with kurtosis 5.23 greater than 3. The implication is that there are higher values than the sample mean for the three variables. The null hypothesis for the Jarque-Bera is that the distribution is normally distributed. The Jarque-Bera test statistic for Gross Domestic Product is statistically significant with probability 0.002980<0.05 therefore, we reject the null hypothesis and conclude that gross domestic product is not normally distributed. In the same vein, agriculture and Industry are not normally distributed because their Jarque-Bera test statistic are statistically significant with respective probabilities of 0.000637 < 0.05 and 0.00001 < 0.05.

4.2. Unit Root Test

Table 2: Summary of Unit Root Test at Level

Variables	*ADF(Level)*			*Phillip-Perron (Level)*		
	t-stat	*critical value 5%*	*Prob*	*t-stat*	*critical value 5%*	*Prob*
LNGDP	1.394602	2.936942	0.5753	1.045981	2.936942	0.7273
LNGRIC	2.174797	2.936942	0.2182	2,174797	2.936942	0.2182
LNIND	1.009857	2,942245	0.7400	0.528757	2.936942	0.8748

Table 3: Summary of Unit Root Test at First Difference

Variables	*ADF(Level)*			*Phillip-Perron (Level)*		
	t-stat	*critical value 5%*	*Prob*	*t-stat*	*critical value 5%*	*Prob*
LNGDP	3.459477	2.938987	0.0147	3.385016	2.938987	0.0176
LNGRIC	4.009147	2.938987	0.0035	4.060837	2.938987	0.0030
LNIND	4.848168	2,938987	0.0003	4.752757	2.938987	0.0004

Source: Extract from Eviews 10

The Test Hypothesis

$H_{0:}$ variable has unit root ($p > 0.05$)

$H_{1:}$ variable does not have unit root ($p < 0.05$)

The Augumented Dickey-Fuller and Phillip-Perron test reveal from the result obtain in table 2 that lngdp, lngric and lnind all have unit root at level since their p-values are greater than the 5 percent level of significance. Table 3 reveal that lngdp, lngric and lnind became stationary at first difference with their respective probabilities 0.0176, 0.0030 and 0.0004 all less than the 0.05 level of significance.

4.3. Autoregressive Distributed Lag (ARDL) Bounds Test

Table 4: Summary of ARDL bounds Test

Null Hypothesis: No Long-Run Relationship Exist

Dependent Variable	*F- Stat*	*K*	*ARDL (2,2,2) I(0)*	*I(1)*	*Decision*
Lngdp	4.667268	2	3.79	4.85	Short run (no cointegration)
lngric	6.233734	2	3.79	4.85	Long run (cointegration)
lnind	3.782494	2	3.79	4.85	Short run (no cointegration)

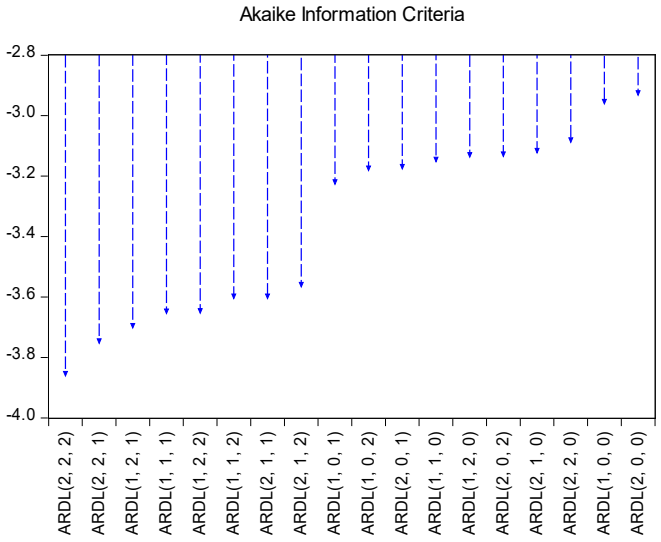

Figure 1: (Dependent Variable GDP)

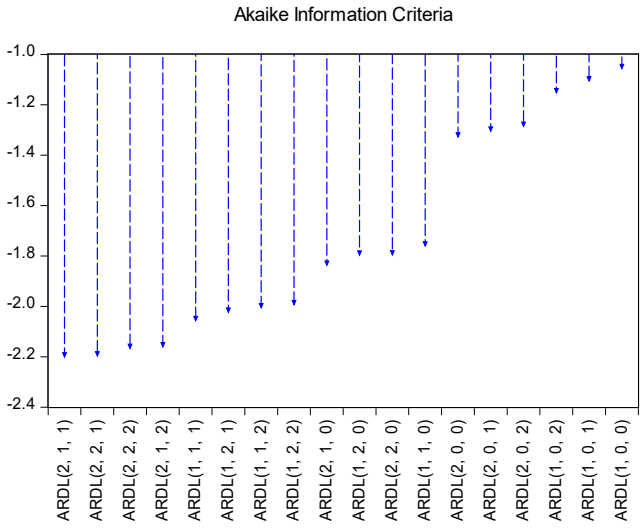

Figure 2: Dependent Variable GRIC

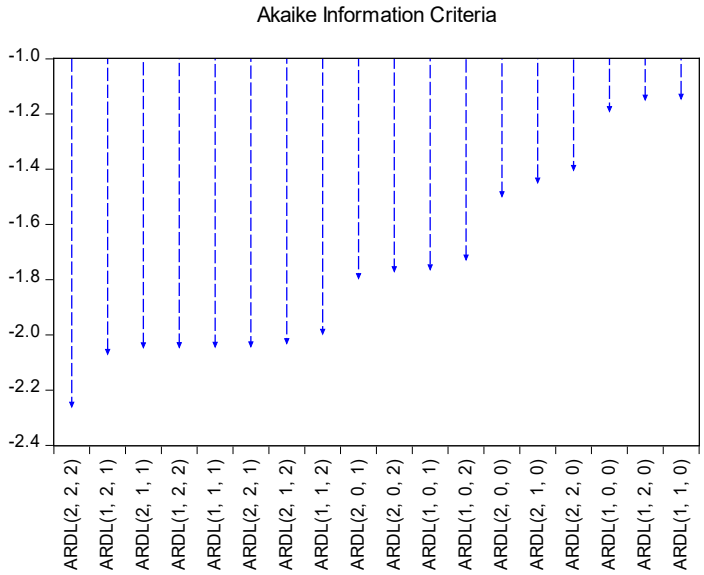

Figure 3: Dependent Variable IND

Source: Authors Estimation and Eviews plotting

Figure1 shows that ARDL (2,2,2) is the appropriate model when gross domestic product is the dependent variable. From the bounds test result shown in table 4, the computed F-statistic 4.667268 is less than the upper bound 4.85 at 5 percent level of significance. Therefore, the null hypothesis of no cointegration or no long run relationship is accepted and the alternative hypothesis of long run relationship among the log of gross domestic product (lngdp), log of agriculture (lngric) and log of industry (lnind) is rejected. Figure 2 also show that ARDL (2,1,1) is the appropriate model when the log of agriculture is the dependent variable. From the bounds test result shown in table 4, the computed F-statistic 6.233734 for the dependent variable lngric is greater than the I(1) bound of 4.85 at 5 percent level of significance. It follows that the null hypothesis of no cointegration or no long run relationship is rejected and the alternative hypothesis of long run relationship accepted. That is, given lngric as the dependent variable there exist a long-run relationship among the log of gross domestic product (lngdp), log of agriculture (lngric) and log of industry (lnind). Figure 3 shows that ARDL (2,2,2) is the appropriate model with industry as the dependent variable. The bounds test result in table 4 shows that the computed F-statistic 3.782414 is less than the I(1) bound of 4.85 at 5 percent level of significance. The null hypothesis of no cointegration or no long run relationship is therefore accepted and the alternative hypothesis of long run relationship

among the log of gross domestic product (lngdp), log of agriculture (lngric) and log of industry (lnind) is rejected.

4.4. Short Run Estimation (Dependent Variable LNGDP)

Table 5: Error Correction Estimation for ARDL (2,2,2) Model

Dependent Variable: D(LNGDP)
Selected Model: ARDL(2, 2, 2)
Sample: 1981 2022
Included observations: 40

Variable	*Coefficient*	*Std. Error*	*t-Statistic*	*Prob.*
C	0.332367	0.082951	4.006801	0.0004
D(LNGDP(-1))	0.411629	0.129360	3.182036	0.0034
D(LNGRIC)	0.354983	0.036846	9.634367	0.0000
D(LNGRIC(-1))	-0.216424	0.057717	-3.749753	0.0008
D(LNIND)	0.393137	0.031957	12.30194	0.0000
D(LNIND(-1))	-0.160031	0.060089	-2.663208	0.0123
CointEq(-1)*	-0.210694	0.054519	-3.864616	0.0006
R-squared	0.938344	Mean dependent var		0.181394
Adjusted R-squared	0.926783	S.D. dependent var		0.114166
S.E. of regression	0.030892	Akaike info criterion		-3.955507
Sum squared resid	0.030538	Schwarz criterion		-3.656919
Log likelihood	84.13239	Hannan-Quinn criter.		-3.848377
F-statistic	81.16772	Durbin-Watson stat		2.052321
Prob(F-statistic)	0.000000			

Source: Authors' calculation (Eviews)

Table 5 shows the short-run coefficient of the estimated ARDL (2,2,2) model based on the Akaike information criteria as displayed in figure 1. The coefficient of determination R^2 is 0.938344, this implies that about 94 percent of the variation in lngdp is explained by variations in lngric and lnind while the remaining 6 percent is explained by variables excluded from the model. The estimated one period lag error correction term is -0.210694 with a negative sign and is highly significant at 5 percent level of significance with a probability of 0.0006. The error correction coefficient of -0.210694 imply that the disequilibrium from the previous year shock in equation three converges back to the long-run equilibrium at a speed of 21.07 percent in the current year ceteris paribus.

Existence of a short-run relationship between Gross Domestic Product, Agriculture and Industry is conspicuous from the outcome of the error correction model. Gross Domestic Product at lag1, Agriculture at lag1 and Industry at lag1 are all statistically significant. This is indicative that there

is a short term causality from the first lags of gross domestic product, agriculture and industry to gross domestic product.

4.5. Long Run Estimates (Dependent Variable LNGRIC)

Table 6: Estimated Long-Run Coefficient. ARDL (2,1,1) Model

Dependent Variable LNGRIC

Variable	*Coefficient*	*Std Error*	*t-statistic*	*Prob*
LNGDP	1.199133	0.315347	3.802579	0.0006
LNIND	-0.182480	0.334034	-0.546292	0.5887

EC = LNGRIC – (1.1991LNGDP – 0.182480LNIND)

Source: Authors' Calculation (Eviews 10)

Table 6 reveal the estimates of long run coefficients of the selected ARDL (2,1,1) model. From the result obtain, the coefficient of gross domestic product (GDP) in the long-run is positive and statistically significant at 5 percent level of significance. The positive coefficient of gross domestic product (GDP) which is 1.199133 is indicative of the fact that in the long-run a unit increase in gross domestic product will increase agriculture by 119.9 percent ceteris paribus. However, the estimated coefficient of industry is statistically not significant at 5 percent level of significance.

4.6. Short-Run Estimation (Dependent Variable LNGRIC)

Table 7: Error Correction Estimation for ARDL (2,2,2,) model

Dependent Variable: D(LNGRIC)

Selected Model: ARDL(2, 1, 1)

Sample: 1981 2022

Included observations: 40

Variable	*Coefficient*	*Std. Error*	*t-Statistic*	*Prob.*
C	-0.721941	0.159920	-4.514378	0.0001
D(LNGRIC(-1))	0.248778	0.087655	2.838140	0.0078
D(LNGDP)	1.779719	0.176477	10.08470	0.0000
D(LNIND)	-0.586065	0.110633	-5.297375	0.0000
CointEq(-1)*	-0.350609	0.078655	-4.457581	0.0001
R-squared	0.806711	Mean dependent var		0.195446
Adjusted R-squared	0.783971	S.D. dependent var		0.155797
S.E. of regression	0.072413	Akaike info criterion		-2.293660
Sum squared resid	0.178282	Schwarz criterion		-2.080383
Log likelihood	49.72638	Hannan-Quinn criter.		-2.217138
F-statistic	35.47552	Durbin-Watson stat		1.581516
Prob(F-statistic)	0.000000			

Represented in table 7 is the result for the short-run estimate for ARDL (2,1,1) model. The result show that R-square is 0.806711 which means that about 80.67 percent of the variation in agriculture is explained by variation in gross domestic product and industry, the remaining 19.33 percent is explained by variables excluded from the model. The first lag of lngric (t-2.838140) > 1.96 is statistically significant meaning that a unit increase in the first lag of lngric will increase lngric by 24.88 percent. Lngdp and lnind are both highly statistically significant with t-10.08470 and t-5.297375 respectively. This means that one percent increase in lngdp will increase lngric by177.97 percent in the short-run. While, one percent increase in lnind will lead to58.61 percent increase in lngric, all things being equal. The one period lag error correction (-0.350609) is negatively sign and is highly statistically significant $|t=4.457581| > |1.96|$. The implication is that the previous period deviation from equilibrium in the short-run is corrected in the long-run at an adjustment speed of 0.350609 in the current period ceteris paribus.

4.6. Short-Run Estimation (Dependent Variable LNIND)

Table 8: Error Correction Estimation for ARDL (2,2,2) Model

Dependent Variable: D(LNIND)
Selected Model: ARDL(2, 2, 2)
Sample: 1981 2022
Included observations: 40

Variable	*Coefficient*	*Std. Error*	*t-Statistic*	*Prob.*
C	-0.570486	0.162133	-3.518636	0.0014
D(LNIND(-1))	0.449968	0.136138	3.305245	0.0025
D(LNGRIC)	-0.593829	0.104135	-5.702491	0.0000
D(LNGRIC(-1))	0.441479	0.127966	3.449966	0.0017
D(LNGDP)	1.950030	0.152856	12.75733	0.0000
D(LNGDP(-1))	-0.933234	0.290458	-3.212979	0.0031
CointEq(-1)*	-0.340426	0.097849	-3.479078	0.0016
R-squared	0.867366	Mean dependent var		0.178758
Adjusted R-squared	0.842497	S.D. dependent var		0.173359
S.E. of regression	0.068800	Akaike info criterion		-2.354064
Sum squared resid	0.151472	Schwarz criterion		-2.055476
Log likelihood	52.90426	Hannan-Quinn criter.		-2.246934
F-statistic	34.87746	Durbin-Watson stat		2.076919
Prob(F-statistic)	0.000000			

Source: Researchers' computation (Eviews)

The short-run coefficient of the estimated ARDL (2,2,2) model base on Akaike information criteria shown in figure 3 is displayed in table 8. The

result show that the coefficient of determination R-square is 0.877366, this means that 87.74 percent variation in lnind is explained by variations in lngdp and lngric. The remaining 12.26 is explained by variables omitted from the model. The first lags of lnind, lngric and lngdp are all highly statistically significant with their t-statistic 3.305245, 3.449966 and 3.212979 respectively. That is, a unit increase in the first lags of industry and agriculture will increase industry and agriculture by 45 and 44.15 percent respectively. While a unit increase in the first lag of gross domestic product will decrease industry by 93.32 percent.

5. POST ESTIMATION TEST

Post estimation test particularly serial LM test and CUSUM stability test were conducted on ARDL (2,2,2), ARDL (2,1,1) and ARDL (2,2,2) models and the results summarized in tables 9.

Table 9: Breusch-Godfrey Serial LM Test

Model (Dependent Variable)	*F-Statistics*	*P-Value*
GDP ARDL (2,2,2)	0.273506	0.6882
GRIC ARDL (2,1,1)	1.339169	0.2023
IND ARDL (2,2,2)	1.160931	0.2247

Source: Authors' calculation (Eviews 10)

The results in table 9 shows that ARDL (2,2,2) with GDP as dependent variable is serially uncorrelated (p-value 0.6882). ARDL (2,1,1,) with GRIC

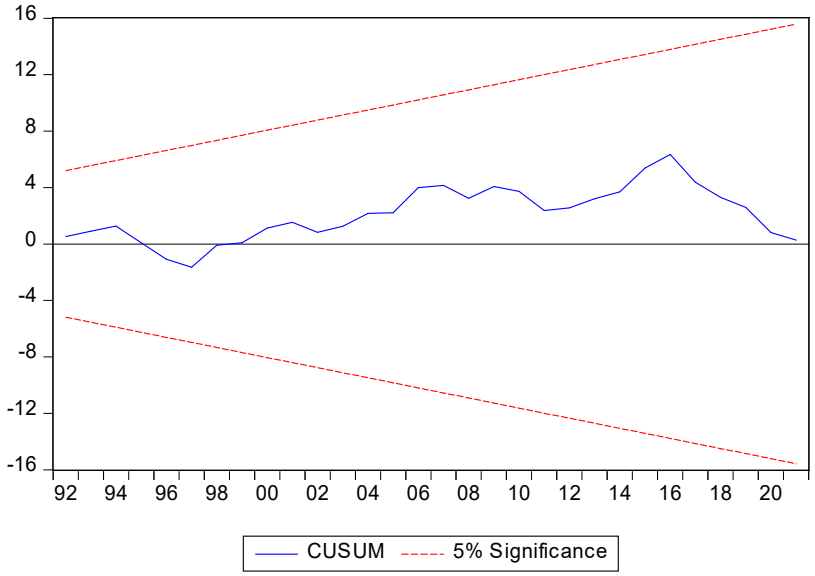

Figure 4: Plot of Cummulative Sum of Recursive Residuals (GDP)

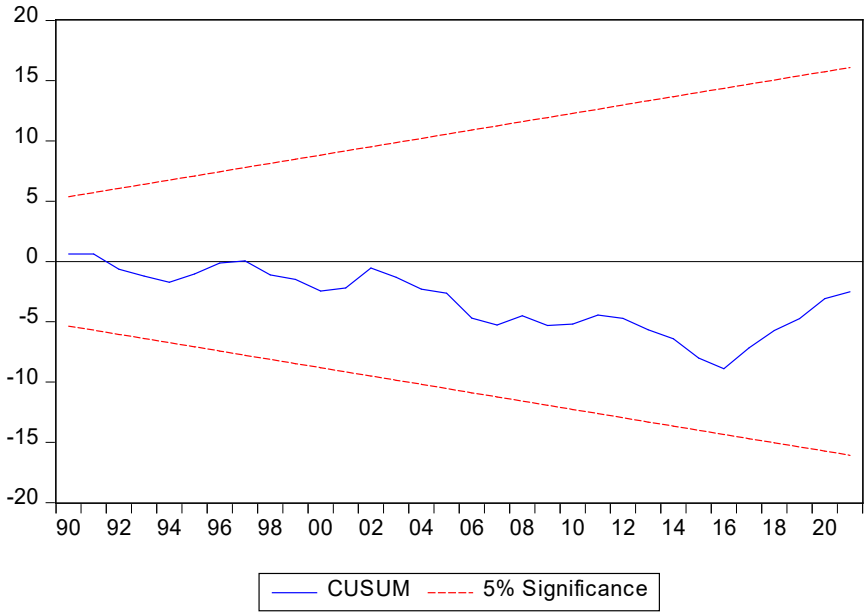

Figure 5: Plot of Cummulative Sum of Recursive Residuals (GRIC)

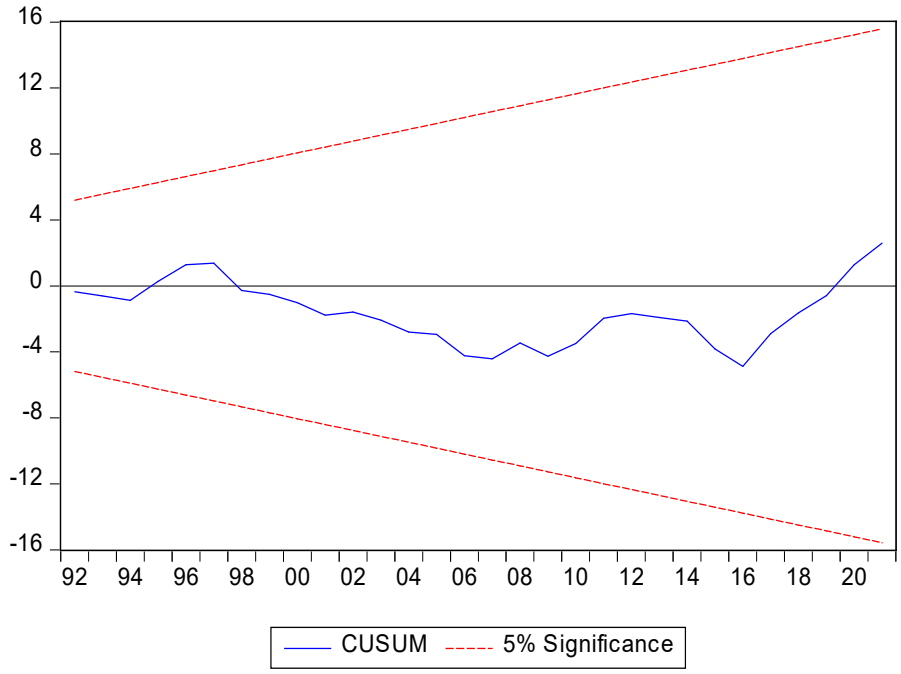

Figure 6: Plot of Cummulative Sum of Recursive Residuals (IND)

as dependent variable is also free from serial correlation (p-value 0.2023). While ARDL (2,2,2) with IND as dependent variable has no serial correlation (p-value 0.2247). The results in figure 4,5 and 6 also show that the models ARDL (2,2,2) GDP, ARDL (2,1,1) GRIC and ARDL (2,2,2) IND are stable since they all lie within the confidence bounds and no structural breaks.

5. CONCLUSION

5.The aim of the study is to determine the relationship between gross domestic product (GDP), agriculture (GRIC) and industry (IND) in Nigeria, specifically, to examine the trend in the movement of GDP, GRIC and IND and to establish causality among the variables under investigation in Nigeria. The autoregressive distributed lag (ARDL) model was introduced to test the relationship. The result show absence of long memory dependence between gross domestic product, agriculture and industry, where gross domestic product is made the dependent variable, also, Gross Domestic Product at lag1, Agriculture at lag1 and Industry at lag1 are all statistically significant. This is indicative that there is a short term causality from agriculture and industry to the gross domestic product.

On the contrary, when agriculture was made the dependent variable, industry and GDP contributed significantly to gross domestic product in the short run in Nigeria. Whereas, in the long run only GDP has impact on agriculture in Nigeria. This means that the impact the gross domestic product has on agriculture does not diminish abruptly in Nigeria. The speed of adjustment estimated by the error correction model show that industry adjust moderately to changes in both agriculture and gross domestic product. It is therefore concluded that agriculture and industry substantially contribute to the growth of gross domestic product in Nigeria. We recommend strongly innovations in the agricultural and industrial sectors to boost and strengthen the Nigerian economy.

Monday & Olalekan (2020) stated that there was a long-run relationship between the inflation rate, unemployment rate and interest rate on real gross domestic product per capita (proxy for economic growth) in Nigeria. The results further revealed that only the unemployment rate had a significant positive impact on real gross domestic product per capita in the long-run and the inflation rate had a significant negative impact on real gross domestic product per capita in the short-run. Novelty.

Charles et al. (2022) found that growth output of Real GDP(RGDP) was cointegrated with Exchange rate (EXR), Inflation Rate (IFR) and Monetary Supply (M2) and the existence of a long-run relationship amongst the variables.

Ojiaku & Joseph (2020) observed using ARDL model that foreign exchange rate and crude oil prices positively and significantly influenced

FDI in the country both in the short run and in the long run. It was also observed that inflation had negative and significant impact on FDI both in the short and long run.

5.1. Recommendation

The study recommends that when agriculture is used as the dependent variable in an economy, Nigeria should invest more on Gross Domestic Product, than in Industry, this is because, GDP impacts positively to the Agric sector both on the short and long term, while the Industry only impact on Agric sector on the short term.

Reference

Pesaran, M. H and Smith, R. J. (2001). Bounds Testing Approach to The Analysis of Level Relationships. *Journal of Applied Econometrics 16*(3), 289-326.

Todaro, M. P. and Smith, C. (2003). Economic Development. Washinton DC: Peterson Education Ltd.

Monday, O. A. & Olalekan, L. O. (2020). Autoregressive Distributed Lag Modeling of the Effects of Some Macroeconomic Variables on Economic Growth in Nigeria**.** *Folia Oeconomica Stetinensia,* 20(2), 1-19.

Charles, O. A., Ekwueme, G. O., Olasunkanmi, A. B. & Olatunji, T. A. (2022). The Nexus Between Some Selected Macroeconomic Variables on Growth Output in Nigeria: An Autoregressive Distributed Lag (ARDL) Approach. *Economics and Business Quarterly Reviews,* 5(4), 256-262.

Ojiaku, E. U. & Joseph, C. O. (2020). Impact of Selected Macroeconomic Variables on Foreign Direct Investment in Nigeria: Auto-Regressive Distributed Lag (ARDL) Model. *International Journal of Economics, Commerce and Management,* 8(12), 41-55.