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Effects of Climate Change on Economic Growth in Nigeria

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Abstract— **The climate change poses significant challenges to economic growth in Nigeria This investigate the impact of climate change on economic in Nigeria from i980 t0 203.The data collected was linear in nature and unit root test was conducted, dependent variable GDP was stationary at level, while the independents agriculture, annual rainfall and C02 carbon emission as proxy of climate changes variables were stationary at first difference, as determined by the Augmented Dickey-Fuller test. The Johansen cointegration test showed no cointegration, indicating no long-term relationship between climate change and economic growth. Since the variables were integrated at orders I (1) and I (0), the Autoregressive Distributed Lag (ARDL) model was used to assess the effects of climate change on economic growth in Nigeria. The findings revealed that agricultural production and CO2 emissions, annual rainfall were negatively impact on economic growth in Nigeria due to the climate related events such as changes rainfall pattern, extreme weather events, rising temperatures have detrimental on economic growth in Nigeria. This paper recommended that there is need for climate and mitigation strategies in Nigeria by investing in non-renewable energy, promote sustainable agricultural practices and implementing climate resilient infrastructures. Moreso, there need to provide policies to curb or minimize carbon emission and there is need for the government to develop rainfall capture storage to reduce water wastage and promote water conservation.**

Index Terms— **Climate Change, Gross Domestic Product, Agriculture, Annual Rainfall, Carbon emission, Autoregressive Distributed Lag Model.**

I. INTRODUCTION

One of the most severe challenges facing the whole world today is climate change. The effects of this phenomenon are very painful in the economies and societies in which it manifests. Developing countries in general and Nigeria in particular are very much susceptible to an adverse change in climate, with most of the population being highly vulnerable to changes linked to the climate. Economic growth in Nigeria, by and large, hinges on the natural resources that comprise oil and gas. Still, climate change threatens these resources and infrastructure that support them. Reduced rainfall can bring danger of growth failure, devastation to dams and retention facilities through flooding, damage to oil and gas pipelines and refineries by increasing levels of the sea, and shortage of petroleum infrastructures because of coastal erosion that can claim both land and associated structure.

Nigeria is particularly prone to the effects of climate change because of its topographical situation and its dependence on industries sensitive to climate variations. This country has faced an increase in temperature over time and more frequent intense rainfall events, as well as an alteration from previous average patterns of precipitation. This has profoundly affected the livelihoods of most Nigerians and the broader economy. Over 60 percent of the Nigerian labor force is put to work as agriculture is the pillar of the economy. Farmers' productivity declines due to changes in temperature and rainfall patterns as well as an increased incidence and severity of extreme weather events. Droughts, floods, and heat stress can cause crop failure and reduced yields or death of livestock, with subsequent economic deprivation to farmers and threats to food security for the entire population.

The country: Nigeria is particularly predisposed to the impacts of climate change on its topography and industrial dependence on those sensitive to climatic perturbations. It features an increase in average temperature, frequent and sometimes extreme rainfall events, and alterations to previously established average precipitation patterns. All these have affected the livelihoods of most Nigerians and the economy accrues benefits on behalf of Nigerians. It is the basis of employment of above 60 per cent of Nigeria's economically active population in agricultural activity-the base of Nigeria's economy. Its influence is felt in the production of food as reflected through changes in vegetation, alteration in temperature and rainfall patterns, increased incidence and severity of extreme weather events. Droughts, floods, and heat stress can lead to crop failures and reduced yields or lead to total loss of livestock. All these causes economic deprivation of farmers and create threats to food security among populations.

Economic disasters from climate change hamper quite considerably the country, which in turn worsens environmental problems and the overall well-being of Nigerians (Adejumo, 2021). Climate change is a change in the statistical climate pattern that lasts about ten years or more. For example, as reported by the Intergovernmental Panel on Climate Change (2001), it involves the increasing frequency and intensity of extreme weather events and the gradual rise in global average surface temperature. Climate change, according to the German Advisory Council on Climate Change, is the greatest and most urgent threat to human society and natural environments in both developed and developing countries.

Its effects are far-reaching, influencing health, food production, housing, safety, and employment, with certain areas, particularly small island nations and developing countries, facing increased vulnerability to climate-related issues The impact of climate change on agricultural activities can be examined from multiple perspectives. Changes in climate alter the distribution of rainfall and temperature throughout the year, which in turn affects crop yields, particularly for those crops reliant on rain-fed conditions (Thurlow et al., 2009). Excessive rainfall can damage arable land, harm cultivated crops, promote weed growth, and increase post-harvest losses. Conversely, a significant decrease in rainfall can lead to drier land, reduced water levels in streams and rivers, and an increased need for farmers to seek water for irrigation, ultimately resulting in significant loss of labor hours and decreased crop yields (Ozor, 2009).

In the developed economies, the extent has been minimal by which the effects of climate change have done severe damage because of the great natural advantage, very advanced adaptation strategies and high technology, mechanized agricultural systems, and, more importantly, greater wealth. These factors have helped developed economies reduce the adverse effects of climate change on their economies. For developing countries like Nigeria, the affliction of climate change falls very heavily due to high temperature levels, a limited capacity for adapting to these changes, and a lack of effective early warning systems. Aside from this, climate change also has it said very profound effects on economies heavily reliant on natural resources, especially in the sector of agriculture.

Indeed, the agricultural and agro-allied sectors in Nigeria have great potential for bolstering the growth and diversification of the economy beyond crude oil dependence (Gershon et al., 2019). However, these sectors are subject to adverse climatic conditions, such as temperature and rainfall. The typical April to October rainfall season and the October to March harmattan or dry season have been disrupted by inconsistent changes in rainfall and temperature patterns. On the one hand, inconsistent rainfall has exposed other extreme climatic conditions that could be disastrous to prospective investments in agriculture (Gershon and Patricia, 2019). However, extreme rainfall conditions can also generate many pests and diseases that affect crop yield and animal husbandry, while increased temperatures create favorable conditions for the reproduction of pests and thus further affect crop production.

II. RESEARCH QUESTIONS

- How does climate change affects Nigerian economic growth
- What is the relationship between climate change and economic growth
- How change in annual rainfall and carbon emission related to economic growth in Nigeria

III. RESEARCH OBJECTIVES

The study aimed to investigate the impact of climate change on economic growth in Nigeria, with the following objectives:

- To examine the effects of climate change on economic growth in Nigeria.
- To examine the effects of climate change on sub economic sectors, such as agriculture, water supply, energy, and infrastructure.
- To explore adaptation and mitigation strategies adverse effects of climate change on economic growth.

IV. EMPIRICAL LITERATURE REVIEW

Several empirical studies have examined the impact of climate change on Nigeria's economic growth, yielding varied outcomes.

By leveraging Ordinary Least Squares (OLS) estimates, (Jonathan et al. 2017) considered several variables, including annual rainfall, carbon emissions, and forest depletion. The study found that climate change adversely affects economic growth in both the short and long run. They also found out that forest depletion negatively impacts growth. This recommendation is set for the government to formulate policies concerning carbon emissions and forest depletion. Likewise, (Ajayi and Shola) analyzed how climate change impacts economic growth in Nigeria from 1991 and 2021 using time series data. They used an ARDL model, and their findings confirmed that all four categories of climate change methane, emissions, gases, and liquids adversely affected the economic growth of Nigeria. Overall, the study revealed that the aggregate of all these emissions had adverse effects on the nation to Nigeria economically.

(Foye 2018) analyzed the dynamic relationship between climate change, human health, and the economic growth of Nigeria using the Structural Vector Autoregressive (SVAR) model. Impulse response functions indicated that over the long term, economic growth, climate change, and human health strongly predict one another across the globe and within an economy. Around 0.3% of variance in health comes from economic growth, with around 62.9% being attributed to it. The author deduced that shocks relevant to poor human health have a stronger impact than the milder effects on economic growth. Likewise, (Akambi et al, 2014) examined the link between climate change, human development, and economic growth. They studied data on climate change, human development, carbon emissions, and the country poverty index using quantitative techniques. Their results indicate that significant constraints on human development are what are caused by climate change, and the same human development also has adverse effects on economic growth negatively.

(Gilbert and Ifarajimi 2020) investigated the effects of climate change on economic growth in Nigeria using Fully Modified Ordinary Least Squares (FMOLS) estimator along with Granger causality tests. The study was conducted to determine both impact and causal relationship. The findings revealed that climate change is of adverse effect on per capita income growth rate and hence on the Human Development Index (HDI). Moreover, it had been discovered that carbon emissions had significant negative effects on Nigeria's economic welfare. In a similar study, Domnic et al. (2017) focused their studies on climate change effects on crop output in Nigeria, based on time series data spanning a period of 1980 to 2013. The study had variables such as rainfall, population, and carbon emissions, and employed the Vector Error Correction (VEC) model to analyze the data. In short, it was revealed that, in the short run, rainfall was the only climate factor to have a positively significant relationship with crop output. In the long run, however, all climate factors were found to have significant effects on crop output.

(Gershon and Mbajekwe, in their 2020) research, studied the effect of climate change on agricultural production in Nigeria. According to their econometric analysis employing the Autoregressive Distributed Lag (ARDL) model, a long-run relationship between climate change and crop production was found, but the same could not be said for livestock production. It was found that long-run positive and significant impacts of rainfall and carbon emissions could be observed on crop production. Similarly, (Kareem et al., 2023) examined the effect of climate change and population growth rates on economic growth using a spinning time-series data set from 1986 to 2021 while employing the Autoregressive Distributed Lag (ARDL) model for the analysis. First lag of LNGDP had a significant relationship with economic growth at both 10% and 1% levels, as the analysis results indicated. From the findings of the study, the birth growth rate and sole migration affected the economic growth in positive and negative ways between the third lag and the economic growth. It also established a causal relationship between crude death rate and economic growth.

Detailed research has been conducted by (Ubokudom et al. 2024) on the nexus between climate change, poverty, and agricultural performance in Nigeria by using time series data spanning from 1980 to 2012. According to the findings of the study, forest depletion, carbon emissions, and government spending on agriculture have an appreciable negative effect on actual gross domestic product (GDP).

Agricultural performance, on the other hand, was found to have a significant positive effect on economic growth. The other findings also showed that increasing temperatures have adverse effects on poverty levels. Similarly, (Fayemi 2020) assessed the impact of climate change and global warming on sustainable development and socio-economics. This study used descriptive statistics as data analytical tools and made use of a simple random sampling method to sample 100 residents from five selected streets in Ijebu Ode metropolitan area, Ogun state, Nigeria. The findings indicated that climate change and global warming produced results such as soil erosion, flooding, desert encroachment, drought, and environmental imbalance, which constitute many threats to sustainable livelihoods and socio-economic well-being within the area of study.

This study was undertaken by (Adelegun and Enyoghasim 2020) as empirical research on climate change-energy consumption-economic growth relationships. A framework of a Vector Autoregression Model was the applied mode of analysis to establish dynamic relationships among these three variables. Results from the study establish that climate change clearly exhibits joint Granger causality with energy use and GDP. This, in essence, implies that climate change and energy productivity have joint significant relations with gross domestic product. In the same way, (Ogbeide-Osaratin 2022) did a depth study on the nexus between climate change, poverty, and income inequality in Nigeria from time series data between 1980 and 2020. The study applied dynamic ordinary least squares econometric analysis for the investigation. The study found that climate change and income inequality had a significant relationship, and the U-shaped hypothesis about climate change in relation to income inequality was supported.

(McCarty and Aderem in 2019), analyzed the health impacts of environmental quality in Nigeria with respect to the sustainable economic development aspect of the study. A dynamic ordinary least squares (DOLS) method was employed in the analysis. The results show that a negative and insignificant relationship exists between carbon emissions and mortality rates. Whereas, the study finds a unidirectional relationship where carbon emissions determine electricity consumption and vice-versa, it also finds that carbon emissions Granger-cause government health expenditures. (Ceesay et al., 2020), used econometric approaches to investigate the nexus between climate change and economic growth. It covered a panel estimation method, fixed effects, random effects, and Fisher-unit root test with a trend constant. Their results indicated a very significant negative impact of economic growth on poverty growth in the chosen West African countries and mentioned that the urban population has a key role in the growth of poverty with a strong connection with food security

V. RESEARCH METHODOLOGY

The research methodology section explains the methodology adopted in data collection and analysis, and it encompasses research data sources, research design and model specification.

VI. RESEARCH DESIGN

The research will take the form of a quantitative research design, econometric modeling; an assessment of the impact of climate change in Nigeria on economic growth. The study will aim to quantify the impact of climate change on economic growth in Nigeria. The research sets out to investigate the extent of climate change's effect on the Nigerian economy using econometric models and statistical analysis. The data will be collected from the Central Bank of Nigeria, National Bureau of Statistics, and World Development Index from 1980 until 2023. The data will be analyzed using Autoregressive Distributed Lag Model (ARDL). Thereafter, the outputs of the models will be interpreted and lead to salient policy recommendations. Specifically, this study will be carried out through ARDL, which application is considerably adequate for this sort of analysis. Method (Model Specification) The Autoregressive Distributed Lag (ARDL) model was employed to investigate the impact of climate change on economic growth in Nigeria. To assess the stationarity of the variables, a unit root test was performed using the Augmented Dickey-Fuller (ADF) method. The dependent variable, GDP, was found to be stationary at level, while the other regressors were stationary at first difference. This stationarity enables the application of the ARDL model to conduct Johansen cointegration, which allows for estimating the relationship between climate change and economic growth

VII. DATA SOURCES

The secondary dataset is used for this study because of the nature of the variables in the study. The data has been extracted from the national bureau of statistic and central bank of Nigeria database. These variables are carefully selected based on the strong theoretical basis with which they affect the influence of climate change on economic growth, for-example GDP, AGR, ARF, as well as C02. The data spanned between 1980 and 2023 which gives 44 observations in total. The detail data are given below

VIII. RESEARCH HYPOTHESIS

The following are the research hypothesis which divided in to Null and Alternative

- H_0: There is no significant connection between climate change and economic growth in Nigeria.

IX. MODEL SPECIFICATION

The study seeks to investigate the effects of climate change on economic growth in Nigeria, utilizing the Autoregressive Distributed Lag (ARDL) The functional relationship between climate change and the economic growth rate can be expressed as follows:

RGDP is dependent variable
AGR, ARF and CO2 is independent
RGDP = f (AGR + ARF + CO2). (1)
The model becomes

$$RGDP_t = \gamma_0 + \Sigma\Delta\gamma_1 AGR_{t-1} + \Sigma\Delta\gamma_2 ARF_{t-1} + \Sigma\Delta\,\gamma_3 CO2_{t-1} + u_i. \quad (1)$$

whereas
GDP = Dependent variable by growth rate of real GDP
γ_0 = Intercept
$\gamma_{1-\gamma_3}$ are parameter to be estimated.
AGR = Agriculture
ARF = Annual rainfall
C02 = Carbon emission.
t = Number of years (44 Observation)
ε = Error term or stochastic account the important other variables that are not included in the model.

X. RESULT AND DISCUSSION

Table 1 Unit Root Test

Test	Variables	Percentage	T-Statistic	Probability	Stationarity
ADF	GDP	1% 5% 10%	-3.626784 -2.945842 -2.611531	0.0021	I (0)
	AGR	1% 5% 10%	-3.596616 -2.933158 -2.604867	0.0007	I (1)
	ARF	1% 5% 10%	-3.596616 -2.933158 -2.604867	0.0009	I (1)
	C02	1% 5% 10%	-3.596616 -3.933156 -2.604867	0.0000	I (1)

Source: Author Computation EVIEWS

The above highlights the results of the unit root test: investigating the properties of the data to assess its stationarity, i.e., whether it has a unit root and the order of integration. The Augmented Dickey-Fuller test was performed in this context, and stationarity results with an intercept term are displayed in the table. The table shows that all variables are stationary-the dependent variable GDP is stationary at level and denoted as I (0) while the other explanatory variables agriculture, annual rainfall usage, and carbon emissions are stationary at first difference-denoted as denoted I (1)-with statistical significance of the first and second using the absolute values of every t-statistic. And also, because all t-statistics are greater than the probability values assigned to them, this order of integration indicates the possibility of no long-run relation regarding climate change and economic growth in Nigeria. Given the order of integration i.e. I (0) and I (1), the autoregressive distributed lag (ARDL) model is considered appropriate for this study. This model presents very unique advantages over other models when considering it for econometric analysis.

Table 2: Johansen Cointegration Test

Hypothesize No of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob Critical Value
None	0.422979	41.99997	47.85613	0.1587
At Most 1	0.202012	18.90515	29.79707	0.4998
At Most 2	1.185880	9,427386	15.49471	0.3273
At Most 3	0.018638	0.790177	3.841465	0.3740

Source: Author Computation EVIEWS 2024

Johansen cointegration test supplies show, by all means, that we have no basis to reject the null hypothesis; i.e. No cointegration relationship, at most 1 cointegration relationship, at most 2 cointegration relationships, and at most 3 cointegration relationships-the reference of all this is not at level values which trace tests do not exceed the critical value in terms of probability greater than 0.05%, we cannot reject the null hypothesis of no cointegration relationship. Hence with a table where trace statistic level is less than the critical value at 0.05%, the overall conclusion drawn is that there is no evidence of cointegration relationship between series at the 5% significant level; that is, there is no co-integration among variables, thus implying a lacking long-run mutual gain between climate change and economic growth in Nigeria. In other words, the time series will not be moving together in the long run, and any relationship that is short term is likely not due to an equilibrium over the long run. Thus, Autoregressive Distributed Lag Model would be the perfect study model and there's no error correction model test needed.

Table 3: Autoregressive Distributed Lag Model

Variables	Coefficient	Std Error	T - Statistic	Prob
GDP (-1)	0.632753	0.127216	4.973866	0.0000
AGR	4.052366	0.173292	23.38461	0.0000
AGR (-1)	-2.104624	0.579171	-3.633857	0.0008
ARF	-4.29E+09	1.59E+09	-2.706453	0.0102
C02	-1.47E+10	6.71E+09	2.190050	0.0349
C	7.75E+09	2.32E+10	-0.333379	0.7407
R. Square	0.994109	Mean of Dependent Variable		2.75E+11
Adjusted R. Square	0.993313	S.D Dependent Variable		1.47E+11
SE Regression	1.20E+10	Akaike Information Criteria		49.38517
Sum Square Residual	5.34E+21	Schwarz Criteria		49.63092
Log Likelihood	-1055.781	Hannan-Quinn Criteria		49.47580
F – Statistic	1248.840	Durbin Watson Statistic		1.323117
Prob Statistic	0.000000			

Source: Author Computation EVIEWS 2024

Surveying from the ARDL table 3, the outcome implies that if GDP has an increase of one unit from the previous period, then simply from this, the current GDP increases by 0.63 units indicating a strong positive relationship whereby current GDP is influenced by past GDP. Similarly, the coeffiant of agriculture indicates for a one percent increase in climate related event in the current period is associated with decrease of agricultural productivity leading to 2.10% decrease in GDP signified strong negative impact of climate change to GDP due to increase in temperature and change in rainfall pattern which can lead to crop failure and reduce the yield.

The annual rainfall ARF indicate a large negatives coeffiant of annual rainfall -4.29 suggest that an increase in annual rainfall is associated with decrease I in economic growth this inverse relationship showed that excessive rainfall can lead to flooding and damage infrastructure such as road, bridges and transport system which disrupting economic growth due to climate related events. this indicates inefficiency and poor management of total annual rainfall in Nigeria. Whereas negative coeffiant C02 carbon emission 1.47 indicate that as C02 increase economic growth tend to decrease because C02 greenhouse contribute to climate change as C02 rise they can lead to the change in temperatures, precipitation pattern and other environmental conditions. This coefficient also revealed that for a one unit increase in C02 carbon emission is associated with a 1.47billion unit decrease in GDP is currently linked to a higher emission this concludes that more C02 emission low output low economic growth in Nigeria.

The R-squared value of 0.994109 shows a strong and positive relationship between the dependent variable (GDP) and the explanatory variables (AGR, CO2, and ARF). This means that about 99.41% of the variation in Nigeria's GDP from 1980 to 2023 is explained by these variables, while the remaining 0.59% is due to other factors not included in the model. This indicates the model has a good fit. Similarly, the adjusted R-squared value of 0.993313, which accounts for the number of predictors, is slightly lower but still indicates the model is robust and performs well.

F – Statistic 1248.849 with corresponding prob of 0.000000 indicate the overall model is statistically significant suggesting that at least one predictor is significantly explained the GDP variability. Whereas Residual sum of square 5.34% value reflect the discrepancy between observed and predicted value also indicating better fit of the model

The standard error of 1.20 and mean of dependent variable of 1.75 showed the correctness statistical significance and reliability of the parameter estimate the computed standard error is smaller than the mean of dependent variable this indicate there is statistical significance between AGR, ARF, C02 and real GDP. Additionally, Durbin Watson statistic uses to observe the presence of serial correlation between the variable separated from each other in given time lag Durbin Watson should be 2.00 if its less than 2.00 it indicates presence of autocorrelation. Base on ARDL result Durbin Watson statistic of 1.323117 indicate there is presence of serial correlation as such there is need to conduct a Breusch Godfrey LM test in order to minimize the rate of serial correlation.

XI. DIAGNOSIS TEST

Table 4: Breusch Godfrey Langrage Multiplier

F – Statistic	4.632658	Probability F (2,35)	0.0164
Observed R. Squared	9.000468	Prob. Chi-Square (2)	0.0111

Source: Author Computation EVIEWS 2024

The table displays the results from the Breusch-Godfrey LM test, where an F-statistic equal to 4.632658 is significant at the level of 5%. Since F (2,35) is above 0.005, it means we do not reject the null hypothesis of cultureless comes states there are no significant serial correlations in the remainders. Further, the R-squared value of 9.000468 indicates that lagged residuals bring forth only 9.00468% of variations in the residuals. Such minor variations add strength to our inference regarding the absence of any significant serial correlation in the residuals for the ARDL model.

XII. IMPLICATION AND RECOMMENDATIONS

Reference to aforementioned finding, the following policy and recommendations should be suggested.

There is need to enhance policies and programs for support to farmers adopting dry-resistant crops, ways of improving irrigation systems, and reducing the level of dependency on rain-fed agriculture have to be introduced. The government should set up early warning systems for the fore-coming and existing climatic hazards; they will also develop the capacities of communities to respond to extreme weather events.

There is need to Invest in infrastructure that enhances the resiliency of communities to climate change: flood control measures, coastal protection systems, and water infrastructure for drought-resilience.

Government should increase awareness and expound for citizens about the influence of climate on economic growth and motivate collective action in reducing its effects. This would enhance the sense of responsibility and driven policy to support a climate change mitigation and adaptive measures.

Government should encourage climate change resilient agriculture in order to support farmers in adapting new practice that will enhance productivity while reducing climate change impact through investing in drought-tolerant crops, irrigation system as well as sustainable land management practice.

There is need to develop and implement strategies to improve rainwater catchment and storage systems to reduce water waste and promote water conservation, thus mitigating the adverse effects that decreased rainfall has on economic growth.

The government should invest in climate change adaptation by increasing the resources allocated to strengthen infrastructure, enhance disaster preparedness, and build resilient communities against the vulnerable. This intervention is meant to reduce the economic costs associated with such disaster's climate change related occurrences.

There is need to implement policies and programs that bring with them support to farmers adopting drought-resistant seeds, mechanisms of irrigation, or lessened reliance on rain-fed agriculture.

XIII. CONCLUSION

The study conducted an empirical analysis on the effects of climate change on economic growth in Nigeria from 1980 to 2023. Due to the nature of the study, the Autoregressive Distributed Lag (ARDL) model was applied to capture the impact of climate change on economic growth. The findings revealed that, in the short run, both agricultural production, CO2 emissions and annual rainfall have negatively impact on economic growth in Nigeria due to climate related events such as changes in rainfall pattern extreme weather and rising in temperature have significantly undermined the country's economic performance. This suggests that higher CO2 emissions led to increased output and economic growth, though it raises environmental concerns.

Strategies should be developed to enhance rainfall capture and storage, minimizing water wastage and promoting conservation. These measures will help mitigate the negative effects of reduced rainfall on Nigeria's economic growth The results suggest that the Nigerian government should implement policies to reduce CO2 emissions, as they pose environmental concerns. This can be achieved by promoting the use of environmentally friendly equipment, machinery, and technologies that generate minimal greenhouse gases. Improving road and rail transport, adopting biofuels, and using energy-saving devices are key steps in this direction.

APPENDIX

Unit Root Test GDP Unit Root at Level

Null Hypothesis: GDP has a unit root				
Exogenous: Constant				
Lag Length: 7 (Automatic - based on SIC, maxlag=9)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-4.223621	0.0021
Test critical values:	1% level		-3.626784	
	5% level		-2.945842	
	10% level		-2.611531	

C02 At First Different

Null Hypothesis: D(C02) has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic - based on SIC, maxlag=9)				
			t-Statistic	Prob.*

Augmented Dickey-Fuller test statistic			-7.002590	0.0000
Test critical values:	1% level		-3.596616	
	5% level		-2.933158	
	10% level		-2.604867	

Aru At First Diffrernt

Null Hypothesis: D(ARU) has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic - based on SIC, maxlag=9)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-4.472734	0.0009
Test critical values:	1% level		-3.596616	
	5% level		-2.933158	
	10% level		-2.604867	

Agr At First Different

Null Hypothesis: D(AGR) has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic - based on SIC, maximum lag=9)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-4.538110	0.0007
Test critical values:	1% level		-3.596616	
	5% level		-2.933158	
	10% level		-2.604867	

Johansen Cointegration Test

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized		Trace	0.05	Prob.**
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Critical Value
None	0.422979	41.99997	47.85613	0.1587
At most 1	0.202012	18.90515	29.79707	0.4998
At most 2	0.185880	9.427386	15.49471	0.3273
At most 3	0.018638	0.790177	3.841465	0.3740
Trace test indicates no cointegration at the 0.05 level				

Autoregressive Distributed Lag Model				
Method: ARDL				
Date: 09/11/24 Time: 17:01				
Sample: 2 44				
Included observations: 43				
Dependent lags: 1 (Automatic)				
Automatic-lag linear regressors (1 max. lags): AGR ARU C02				
Deterministic: Restricted constant and no trend (Case 2)				
Model selection method: Akaike info criterion (AIC)				
Number of models evaluated: 8				
Selected model: ARDL (1,1,0,0)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.*
GDP (-1)	0.632753	0.127216	4.973866	0.0000
AGR	4.052366	0.173292	23.38461	0.0000
AGR (-1)	-2.104624	0.579171	-3.633857	0.0008
ARU	-4.29E+09	1.59E+09	-2.706453	0.0102
C02	1.47E+10	6.71E+09	2.190050	0.0349

C	-7.75E+09	2.32E+10	-0.333379	0.7407
R-squared	0.994109	Mean dependent var		2.75E+11
Adjusted R-squared	0.993313	S.D. dependent var		1.47E+11
S.E. of regression	1.20E+10	Akaike info criterion		49.38517
Sum squared resid	5.34E+21	Schwarz criterion		49.63092
Log likelihood	-1055.781	Hannan-Quinn criter.		49.47580
F-statistic	1248.849	Durbin-Watson stat		1.323117
Prob(F-statistic)	0.000000			

Godferry Srial Lm Test

Breusch-Godfrey Serial Correlation LM Test:			
Null hypothesis: No serial correlation at up to 2 lags			
F-statistic	4.632658	Prob. F (2,35)	0.0164
Obs*R-squared	9.000468	Prob. Chi-Square (2)	0.0111

REFERENCES

[1] Adejumo, M.O. (2021). Climate Change and Economy in Nigeria:Auantitative Approach, 1980-2017. University of Lagos, Department of Economics, Nigeria. (ACE) Acta Economica, Vol. XIX, No. 34, 2021 169 – 186

[2] Adelegan, A. E., & Enyoghasim, M. O. On the Relationship Between Climate Change, Energy Use and Economic growth.

[3] Afolayan, O. T. & Aderemin, T. A. (2019). Emvironmental quality and health effect in Nigeria implication for sustainable economic development SSRG International journal of Economic and management study SSRG (IJEMS) 6(11) 44-55

[4] Akanbi, B. E., Adagunodo, M., & Satope, B. F. (2014). Climate change,human development and economic growth in Nigeria. International Journal of Humanities and Social Science, 4(13), 222-228.

[5] Agba, D. Z., Adewara, S. O., Adama, I. J., Adzer, K. T., & Atoyebi, G. O. (2017). Analysis of the effects of climate change on crop output in Nigeria. American Journal of Climate Change, 554-571

[6] AJAYI, I. S. (2024). Effects of Climate change on Economic Growth in Nigeria.

[7] Ceesay, E. K., Oladejo, H. O., Abokye, P., & Ugbor, O. N. (2020). Econometrics Analysis of the Relationship between Climate Change and Economic Growth in Selected West African Countries. Energy and Environment Research. https://doi. org/10.5539/eer. v10n2p39

[8] Fayemi, J. A. (2020). Effects of Climate Change and Global Warming on Sustainable Development and Socio-Economic Life of Ijebu-Ode Indigenes of Nigeria. Journal of Sustainable Development in Africa, 22(1), 95-103.

[9] Gershon, O., & Mbajekwe, C. (2020). Investigating the nexus of climate change and agricultural production in Nigeria. International Journal of Energy Economics and Policy, 10(6), 1-8.

[10] Gershon, O., Patricia, O. (2019), Carbon (CO2) Footprint determination: An empirical study of families in port Harcourt. Journal of Physics: Conference Series, 1299, 012019

[11] Intergovernmental Panel Climate Change [IPCC], (2018). Summary for Policymakers. In: Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above preindustrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat ofclimate change, sustainable development, and efforts to eradicate poverty, V. Masson-Delmotte, et. al., Editor. 2018: www.ipcc.ch/sr15/chapter/spm

[12] Kareem, R. O., Isiaq, T. S., Fabunmi, B. E., & Taiwo, A. B. (2023). Climate Change and Population Growth Rate: any Implications for Economic Growth in Nigeria. Valahian Journal of Economic Studies, 14(2), 111-129

[13] Mcguigan, C., Reynolds, R., Wiedmer, D. (2002), Poverty and Climate Change: Assessing Impacts in Developing Countries and the Initiatives of the International

Community. London: School of Economics Consultancy Project for the Overseas Development Institute
[14] Ogbeide-Osaretin, E. N., Orhewere, B., Ebhote, O., Akhor, S. O., & Imide, I. (2022). Climatechange, poverty and income inequality linkage: empirical evidence from Nigeria. International Journal of Energy Economics and Policy, 12(5), 332-341
[15] Ogbuabor, J.E., Egwuchukwu, E. I (2017). The impact of climate change on the Nigerian economy. International Journal of Energy Economics and Policy, Econjournals, Vol. 7(2), pages 217-223
[16] Onyejiuwa, D. C. (2020) The Impact of Climate Change on Economic Growth in Nigeria
[17] Ozor, N. (2009), Implications of Climate Change for National Development the Way Forward, African Institute for Applied Economics (AIAE), Enugu Forum Policy Paper 10.
[18] Thurlow, J., Zhu, T., Diao, X. (2009), The Impact of Climate Variability and Change on Economic Growth and Poverty in Zambia. IFPRI Discussion Paper 00890. Washington, DC: International Food Policy
[19] Ubokudom, A. I., Onyeaghala, I. D., & Opara, J. K. (2024). Assessment of Climate Change, Poverty and Agricultural Growth Performance in Nigeria (1980 – 2017). Journal of community & Communication Research, 9(1), 19 - 28