# ANALYSING THE EFFECT OF CARBONN DIOXIDE EMISSION ON AGRICULTURAL OUTPUT IN NIGERIA

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## ABSTRACT

*Over the years there is decrease in agricultural output in Nigeria and was as a result of global warming which was cause by carbon dioxide emission, this has affected food production, crop production and agricultural output respectively. This study investigates effect of carbon dioxide emission on agricultural output in Nigeria. The study adopted transposed second generation of environmental Kuznets curve model which defines growth (agricultural output) as a function of CO2 Emission. Secondary data were sourced from World Development World Indicator (WDI) 2024 from 1981 to 2023. The study employs auto regressive distributive lag (ARDL) bound test of cointegration and error correction model (ECM). The result shows that F-statistics having a value of 3.420965 in model 1which is greater than the values of the lower bound (2.39) and the upper bound (3.38) at 5% level of significance. Also in model 2, the coefficient of F-statistics is 6.253450 which is greater than the critical value of lower bound I(0) and upper bound I(1) of 3.38. Again model 3 having the coefficient of F-statistics 9.955424 that is greater than both the lower and the upper bound test at 5% level of significance. Therefore, the null hypothesis of no long run co-integration was rejected. The Durbin-Watson statistic of 1.636522, 1.711298, 2.033171 and 1.852129 indicates no autocorrelation in the residuals. The overall regression is significant at 1 percent as can be seen from the R-Squared and the F-statistic. R-Squared of 0.775638, 0.761528, 0.714938 and 0.956523 indicate about 77%, 76%, 71% and 95% of variation in endogenous variable AGRIC.GDP, FOOPROD, CROPPRO is explained by changes in exogenous variables. Also, an F-statistic value of suggests significance of the determinants in the ECM. The study recommended that Nigeria government needs to have a serious priority to agricultural sector. The current climate change effect can be minimized if policy toward mitigation is geared. Agricultural output can be increased and sustained by developing agricultural technologies that are environmentally sensitive through trade openness. Also agricultural innovation that increase soil nutrient and not contribute to change in climate change be encouraged.*

**Keyword:** carbon dioxide emission, agricultural output, sustainable development goal, climate vulnerability.

## 1.0 INTRODUTION

Agricultural Sector is the engine of every country's development. It is a multiplier effect on any nation's socio-economic and industrial fabric because of the multifunctional nature of the sector. Agricultural output has


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potential to be industrial and economic springboard from which development can take off. In Africa, the agriculture sector (output) remains the main source of livelihood for most rural communities in general. It provide a source of employment for than 60% of the population and contributes about 30% of gross domestic product ( Olawuyi, Mohammed & Adeniyi, 2020). In Nigeria, agriculture is the main source of food and employs about 60-70 percent of the population (Olawuyi et al, 2020). Furthermore, it is significant sector of the economy and source of raw material used in the processing industries as well as a source of foreign exchange earnings for the country.

Since agriculture in Nigeria is mostly rain-fed it follows therefore that any change in climatic is bound to impact its output in particular and other socio-economic activities in the country. The impact could; however be measured in terms of effect on crops growth, food production, availability of soil water, soil erosion, incident of pest and diseases, sea level rises and decrease in soil fertility (Adeniyi, 2020). The northeast region of Nigeria is increasingly becoming an arid environment at a very fast rate per year with dessert encouragement due to human activities while in the south east, south south and the North West are face with flooding as result of rising temperature. Climate change resulting from carbon dioxide emission is the most severe problem that world is facing today. It has being suggested that it is a more serious threat than global terrorism (king, 2019).

There are predictions that the average global temperature will heat up from 0.9 oC to 1.5 oC by 2050 and could be higher based on the desertification indicator (Arora, 2019). Since global temperatures have risen substantially over the years due to climate change, many environmental diseases caused by extreme weather e.g., cold spells and heat waves affect the attitude, topography, and cause environmental disturbance on yields, and portend serious threats to livestock(Arora 2019)

The implosive dangers due to the inestimable effect of climate change remain a major policy problem because it could cause development reversal through famine due to agricultural yield and food value chain disasters. Based on the annual report by Weather, Climate, and Catastrophe Insight, natural disaster costs to the global economy between 2016 and 2018 increased from $200 billion per year to $225 billion per year. Similarly, the 2020 World Food Program report, Global Assessment of Land Degradation and Improvement, and United Nations Environment Program have jointly estimated that crop yield per hectare is significantly slower than the population growth, a quarter of the land area globally is degraded due to anthropogenic activities and climate change, and more than 600 million hectares of farmland have become infertile due to drought and desertification, respectively (FAO, 2020).

Over the years there is decrease in agricultural output in Nigeria as a result of dessert encroachment, flooding which has affected many parts of the country and this brought food insecurity in the Nation. In preamble to the 2030 agenda of sustainable development goal target, world leaders affirmed that they are determinant to protect the planet from degradation, including through sustainable consumption and production, sustainably managing its natural resources and taking urgent action on climate change, so that it can support the needs of the present and future generations. Carbon dioxide (CO2) emissions and climate change have significant implications for agricultural output in Nigeria (Ezeaku, 2020). Severe


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environmental disruptions affect agricultural performance because they have causal link (Opeyemi 2019). The agricultural sector and global food security are deeply correlated (shahzad etal, 2021). As a developing nation heavily reliant on agriculture, Nigeria faces unique challenges in mitigating the adverse effects of climate change and ensuring sustainable agricultural practices (Ezeaku, 2020; Adejuwon, 2019). The changing climate patterns, including drought, flow disaster, altered rainfall distribution, rising temperatures, and increased frequency of extreme weather events, pose severe threats to crop yields, livestock production, and overall food security in the country (Adejuwon, 2019; Ayoola et al., 2018). These impacts not only affect farmers' livelihoods but also hinder Nigeria's ability to meet its food demands and exacerbate existing socio-economic challenges (FAO, 2020).

While some research has been conducted on the impacts of climate change on agricultural productivity in Nigeria, there is a need for a comprehensive analysis of the specific effects of carbon dioxide emissions and climate change on the agricultural sector (Ezeaku, 2020; Adejuwon, 2019). Understanding the key challenges faced by farmers, identifying potential solutions, and developing evidence-based policies and strategies are crucial to promoting resilient agricultural systems and ensuring sustainable food production in Nigeria (Ayoola et al., 2018; Olawuyi et al., 2020). Best to my knowledge, most of the study use single variable to proxy agricultural output Therefore, this study aims to address this research gap using three different proxy of agricultural output and form three model also climate change will be proxy by two variable to examining carbon dioxide emission, climate change and agricultural output in Nigeria with following specific objective: to examine the effect of carbon dioxide emission on agricultural output, to investigate the relation exist among carbon dioxide emission fertilizer, deforest depletion trade openness, technology and agricultural output in Nigeria. Again the study employ, ARDL bound test and ECM to test the following hypothesis (i) H0: carbon dioxide emission, climate change has no significant effect on agricultural productivity in Nigeria.(ii) H0: There exist no long run relationship between carbon dioxide emission, climate change and agricultural output in Nigeria.

## 2.0 LITERATURE REVIEW

### Conceptual clarification

Carbon dioxide emission: Carbon dioxide ($CO_2$) emissions refer to the release of carbon dioxide gas into the atmosphere as a result of human activities, such as burning of fossil fuels, deforestation, and industrial processes. These emissions are the primary driver of anthropogenic climate change (Intergovernmental panel on climate change (IPCC), 2014).

Climate change refers to long-term alteration in temperature, precipitation patterns, wind patterns, and other aspect of the Earth's climate system. It is primarily caused by human activities, such as greenhouse gas emissions, and has far reaching impacts on ecosystems, weather patterns and socio-economic system.

Agricultural productivity: Agricultural productivity refers to the efficiency and output of agricultural system in producing food, fiber, and other agricultural commodities. It is influenced by various factors,


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including climate change, soil conditions, water availability, and agricultural practices (Food and Agriculture Organization of United Nation (FAO) 2017).

**Theoretical Literature**

Analytically, the environmental Kuznets curve (EKC) is employed to estimate the relationship between pollution and income per capita. The leading critiques of the EKC have argued that the econometric framework of EKC is subjective (Arrow et al., 1995; Copeland & Taylor, 2004; Stern, 1998). Dasgupta (2002) argued that EKC is monotonic. There are two perspectives to this argument namely new toxics and race-to-the-bottom scenarios. The new toxics scenario posits that EKC does not hold for new toxics e.g., carcinogenic chemicals, and carbon dioxide. On the other hand, the race to the bottom scenario asserts that EKC is inconsistent because of the outsourcing operation by developed countries in which they outsource dirty production to developing countries thereby making it increasingly difficult for emissions to be reduced. The revised EKC further argued that arising from inevitable technological changes, EKC shows a downward curve behavior shifting to the left (Stern, 2004). Stern (2004) contends that the proximate causes that define the EKC relationship are namely, the scale effect (expansion), the changes in economic structure or product mix, changes in the technological state, different industrial pollution, and changes in input mix.

In a similar vein, scholars try to decompose pollution, a major issue in the EKCs. Selden and Song (1994) estimated EKCs using four-dimensional series namely SO2, NOx, SPM, and CO2. Shafik and Bandyopadhyay (1992) studied EKC from 10 indicators. Grossman and Krueger (1991) estimated EKCs using SO2, dark matter (fine smoke), and suspended particles (SPM). In a related development, pollution was decomposed into local pollution and global pollution in the study of EKC (Lopez, 1994). According to Lopez (1994), local pollution is amenable to EKC rather than global pollution. Also, pollution generated from consumption rather than production was considered in a study such as McConnel (1997).

Empirically, the EKC is conceptualized in the literature from two generations of analysis. Firstly, first-generation EKC (FGEKC) conceptualized a two-phased dimension: increasing and decreasing functional relationship between income inequality and economic development expansion over time (Kuznets, 1955). Secondly, FGEKC estimated that income inequality first rises and then falls as economies develop. In the second generation, the concept of EKC (SGEKC) further hypothesized a two-dimensional relationship between pollution events and economic growth per capita (Grossman & Krueger, 1991; Shafik & Bandyopadhyay, 1992). The apparent difference between FGEKC and SGEKC is the attention placed on income inequality (FGEKC) and GDP per capita (SGEKC). The underpinning argument anchored in both FGEKC and SGEKC is that pollution is sub-specie of development. Based on development realities, EKC argued that greater economic activity constitutes a task to environmental quality through technology-pollution channels. The SGEKC, therefore, views the scale effect as the core explanatory variable on the relationship between environmental pollution and income per capita. Within the SGEKC, two methodological frontiers exist that decomposed the two-dimensional EKC into a square-EKC model and a cubic-EKC model. The SGEKC model estimated a functional relationship between environmental pollution and quadratic (or cubic) GDP per capita.


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**Empirical Literature**

Jonathan and Emmanuel (2023) examined the impact of climate change on the Nigerian economy using secondary data from 1981 to 2014. The study used OLS and Johansen co- integration and the result indicate that both in the long-run and short-run, carbon emission affect growth adversely in Nigeria.

However the period between 2014 and 2023 is huge which so many economic activities may have occurred within the period which the study did not take into consideration. Also the study uses a single variable that influence climate change which is not enough to give conclusion.

Another study by Akomalafe, Awoyemi and Babatunde (2018) investigates climate change and its effect on agricultural outputs in Nigeria using cross sectional data from January to April 2016. Autoregressive Distributed Lag (ARDL) bound test of co-integration approach was used to analysis the data. The result shows that climate change is significant in influencing agricultural productivity in the short run. However the study fails to addressed the likely problem why the result is not significant in long run.

Opeyemi, et al. (2021) investigate effect of climate change on Agricultural productivity in Nigeria: A cointegration Model Approach. Time series data were employed analyze using descriptive and cointegration. The result revealed that climate change has negative effect on agricultural productivity. However the study used temperature to proxy climate change which is not a good measure of climate change.

Ominyi and Abu (2017) used vector auto regressive (VAR) and Granger causality test to investigate the climate change and income per capita in Nigeria using data from 1986 to 2015. The study indicates that increase in income per capita and carbon dioxide (CO2) emission in the country. However, the study concentrated on only two variable GDP per capita and CO2 emision.

Lapinskiene, et al. (2016) tested the carbon emission, climate change and environmental kuznet curve (EKC) relationship between greenhouse gases (GHG) and per sectional data from 1995 to 2008. The result confirms the presence of inverted.

Asank (2019) investigated the carbon emission, economic growth energy consumption and trade openness in Ghana from 1980 to 2011 using Johansen co integration test, erro correction model (ECM) and Granger causality. The result from the co-integration test indicates a long run relationship amongst the variables. Granger causality test showed a unidirectional causality from energy consumption and trade openness in Ghana. A sank test johansen co-integration without knowing the direction of the variables.

**Theoretical Framework**

In line with study by Guterres (2020), this study undertook modifications in the baseline model EKC by transposing the SGEKC i.e., interchanging the LHS and RHS function in the SGEKC. The modified


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SGEKC does not consider the quadratic changes in the regressors. This is because, only one type of growth (GDP) i.e., agricultural contribution to GDP (Agric. GDP) is considered in this study.

## 3.0 METHODOLOGY

### Research Design

Data were sourced from World Development Indicators (WDI) 2024. This study adopts a quasi-experimental research design. ARDL method was utilized to account for time-varying impacts of climate variability (proxy by CO2 emission and CO2 intensity) on Agricultural GDP (Agric GDP), food production index (FOODPI), and crop production index (CROPI) in Nigeria. From the literature, poverty is linked with climate variability through drought, flood, extreme temperature index, desertification, etc., which causes a decline in crop yield as well as causes investment risk in the agribusiness outlook. Hence, employment falls and inflation grew which cripples' income and standard of living thereby leading to poverty.

### Model Specification

This model is adapted from the work of Amaefule, Shoaga, Ebelebe & Adeola (2023), agricultural contribution to GDP (Agric. GDP) is considered in this study. Hence,

Agricu.GDPt = f (CO2Emission) (1)

Where agricultural productivity is proxy by Agric.GDP, FOODPRO, CROPPRO as follows:

$Agric.GDPt=f\ (CO2Emissionst,)$ (2)

Where CO2 Emissions and intensity is proxy by carbon emissions:

$Agric.GDPt=f\ (CO2Intensityt,)$ (3)

$$AGDP_t = \beta_0 + \beta_1 CO2EM_t + \beta_2 FCPL_t + \beta_3 TLF_t + \beta_4 GCF_t + RINT_t + \beta_1 INF_t + \beta_2 PMCL_t + \beta_3 AVDPW_t + \beta_4 GCF_t + \mu_t \quad (4)$$

$$Foodpl_t = \beta_0 + \beta_1 CO2INT_t + \beta_2 FCPL_t + \beta_3 INF_t + \beta_4 AVDPW_t + FERCON_t + \beta_1 POP_t + \beta_2 EMPLAGR_t + \beta_3 ARABLND_t + \mu_t \quad (5)$$

$$CrooPL_t = \beta_0 + \beta_1 CO2INT_t + \beta_2 FCPL_t + \beta_3 INF_t + \beta_4 AVDPW_t + FERCON_t + \beta_1 POP_t + \beta_2 EMPLAGR_t + \beta_3 ARABLND_t + \mu_t \quad (6)$$

The model is modified by including trade openness and technology to form another model:

$$AGDP_t = \beta_0 + \beta_1 CO2EM_t + \beta_2 FERZ_t + \beta_3 FORDL_t + \beta_4 INFL_t + \beta_5 RINTR_t + \mu_t \quad (7)$$

$$AGDP_t = \beta_0 + \beta_1 CO2INS_t + \beta_2 FERZ_t + \beta_3 FORDL_t + \beta_4 INFL_t + \beta_5 RINTR_t + \beta_6 TRO + \beta_7\ GFCF + \mu \quad (8)$$

$$AGDP_t = \beta_0 + \beta_1 CO2INS_t + \beta_2 TRO_t + \beta_3 GFCF_t + \beta_4 POP_t + \beta_5 RINTR_t + \mu_t \quad (9)$$

$$Foodpl_t = \beta_0 + \beta_1 CO2INT_t + \beta_2 EMPLAGR_t + \beta_3 POP_t + \beta_4 INFL + \mu_t \quad (10)$$

$$CrooPL_t = \beta_0 + \beta_1 CO2INT_t + \beta_2 FERZ_t + \beta_3 AGVADD_t + \beta_4 EMPLAGR_t + \beta_5 POP_t + \mu_t \quad (11)$$

Where Agric.GDP is agriculture contribution to GDP, CROPPI is crop production index,


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**Priori expectation**

FOODPI is food production index, CO2EM is CO2 emissions<0, CO2INT is CO2 intensity<0, RINT is real interest<0, INF is inflation>0, TRO>0, GFCF>0, AVADD is agricultural value added per worker>0, FERZ is fertilizer consumption>0, EMPLAGR is employment in agriculture>0, FORDL forest depletion<0 POP population u <0, αi is constant, and $\mu it$is stochastic term**.**

**Measurement of Variables**

**Agric. GDP**: Agriculture, forestry, and fishing, value added (% of GDP) Agriculture, forestry, and fishing corresponds to ISIC divisions 1-3 and includes forestry, hunting, and fishing, as well as cultivation of crops and livestock production. Value added is the net output of a sector after adding up all outputs and subtracting intermediate inputs.

**CO2 emissions (kt)** Carbon dioxide emissions are those stemming from the burning of fossil fuels manufacture of cement. They include carbon dioxide produced during consumption of solid, liquid, and and gas flaring.

**Food production index:** Food production index covers food crops that are considered edible and that contain nutrients. Coffee and tea are excluded because, although edible, they have no nutritive value.

**Population in the largest city**: (% of urban population in largest city is the percentage of a country's urban population living in that country's largest metropolitan area.

**Crop production index**: Crop production index shows agricultural production for each year relative to the base period 2014-2016. It includes all crops except fodder crops. Regional and income group aggregates for the FAO's production indexes are calculated from the underlying values in international

**Agriculture value added**: value added (annual % growth) Annual growth rate for agricultural, forestry, and fishing value added based on constant local currency. Aggregates are based on

**Fertilizer consumption:** (kilograms per hectare of arable land) Fertilizer consumption measures the quantity of plant nutrients used per unit of arable land

**Employment in agriculture :** (% of total employment) (modeled ILO estimate) Employment is defined as persons of working age who were engaged in any activity to produce goods or provide services for pay or profit, whether at work during the reference period or not at work due to temporary absence from a job, or to working-time arrangement

Interest payments (% of revenue

**Interest payments:** (% of revenue) Interest payments include interest payments on government debt--including long-term bonds, long-term loans, and other debt instruments to domestic and foreign residents.

To determine the relationship between the variables, correlation analysis was carried out for the model and the result is presented below.


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## 4.0 RESLT AND DISCUSSION

**Table 4 Summary of Unit Root**

| ADF TEST STATISTICS | | | CRITICAL VALUE AT 5% LEVEL OF SIGNIFICANCE | | |
|---|---|---|---|---|---|
| **VARIABLES** | **Level** | **Ist Difference** | **Level** | **Ist Difference** | **Order of Integration** |
| **AGDP** | -1.867197 | -6.837000 | -2.938987 | -2.938937 | I(1) |
| **CO2EM** | -1.414125 | -6.690264 | -2.935001 | -2.936942 | I(1) |
| **FORDL** | -1.841328 | -6.623132 | -2.935001 | -2.936942 | I(1) |
| **INFL** | -2.081446 | -4.889985 | -2.957110 | -2.941145 | I(1) |
| **RINTR** | -5.567127 | ---------------- | -2.935001 | ---------------- | I(0) |
| **CO2INS** | -3.385230 | -5.255752 | -3.526609 | -2.943427 | I(1) |
| **EMPLAGR** | -1.020934 | -3.613657 | -2.941145 | -2.941145 | I(1) |
| **FOODPROD** | -2.246020 | -3.544493 | -2.938987 | -3.540328 | I(1) |
| **POP** | 0.259338 | -5.631030 | -2.936942 | -2.936942 | I(1) |
| **AGVADD** | 1.894454 | -5.030249 | -2.935001 | -2.936942 | I(1) |
| **CROPORO** | -2.240752 | -4.277209 | -2.935001 | -2.936942 | I(1) |
| **FERZ** | 1.446626 | -2.971413 | -2.935001 | -2.938987 | I(1) |
| **TRO** | -3.331132 | -------------- | -2.938997 | -------------- | I(0) |
| **GFCF** | -0.999625 | -9.079264 | -2.936942 | -2.936942 | I(1) |

***Source:*** Author's Computation using E-view 10; 2023

From table1 testing the stationarity of the variable at 5% level of significance, the ADF test result showed that only real interest rate (RINTR) and trade openness (TRO) are stationary at level while, agricultural output proxy by, agric.GDP (AGDP), food production (FOODPROD) and crop production are stationary at 1$^{st}$ difference. Also climate change proxy by carbon dioxide emission(CO2EM) and carbon dioxide intensity(CO2INS, Forest depletion (FORDL), inflation (INFL), real interest rate(RINTR), employment in agriculture(EMPLAGR), population(POP), agricultural value added(AGVADD),GFCF, and fertilizer consumption(FERZ) were not stationary at level but all attained stationarity at 1$^{st}$ difference. This means that two (2) variable is integrated of order zero I (0) and twelve (12) of the remaining variables are integrated of order one I (1)

**Table 2 Summary of Cointegration Bound Tests of Model 1-10**

| | T- Statistics F-Statistics | Value K | Critical value I(0) Lower | Critical Value I(1) Upper | Significance |
|---|---|---|---|---|---|
| MODEL 1 | 3.420965 | 5 | 2.39 | 3.38 | 5% |
| MODEL 2 | 6.253450 | 5 | 2.39 | 3.38 | 5% |
| MODEL 3 | 9.955424 | 5 | 2.56 | 3.49 | 5% |
| MODEL 4 | 2.458583 | 5 | 2.39 | 3.38 | 5% |

***Source:*** Author's Computation using E-view 10; 2023


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From Table 2, the result of The ARDL bound co-integration test result for agricultural output proxy by (AGDP) equation. The first step in this technique is to compare the result of the calculated F-statistic with the critical bound values given by Pesaran *et al.*, (2001). The ARDL co-integration in table 2 it revealed that co-integration exists among the variables of interest and at 5% level of significance. This can be explained by the fact that the F-statistics having a value of 3.420965 in model 1which is greater than the values of the lower bound (2.39) and the upper bound (3.38) at 5% level of significance. Also in model 2, the coefficient of F-statistics is 6.253450 which is greater than the critical value of lower bound I(0) and upper bound I(1) of 3.38. Again model 3 having the coefficient of F-statistics 9.955424 that is greater than both the lower and the upper bound test at 5% level of significance. Therefore, the null hypothesis of no long run co-integration was rejected. Thus, it was concluded that there exists a long run relationship among AGRIC.GDP CO2EM, FORDL, INFL, RINTR, CO2INS, EMPLAGR, TRO, GFCF and FERZ in Nigeria.

**Table 3 Summary of ECM Result**

| | **AGRIC. GDP** | **AGRIC.GDP** | **FOODPRO** | **CROPPRO** |
|---|---|---|---|---|
| CO2Emission | -0.000111 | | | |
| CO2Intensity | | -1.420819 | -6.216242 | -4.808926 |
| FERZ | -0.354635 | -0.2203363 | | 45.416172 |
| FORDL | -0.000000 | 1.88E-15 | | |
| INF | -0.073308 | -0.072018 | -0.134391 | -1.959151 |
| RINTR | 0.076817 | 0.021346 | | |
| EMLAGR | | | -2.448524 | -33.113459 |
| POPG | | | -39.491949 | |
| AGVADD | | | | 0.000000 |
| TRO | | 0.540771 | | |
| GFCF | | 0.094969 | | |
| R-Squared | 0.775638 | 0.761528 | 0.714938 | 0.956523 |
| Adjusted-R | 0.726559 | 0.709362 | 0.688244 | 0.931083 |
| F-statistics Prob. | 0.000000 | 0.000000 | 0.000094 | 0.000000 |
| Durbin Watson Stat. | 1.636522 | 1.711298 | 2.033171 | 1.852129 |

From table 3, the short run dynamic result above revealed that the estimated equation passed the diagnostic tests. Durbin-Watson statistic of 1.636522, 1.711298, 2.033171 and 1.852129 indicates no autocorrelation in the residuals. The overall regression is significant at 1 percent as can be seen from the R-Squared and the F-statistic. R-Squared of 0.775638, 0.761528, 0.714938 and 0.956523 indicate about 77%, 76%, 71% and 95% of variation in endogenous variable AGRIC.GDP, FOOPROD, CROPPRO is explained by changes in exogenous variables. Also, an F-statistic value of suggests significance of the determinants in the ECM.


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The coefficient of carbon dioxide intensity is significant at 5% levels and negative with the coefficient -1.4208191, -6.216242 and -4.808926. This indicates carbon dioxide intensity (CO2INS) influenced agricultural output FOODPRO and CROPPRO in Nigeria in the short run and the coefficient of CO2Emission is -0.000111 which also shows that carbon emission has less influence on Agricultural output in Nigeria. Again, the coefficient of TRO and GFCF of 0.540771 and 0.094969 has positive influence on AGRIC.GDP under the period of study.

**CONCLUSION**

From the study, it shows nexus between carbon emissions and agricultural output in Nigeria. The study also shows that a change in CO2 intensity has significant effect on agricultural output. This is clearly revealed in the intensity of the CO2Emission on Agricultural output, Food production as it shows in model 2 (two) however, crop production seems not to be a good measure for agricultural output, preferable agric. GDP and food production as shows in table 8, 11 and 13 respectively.

**RECOMEMDATIONS**

From the above findings, it could be recommended that Nigeria government needs to give serious priority to agricultural sector. The current climate change effect can be minimized if policy toward mitigation is geared. Agricultural output can be increased and sustained by developing agricultural technologies that are environmentally sensitive. Also agricultural innovation that increase soil nutrient and not contribute to change in climate be encouraged.

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