

**Employment and Agricultural Performance in Nigeria**

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**Being a M.Sc. Thesis Submitted to the Department of Economics and Development Studies,  
Faculty of Management and Sciences, Lead City University, Ibadan, Oyo State, Nigeria**

**In Partial Fulfillment of the Requirements for the Award of Master of Science Degree  
(M.Sc.) in Economics**

**2024**

### Certification

This is to certify that this thesis titled “Employment and Agricultural Performance in Nigeria” was carried out by Onuh Markson ONDAH with Matriculation number of LCU/PG/002952 in the Department of Economics, Faculty of Management and Social Sciences, Lead City University, Ibadan, under my supervision and that this work has not been previously submitted.

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## **Dedication**

This master's degree project is dedicated to Almighty God.

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## Acknowledgements

I wish to appreciate the Management of Lead City University for the opportunity afforded me to pursue my Postgraduate Studies with the laudable university. My profound gratitude goes to the school library and the school of Post-graduate Studies for the necessary corrections and guidance. There was never lack of wants throughout as GOD Almighty strengthened me during difficult times, my sincere appreciation goes to my Supervisor, Dr. O. O. Ogunjinmi whose contributions and constructive criticism pushed me this far. My profound gratitude goes to Head of Department, Dr. O. O. Ogunjinmi, the Dean, Faculty of Management and Social Sciences, Professor O. Campbell. My warm appreciation goes to my lecturers; Dr. Oyaromade R., Dr. Adesina O. O., Dr. Ogunro T.O., Dr. E.R. Aderinto, Dr. O. Y. Alimi, Dr. Emiola T., Mrs. Oduyoye-Ejumedia A., and Mrs. F. V. Famuti, of the Department of Economics for the support and individual contribution to ensure the work comes out unique. Also, I appreciate the administrative staff and fellow postgraduate students in the Department of Economics and Developmental studies.

Furthermore, I am thankful to Lead City University Ibadan for providing the platform, necessary resources and facilities essential for the successful completion of this project.

Lastly, I am deeply grateful to my parents Mr and Mrs Ondah for their unwavering support, understanding, and patience during this endeavor.

As the inputs and assistance for the above-mentioned institutions and individuals towards the completion of this work are acknowledged, I bear the responsibility for any error or omission, if any found in the work.

## Abstract

Employment in the agricultural sector holds immense significance for Nigeria, as the agricultural sector is a vital component of the country's economy. This study examined the effect of employment on agricultural sector performance in Nigeria, while unbundling agricultural performance into agricultural output and agricultural exports. The study also analysed the response of agricultural output and exports to employment shocks in Nigeria. The study employed secondary data obtained from the Central Bank of Nigeria and World Development Indicators spanning from 1991 to 2022. The ARDL and VAR Impulse Response and Variance Decomposition analyses were utilized in estimating the objectives of the study. Results show that employment has a positive and statistically significant effect on agricultural output in both the short and long run. Conversely, employment has a **negative and significant relationship with agricultural exports in both the short and long run**. For the response of agricultural output and exports to shocks in employment, variance decomposition analysis revealed that employment's contribution to the variance in agricultural output increases gradually over time, indicating that labor has a growing, albeit moderate, impact on agricultural output growth. Similarly, the impulse response analysis showed that an increase in employment has a positive but short-lived impact on agricultural output. Variance decomposition also reported that agricultural exports in Nigeria is largely self-driven, as indicated by the high proportion of variance explained by its own shocks, with a very marginal contribution by employment shocks. The study recommends that policymakers focus on creating more employment opportunities in the agricultural sector. This involves investing in agricultural training programs, providing incentives for agricultural entrepreneurship, and improving access to agricultural inputs and technologies.

**Keywords:** Agricultural Output, Agricultural Exports, Economic Growth, Employment, Shocks

**Word count:** 279

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## **Chapter One**

### **Introduction**

#### **1.1 Background to the Study**

Agriculture is the mainstay of most developing economies and it is considered a catalyst for the overall development of any nation. It is a critical sector that drives the economic development and industrialization of developing nations, and also holds the ace for reducing unemployment. The agricultural sector is critically important for ensuring food security, income and employment generation, and for stimulating industrialization and overall economic development<sup>1</sup>.

Unlike developed countries, the agricultural sector exceeds most of the economic activity in developing countries. Agriculture contributes to economic development as a continuous process of improving the standard of living of the population. In fact, agriculture is the first economic activity without which life cannot subsist. It is responsible for the provision of food and clothing for the population as well as the supply of a large part of the production materials for other economic sectors<sup>1</sup>.

Many economic indicators and criteria are used to judge the efficiency of the performance of the agricultural sector, which mainly depend on the value of GDP, the volume of production, investments and exports<sup>2</sup>. In this context, agricultural exports are defined as one of the main means of economic growth and sustainable development of developing countries. They are seen as a crucial means of acquiring foreign exchange, stimulating agricultural investment, increasing the employment rate, reducing the number of unemployed and eliminating the poverty rate<sup>2</sup>.

The importance of agriculture in developing economies cannot be over emphasized. For instance, agriculture provides major source of employment in most developing countries, accounting for 38% of the work force in Nigeria, 61.4% in Rwanda, 29.2 % in Egypt, 47.5 in Gabon, 74.2% in Uganda and 85.1 in Burundi<sup>3</sup>.

Agriculture has been an important sector in the Nigerian economy in the past decades, and is still a major sector despite the oil boom. Basically it provides employment opportunities for the teeming population, eradicates poverty and contributes to the growth of the economy<sup>1</sup>. More than 36% of Nigeria's labor force is employed in agriculture, making it the largest employer in the country<sup>4</sup>. In the 1960's, agriculture contributed up to 64% to the total GDP but gradually declined in the 1970's to 48% and it continued in 1980 to 20% and 19% in 1985, this was as a result of oil glut of the 1980's. Recently, Nigeria's agricultural sector contributes a significantly 20.34% in 2018, and 20.87%, 22.88%, 21.92% from 2019 to 2021 respectively <sup>4</sup>.

Although, Nigeria today depends heavily on oil industry for its revenue, it is still predominantly an agrarian country. The agricultural sector in Nigeria is broadly divided into four sub-sectors—crop production, fishing, livestock and forestry. Crop production remains the largest segment and it accounts for about 87.6% of the sector's total output. This is followed by livestock, fishing and forestry at 8.1%, 3.2% and 1.1% respectively<sup>5</sup>. The share of agriculture in Nigeria's total export earnings remains small compared to crude oil exports. For instance in 2019, agriculture accounted for less than 2% of total exports relative to crude oil (76.5%)<sup>4</sup>.

The declining importance of agriculture as shown in the contribution to GDP in the Nigerian economy can also be seen in the steady fall in the share of the population residing in rural areas, the share of the labour force employed in agriculture, and the share of the nation's export earning derived from agricultural commodity exports<sup>4,5</sup>. Even though agriculture employs a large

proportion of the Nigerian labour force, the trend of employment in the sector is falling and this agricultural unemployment could be linked to poverty among agricultural workers and rural inequality which in turn affects the contribution of agriculture output growth and agricultural exports<sup>6</sup>.

Nigeria stands as a major producer of various crops, including cassava, rice, yams, maize, and cocoa. However, the agricultural landscape faces challenges such as insufficient infrastructure, limited access to credit, and the impact of climate change on crop yields<sup>7</sup>. Livestock farming, encompassing cattle rearing, poultry, and fisheries, is also a substantial contributor to the agricultural sector, prompting governmental initiatives to improve livestock production and mitigate issues like conflicts between herdsman and farmers<sup>8</sup>. To bolster the overall performance of the sector, the Nigerian government has implemented various agricultural policies and programs, including the Agricultural Transformation Agenda and recent initiatives like the Green Alternative<sup>9</sup>. However, challenges persist, including inadequate infrastructure, post-harvest losses, low mechanization, and susceptibility to climate change, with access to credit and market information remaining critical issues for farmers.

The agricultural landscape is evolving through ongoing efforts to promote research and innovation, focusing on improved seed varieties, modern farming practices, and the integration of technology. While Nigeria currently exports agricultural products such as cocoa, there is considerable potential for increased exports with the implementation of enhanced value chain development and quality control measures<sup>6</sup>.

Employment in agriculture holds immense significance for Nigeria, as the agricultural sector is a vital component of the country's economy<sup>6</sup>. With about 38 percent of the labor force engaged in agriculture, it serves as a crucial avenue for employment, contributing significantly to livelihoods

and income generation. The performance of the agricultural sector, therefore, directly impacts the well-being of a substantial portion of the population. Increased productivity in agriculture not only ensures food security but also boosts the overall economic development of the nation<sup>9</sup>. However, challenges such as low productivity, inadequate access to resources, and limited technological advancements in farming practices need to be addressed to optimize the potential of labor force participation in agriculture and enhance the sector's contribution to Nigeria's socio-economic growth<sup>10</sup>.

## 1.2 Statement of the Problem

Labor is a crucial factor for agricultural productivity in Nigeria. Similarly, the role of agriculture in generating employment in Nigeria cannot be overemphasized because agriculture occupies a strategic position in the Nigerian economy. This sector positions itself as a principal propeller of growth, asset of wealth creation, provider of employment and means of poverty reduction at the same time<sup>11</sup>.

In Nigeria, a larger percentage of the population dwells in the rural areas who heavily rely on agricultural related activities as a means of livelihood. Before the discovery of oil, Nigerian economy depended heavily on agriculture that this sector alone contributed about 71% to its GDP, over 70% of its employment and about 90% of its foreign earnings within the periods in question<sup>11</sup>. The importance of agriculture in Nigeria is not only the ability of this sector to serve as the major employer of labour but also the backbone in providing food to Nigeria's teeming population, and input in the form of raw materials to the industrial sector among other benefits.

However, the discovery of oil in the 1970s has orchestrated fundamental changes in the Nigerian economy in the past few decades. The quick affluence that is connected with the oil sector has

made the country to neglect agriculture to a larger extent<sup>12</sup>. The aftermath effect of this has been a mass migration of young people from rural area to urban area with the continuous decline in agricultural production and rising level of urban unemployment. Employment in agriculture in Nigeria has declined over the years from 39.46% in 2012, 38.27% in 2013 and decreased to 37.52% in 2014. From 2015 to 2021 employment in agriculture recorded 37.01%, 36.68%, 36.3%, 35.52%, 35.76% (increased) and 35.21% (decrease) respectively<sup>4</sup>.

Agriculture that should have served as an escape route to combat unemployment problem over the years, has witnessed a rapid dwindling in its contributions to the development of the nation's economy. Nigeria that used to be a major exporter of agricultural products some decades ago now depends largely on other countries for the same products. Agricultural export declined by about 11% from N302.2 billion in 2018 to N269.8 billion in 2019. Nigeria's agricultural imports rose by 12.7% from N851.6 billion to N959.5 billion during the same period, the highest value ever recorded in the country. Nigeria remains a net food importer as the agricultural trade deficit has widened with imports exceeding exports by N689.7 billion in 2019 compared to N549.3 billion in 2018<sup>13</sup>. The implication of this has manifested in declining in the participation of the active population to economically engage in agriculture in the country.

Over the years, several attempts to revamp the agricultural sector by the Nigerian government has led to initiation of various policies and programs to unleash the potentials of Nigerian agriculture to feed its increasing population and become a leading exporter of food in the shortest period. This led to the implementation of programs like Operation Feed the Nation (OFN), Green Revolution, National Food Acceleration Production Programs (NAFPP), Directorate of food, Road and Rural Infrastructure (DFRRI) among others<sup>14</sup>.

In 1986, the emergence of the Structural Adjustment Programme marked the deregulation and stimulation of local production in Nigeria. Subsequently, National Acceleration Crops production programme (NAICPP) was as well introduced in 1996 alongside with the Agricultural and Rural Transformation programme (ARTP) in 2000 and the National Economic Empowerment Development Strategy (NEEDS) in 2003/2004 with the aim of encouraging participation of private sector in agricultural development and employment generation among others in the country<sup>14</sup>.

The government of Nigeria also initiated agricultural programs such as the Anchor Borrowers Program (ABP) to diversify its economy away from oil. In October 2021, the government at the Council on Agriculture and Rural Development Regular meeting, approved the implementation of new agricultural policy named “National Agricultural Technology and Innovation Plan” (NATIP) in 2022. The four-year blueprint was designed to help Nigeria’s COVID-19 economic recovery. This policy was to replace the Agriculture Promotion Policy (APP) that was launched in 2016 but terminated in December 2020<sup>14</sup>.

In December 2021, the government of Nigeria launched the National Development Plan (2021-2025). The plan was formulated specifically to tackle existing development challenges confronting the country – especially addressing farmers’ needs. The plan sets targets and identifies priority areas, addressing gaps in infrastructure, macroeconomic stability, social investment, and adaptation to climate change. The plan recognizes lessons learned and builds on the foundation developed in previous plans (e.g., Vision 20:2020, the Economic Recovery and Growth Plan, and the Economic Sustainability Plan). Unfortunately, these programs have failed to achieve their founding goals owing to the lack of policy coordination and corruption.

The absence of significant government initiatives to recruit and engage the labor force in agriculture exacerbates the challenges faced by the Nigeria agricultural sector. A lack of targeted labour recruitment strategies, training programs, and supportive policies further impedes efforts to align labour force participation with the demands of modern agricultural practices in Nigeria<sup>15</sup>. Similarly, limited financial resources hinder the capacity of both the government and private entities to recruit and invest in the agricultural workforce. Insufficient capital restricts the implementation of crucial initiatives, such as training programs, technological adoption, and infrastructure development<sup>2</sup>.

### **1.3 Research Questions**

The following research questions will guide the study;

- i. To what extent does employment affect agricultural output in Nigeria?
- ii. What is the effect of employment on agricultural export in Nigeria?
- iii. How does agricultural output and export respond to employment shocks in Nigeria?

### **1.3 Objectives of the Study**

The broad objective of this study is to examine the effect of employment on agricultural performance in Nigeria, while the specific objectives are to:

- i. examine the effect of employment on agricultural output in Nigeria;
- ii. analyse the effect of employment on agricultural export in Nigeria
- iii. determine the response of agricultural output and exports to employment shocks in Nigeria.

### **1.5 Hypotheses**

The following null hypotheses will be tested

Ho<sub>1</sub>: Employment has no significant effect on agricultural output in Nigeria

Ho<sub>2</sub>: Employment has no significant effect on agricultural export in Nigeria

Ho<sub>3</sub>: There is no positive response of agricultural output and exports to employment shocks in Nigeria

## **1.6 Justification of the Study**

Prior to the discovery of oil, agriculture has historically been the backbone of the Nigerian economy, contributing significantly to the country's GDP, providing employment, and serving as a major source of foreign exchange through exports. However, despite the sector's potential, Nigeria has faced challenges in maximizing agricultural output and exports, which are essential for economic growth and development.

Agriculture remains an important sector in Nigeria, contributing around 22% to the GDP<sup>4</sup>. The sector is a major employer, especially in rural areas, and plays a vital role in food security. Understanding how employment influences agricultural performance in Nigeria can provide insights into optimizing the sector's contribution to the economy. Agricultural exports are a significant source of foreign exchange for Nigeria. Enhancing export performance can reduce the country's dependence on oil and gas, diversifying revenue streams and stabilizing the economy.

The Nigerian government has implemented various policies aimed at increasing employment in the agricultural sector. However, the effectiveness of these policies in driving agricultural output and exports remains unclear. Given the pivotal role of employment in driving agricultural productivity, this study seeks to explore the relationship between employment levels and agricultural output and exports in Nigeria.

This study will provide empirical evidence on the impact of employment on agricultural performance, guiding policymakers in designing more effective employment strategies. While previous studies have examined various factors affecting agricultural output and exports, there is limited research for Nigeria, specifically focused on the effect of employment. This study will fill this gap by providing a comprehensive analysis of how employment levels influence agricultural output and export performance in Nigeria. Findings from this study will assist the government in assessing the effectiveness of current employment and agricultural policies, helping to refine and implement strategies that can boost agricultural output and exports.

There exists a plethora of studies on the contribution of the agricultural sector to employment generation across countries<sup>16, 17, 18</sup>. However, not so many studies have examined the effect of employment on agricultural sector performance<sup>19, 20, 21</sup>. The study deviates from the few studies that have examined the effect of employment on agricultural sector performance by disaggregating the sector's performance into agricultural output and exports. Similarly, the study analyses how agricultural output and exports responds to shocks in employment.

Given the transitioning of employment from production in the real sectors of agriculture and manufacturing to the Services sectors, it is imperative to examine the role of employment on agricultural sector performance in Nigeria.

### **1.7 Scope of the Study**

The study employed yearly time series data covering the period of 1991 to 2022. This is justified by the availability of data on employment in agriculture for Nigeria. The study examined the effect of employment on agricultural performance in Nigeria, while employing agricultural output and exports as indices of performance in the agricultural sector.

## 1.8 Limitations of the Study

The study relied on secondary data from the National Bureau of Statistics and Central Bank Statistical Bulletin, which may have limitations in terms of accuracy, completeness, and timeliness. Discrepancies or gaps in the data could affect the robustness of the findings. Similarly, the analysis covers the period from 1991 to 2022. While this provides a substantial perspective, it may not fully capture the most recent trends and policy impacts post-2020, which could be crucial given the dynamic nature of the agricultural sector and labor force in Nigeria. These limitations suggest areas for further research, including more detailed analysis, incorporation of additional socioeconomic variables, and exploration of the impacts of recent policy changes and external factors on the agricultural sector and labor force participation in Nigeria.

## 1.9 Operational Definition of Terms

**Agricultural Performance:** Agricultural performance refers to the efficiency, productivity, and overall effectiveness of agricultural activities within the sector. It involves assessing factors such as crop yield, livestock production, technological advancements, and economic contributions related to agriculture.

**Agricultural Output:** Agricultural output refers to the total quantity or volume of agricultural products produced by a country, region, or farm within a specific period. It includes crops, livestock, forestry products, and fishery products.

**Agricultural Export:** Agricultural export refers to the sale and shipment of agricultural products from one country to another for trade or commercial purposes. Agricultural exports include crops, livestock, processed foods, and other agricultural commodities.

**Employment in agriculture:** refers to the engagement of individuals in activities related to the cultivation of crops, livestock rearing, forestry, and fishing within the agricultural sector. This definition encompasses various forms of employment, from full-time farmers to seasonal laborers, and includes both formal and informal arrangements.

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## **Chapter Two**

### **Literature Review**

This chapter presents a review of past literature by discussing the concepts of the study relevant theories and empirical findings of literature as related to employment and agricultural performance in Nigeria. The framework of the study will also present the summary of gaps found in literature.

#### **2.1 Conceptual Review**

##### **2.1.1 Employment**

Employment is a key economic indicator that determines the overall performance of an economy. It represents the engagement of individuals in productive activities for wages or other forms of compensation<sup>1</sup>. Employment not only provides individuals with income but also contributes to the overall production of goods and services in an economy. High levels of employment are often associated with economic growth, while low levels indicate economic distress or underperformance<sup>1, 2</sup>. There are different factors influencing employment which include:

a) Economic growth: This is measured by the increase in Gross Domestic Product (GDP), and it has a considerable impact on employment. Robust economic expansion generally results in increased labour demand as businesses expand and novel industries arise.

b) Aggregate Demand: This refers to the overall demand for products and services in an economy, and it has a direct impact on employment. Increased aggregate demand incentivises enterprises to expand production, therefore generating additional employment opportunities<sup>3</sup>.

c) Technological Change: Technological progress can yield both advantageous and detrimental

consequences on employment. Although new technologies have the potential to generate employment opportunities in growing sectors, they can also result in job displacement in businesses where automation replaces human workforce<sup>3</sup>.

d) Government policies, such as fiscal and monetary policies, which encompass taxation, government spending, and interest rates, have the ability to either promote or reduce economic activity and, as a result, impact employment levels.

e) Labour force participation refers to the number of individuals who are actively engaged in the workforce. Greater levels of involvement generally result in higher levels of employment, provided that demand conditions are favourable<sup>4</sup>.

f) Education and Skills: The employability of individuals is determined by the education and skill levels they possess. An enhanced and proficient workforce is more adept at fulfilling the requirements of contemporary economies, resulting in elevated rates of employment<sup>3</sup>.

g) Wages and working conditions: This is of utmost importance in determining the availability of labour. Increased pay incentivise greater labour market participation, whereas unfavourable working conditions can deter individuals from joining.

h) Demographics, such as population growth, ageing, and migration patterns, also have an impact on the availability of labour. For instance, a demographic shift towards an older population might lead to a decrease in the total number of people available for work, whereas immigration can contribute to an expansion of the labour pool.

i) Agricultural dependence: This is a prominent characteristic of many developing economies, wherein employment is predominantly seasonal and susceptible to external disruptions such as climate change.

j) Structural changes : This occurs when economies progress, moving away from agriculture and

towards industry and services, resulting in changes in employment distribution. This process of structural transformation has the potential to generate fresh job prospects, while also leading to the displacement of people from conventional sectors<sup>4</sup>.

## **Employment in the Agricultural Sector**

Agriculture continues to be a crucial sector for employment, particularly in developing countries, where it frequently serves as the primary source of income. Employment in the agricultural sector incorporates a variety of activities, such as forestry, fishing, livestock rearing, and crop cultivation. It is essential for poverty alleviation, rural development, and nutritional security<sup>3</sup>.

Nevertheless, agricultural employment is subject to a variety of economic, social, and environmental factors that create distinct challenges and opportunities. Agricultural employment

is distinguished from employment in other sectors by a number of unique characteristics:

a) **Seasonality:** The demand for agricultural labour is highly seasonal, fluctuating throughout the year in accordance with the planting, developing, and harvesting cycles. Agricultural labourers may experience periods of underemployment or unemployment during off-peak periods as a result of this seasonality.

b) **Informality:** A substantial number of agricultural labourers are employed informally, without the benefit of formal contracts, social security, or legal protection. This is particularly true in developing countries, where small-scale and subsistence cultivation are the predominant agricultural practices.

c) **Vulnerability:** External disruptions, including climate change, price volatility, and natural disasters, are particularly detrimental to agricultural employment. Income stability and job security in the sector can be substantially affected by these factors.

d) **Productivity and Wages:** In comparison to other sectors, agricultural employment is frequently

linked to low productivity and wages. This is partially attributable to the dependence on manual labour and the restricted availability of contemporary technology and inputs.

### **Factors Influencing Employment in Agriculture**

Employment opportunities in the agricultural sector are contingent upon numerous variables:

a) Land Ownership and Tenure: The availability of land and the security of land tenure are essential factors in the determination of agricultural employment. Many rural workers may only have access to wage labour in regions where land ownership is concentrated, rather than self-employment through farming<sup>5</sup>.

b) Modern technology: This has the potential to enhance productivity, but they may also decrease the demand for labour. Nevertheless, it has the potential to generate new employment opportunities in the fields of machinery maintenance, processing, and agribusiness.<sup>5</sup>

c) Access to Credit and Inputs: The productivity and viability of agricultural employment can be substantially influenced by the availability of credit, seeds, fertilisers, and other inputs. The sector's employment expansion may be restricted by its restricted access to these resources<sup>5</sup>.

d) Market Access: Agricultural employment is influenced by access to markets, both domestic and international. Improved market access can result in increased incomes and a greater demand for labour, while inadequate market access can restrict opportunities and ensnare workers in low-productivity subsistence farming<sup>5</sup>.

### **Challenges of Agricultural Employment**

The agricultural sector's employment is confronted with numerous obstacles, particularly in developing regions. This includes:

a) Rural-Urban Migration: The lure of higher-paying employment in cities and rapid urbanisation have resulted in a decrease in rural populations and agricultural labour forces. This trend has the

potential to lead to a decrease in agricultural productivity and labour shortages during prime agricultural seasons.

b) Ageing Workforce: The agricultural sector in numerous countries is characterised by an ageing workforce, as newer generations are frequently less inclined to engage in farming. This can result in a gradual decline in agricultural knowledge and abilities.

c) Gender Inequality: In developing countries, women constitute a significant proportion of the agricultural workforce. Nevertheless, they frequently encounter obstacles, including unequal access to land, credit, and technology, which can restrict their productivity and income potential.

d) Education and Skills: In comparison to other sectors, the agricultural workforce frequently possesses lower levels of education and skills. This can impede the implementation of new technologies and practices that have the potential to enhance productivity and employment conditions.

e) Policy and Institutional Support: In comparison to other sectors, the agricultural sector frequently receives less policy attention and support. The sector's capacity to generate employment and expand may be restricted by inadequate infrastructure, insufficient extension services, and inadequate research and development investment.

### **Employment in the Agricultural Sector of Nigeria**

In Nigeria, agriculture is a critical sector of the economy, as it provides employment opportunities for a substantial portion of the population<sup>6</sup>. The sector has encountered a multitude of obstacles that have restricted its ability to create sustainable and adequate employment, despite the country's extensive natural resources and substantial agricultural potential. Nigeria's economy was historically agrarian, with agriculture serving as the foundation of the economy prior to the discovery of oil. The sector was the primary source of export earnings and

employed the majority of the population. Nevertheless, the energy boom of the 1970s resulted in a shift in focus from agriculture, which resulted in a decrease in agricultural productivity and employment<sup>6</sup>. Nevertheless, agriculture continues to be a critical sector, particularly in rural areas where it is the primary source of income. Agriculture continues to be a substantial employer in Nigeria and contributes approximately 23% to the country's GDP. Smallholder farmers, who engage in subsistence farming, dominate the sector, despite their restricted access to modern agricultural techniques, inputs, and markets. Employment in agriculture in Nigeria has declined over the years from 39.46% in 2012, 38.27% in 2013 and decreased to 37.52% in 2014. From 2015 to 2021 employment in agriculture recorded 37.01%, 36.68%, 36.3%, 35.52%, 35.76% (increased) and 35.21% (decrease) respectively<sup>7</sup>.

### **Factors Influencing Employment in Agriculture in Nigeria**

Employment in Nigeria's agricultural sector is contingent upon numerous variables:

- a) Land Tenure System: The land tenure system in Nigeria is intricate and frequently imposes restrictions on the access to land, particularly for women and young people. It is imperative to have secure land tenure in order to enhance employment opportunities and attract more investment in agriculture.
- b) Access to Finance: The expansion of agricultural activities is significantly impeded by the limited availability of credit and financial services. Farmers are unable to invest in inputs, technology, or infrastructure that would enhance productivity and employment in the absence of sufficient financing.
- c) Technology and Mechanisation: The agricultural sector in Nigeria is characterised by a low level of mechanisation, which results in labour-intensive farming practices that restrict

productivity. Although mechanisation can decrease the need for labour, it can also generate new opportunities in sectors such as agribusiness, industrial operation, and maintenance.

d) Infrastructure: The productivity of agriculture is impeded and employment opportunities are restricted by inadequate infrastructure, which encompasses storage facilities, roads, and irrigation systems. Increased demand for labour can result from improved infrastructure, which can improve market access and reduce post-harvest losses.

e) Government Policies: The sector's employment is significantly influenced by government policies, such as agricultural subsidies, extension services, and rural development programs. Agriculture can be stimulated by effective policies, which can also generate additional employment opportunities.

### **Challenges in Nigeria's Agricultural Employment Sector**

Nigeria's agricultural sector is confronted with numerous obstacles that impact employment:

a) Climate Change: Agricultural productivity and employment in Nigeria is at risk due to the high vulnerability of the country's agriculture to climate change, which is characterised by increasing temperatures, irregular rainfall, and extreme weather events<sup>8</sup>.

b) Youth Migration: The migration of numerous young individuals from rural to urban areas in pursuit of more favourable opportunities has resulted in an ageing agricultural workforce and labour shortages in rural areas<sup>8</sup>.

c) Low Productivity: Nigeria's agricultural productivity is low in comparison to global standards, primarily as a result of the country's dependence on traditional farming methods, limited access to commodities, and inadequate infrastructure<sup>8,9</sup>.

d) Food Insecurity: The agricultural sector, despite its significant employment, is unable to adequately satisfy the nation's food requirements, resulting in food insecurity and restricting the

potential for sustainable employment growth<sup>9</sup>.

e) Insecurity: The agricultural sector's employment is significantly threatened and agricultural activities are disrupted by the growing insecurity in various regions of the country, including farmer-herder conflicts and banditry<sup>10</sup>.

### **2.1.2. Agricultural Performance**

Agricultural performance is a multifaceted concept that encompasses the efficiency, productivity, and overall success of agricultural activities within an economy. In Nigeria, agriculture holds a central position as a significant contributor to the country's GDP and employment<sup>11</sup>. The performance of the agricultural sector is influenced by factors such as climate, technology, government policies, and market fluctuations. Worthy of note, Nigeria has a diverse agricultural landscape, with crops like cassava, yams, cereals (soybean, sorghum, sesame etc.) and cocoa being major contributors to the economy. The adoption of modern agricultural practices, including mechanization and improved seed varieties, has the potential to enhance agricultural performance<sup>12</sup>. However, challenges such as inadequate infrastructure and climate variability pose obstacles to optimal performance. A thorough conceptual understanding of agricultural performance is essential for policymakers to design strategies that promote sustainable agriculture, food security, and economic development in Nigeria<sup>13</sup>.

Agriculture is broadly divided into four sectors in Nigeria—crop production, fishing, livestock and forestry. Crop production remains the largest segment and it accounts for about 87.6% of the sector's total output. This is followed by livestock, fishing and forestry at 8.1%, 3.2% and 1.1% respectively<sup>7</sup>. Agriculture remains the largest sector in Nigeria contributing an average of 24% to the nation's GDP over the past seven years (2013 – 2019)<sup>14</sup>. In addition, the sector employs more than 36% of the country's labour force, a feat which ranks the sector as the largest employer of

labour in the country. One of the measures of agricultural performance in Nigeria is GDP contribution of agricultural sector. GDP from Agriculture in Nigeria decreased to 5685658.24 NGN Million in the fourth quarter of 2023 from 5698270.51 NGN Million in the third quarter of 2023. GDP from Agriculture in Nigeria averaged 4136871.92 NGN Million from 2010 until 2023, reaching an all-time high of 5698270.51 NGN Million in the third quarter of 2023 and a record low of 2594759.86 NGN Million in the first quarter of 2010<sup>14</sup>. In 2013 agricultural contribution to GDP was 23.3%, 22.9% in 2014 and increased to 23.1% in 2015. It continue to increase to 25.1% in 2017, 25.2% in 2019 then reduced to 22.0% in 2020<sup>14</sup>.

### **Macroeconomic Indices of Agricultural Performance**

In macroeconomics, agricultural performance is measured using various indices and indicators that reflect the health, productivity, and contribution of the agricultural sector to the overall economy. These indices provide insights into the efficiency and effectiveness of agricultural practices, as well as the sector's role in supporting economic growth and development. Here are some key macroeconomic indices of agricultural performance:

#### **Agricultural Gross Domestic Product (GDP):**

Agricultural Gross Domestic Product (GDP) is a measure of the value of agricultural production relative to the total GDP of a country. It represents the contribution of agriculture to the overall economy and includes the output of crop and livestock production, forestry, fisheries, and other agricultural activities. The ratio of agricultural GDP to total GDP provides an important indicator of the role that agriculture plays in an economy and its relative importance compared to other sectors such as industry and services. In countries where agriculture is a major economic activity,

agricultural GDP can account for a significant portion of the overall GDP, highlighting the dependence on farming and related activities for livelihoods and economic growth<sup>15</sup>.

The contribution of agricultural GDP to the overall economy can vary significantly between countries and regions, depending on factors such as the level of industrialization, the availability of arable land, and climatic conditions. In some developing countries, agriculture may account for a large share of the total GDP, as many people rely on farming as their primary source of income and sustenance. In contrast, in more developed countries, the share of agricultural GDP may be lower as the economy diversifies and other sectors such as services and manufacturing become more prominent. Monitoring agricultural GDP is important for policymakers to understand the performance of the agricultural sector, plan for food security, and implement strategies for sustainable agricultural development<sup>16</sup>.

#### **Total Factor Productivity (TFP):**

Total Factor Productivity (TFP) is an essential metric in agricultural economics that assesses the efficiency with which all inputs such as land, labor, capital, and materials are utilized in the production process. In agriculture, productivity improvements are often measured not just in terms of the quantity of inputs but in the value of the output relative to these inputs. TFP is calculated by comparing the total agricultural output (in terms of yield or revenue) with the total amount of resources or inputs used. By focusing on the relationship between inputs and outputs, TFP provides insights into the overall efficiency and technological progress within the agricultural sector. It can reveal how well a farming system uses its available resources to generate output and whether advancements in technology, farming practices, or management techniques have led to increased efficiency<sup>17</sup>.

An increase in TFP suggests that the agricultural system is becoming more efficient, which can be the result of several factors such as technological innovation, improved farming practices, better management of resources, or a combination of these. When TFP rises, it indicates that farmers are producing more output with the same amount or even less input, reflecting a move toward more sustainable and efficient agricultural production. In contrast, a decline in TFP could point to inefficiencies in resource use or the need for modernization in farming practices. Monitoring TFP is crucial for policymakers and industry stakeholders as it helps in identifying areas for potential improvement and development in agriculture, ensuring long-term sustainability and productivity growth<sup>17</sup>.

#### **Agricultural Value Added:**

The agricultural value-added index is a key metric used to assess the performance and efficiency of the agricultural sector within an economy. It measures the net output of this sector by taking into account the value of agricultural production and subtracting the intermediate consumption required for production. In other words, it represents the value created by agriculture after accounting for the costs of inputs such as seeds, fertilizers, labor, and equipment. This index is crucial for understanding the contribution of agriculture to economic activity, as it provides insight into how effectively the sector utilizes its resources to generate output and income<sup>18</sup>.

The agricultural value-added index is also indicative of the sector's potential for growth and sustainability. A high value-added index suggests that the agricultural sector is productive and potentially competitive, which can lead to increased exports and economic development. Moreover, the index can be influenced by factors such as advancements in technology, changes in agricultural policies, and shifts in market demand. Tracking the agricultural value-added index over time can provide valuable information for policymakers and stakeholders to make informed

decisions regarding investments and interventions in the sector, aiming to promote sustainable growth and food security<sup>19</sup>.

### **Farm Income:**

Farm income is a critical indicator of farmers' economic health and sustainability within the agricultural sector. It encompasses the total revenue that farmers earn from selling agricultural products, such as crops and livestock, after deducting all operational costs, including inputs like seeds, fertilizers, feed, and labor. In addition, expenses such as equipment maintenance, insurance, transportation, and other overheads must also be accounted for. Farm income provides insight into the profitability of farming activities and can influence farmers' ability to invest in their operations, pay off debts, and maintain a stable livelihood. Higher farm income suggests a successful and sustainable farming enterprise, while lower income can signal financial stress and potential challenges<sup>20</sup>.

The level of farm income can be affected by various factors such as market prices, weather conditions, government policies, and global trade dynamics. For instance, changes in supply and demand can lead to fluctuations in commodity prices, directly impacting farmers' income. Additionally, extreme weather events like droughts or floods can severely affect crop yields and livestock productivity, leading to financial losses. Subsidies, tariffs, and other agricultural policies also play a significant role in shaping farm income. Therefore, monitoring farm income is essential for understanding the economic resilience and challenges faced by farmers, guiding policymakers in supporting the agricultural sector, and ensuring food security and sustainable farming practices<sup>21</sup>.

### **Employment in Agriculture:**

The employment in agriculture index is a crucial measure for understanding the structure of a country's economy, particularly in relation to its labor force distribution. This index represents the percentage of the labor force engaged in the agricultural sector, which includes farming, forestry, fishing, and related activities. Tracking this index helps economists and policymakers gauge the significance of agriculture in the overall economy, as well as the sector's capacity to create jobs and sustain livelihoods. In many developing countries, agriculture remains a major source of employment, often providing opportunities for rural populations and contributing to poverty reduction efforts<sup>22</sup>.

In terms of income distribution, the employment in agriculture index offers insights into the economic well-being of a country's population. A high percentage of employment in agriculture can indicate a less diversified economy, where a significant portion of the population depends on agriculture for their income. This reliance on agriculture can expose the population to risks such as climate change, market volatility, and price fluctuations in agricultural commodities. On the other hand, as economies develop and diversify, the proportion of employment in agriculture typically decreases, reflecting a shift towards industrial and service sectors. This shift can lead to improved income distribution and higher economic resilience<sup>23</sup>.

### **Food Security Index:**

The Food Security Index is a comprehensive metric used to evaluate a country's ability to provide its population with sufficient, safe, and nutritious food. It encompasses three core dimensions: availability, access, and affordability. Availability refers to the overall supply of food within the country, including the production capacity of the agricultural sector and the extent of food imports. Access measures the population's ability to obtain food, taking into account factors such as income levels, distribution systems, and infrastructure for storage and

transportation. Affordability assesses the cost of food relative to people's income levels, indicating whether individuals and families can purchase sufficient and nutritious food<sup>24</sup>.

This index serves as a vital indicator of a nation's agricultural efficiency and its ability to support the health and well-being of its population. High scores on the Food Security Index imply a strong, sustainable agricultural sector capable of meeting the dietary needs of the population and contributing to overall economic stability. Conversely, lower scores can indicate potential vulnerabilities in the food supply chain, highlighting the need for targeted interventions to improve production, distribution, and access to food. Policymakers and stakeholders can use this index to identify areas for improvement and implement strategies to enhance food security and reduce hunger and malnutrition within the country<sup>25</sup>.

#### **Agricultural Export and Import:**

Agricultural export and import indices are essential measures that track the volume and value of agricultural goods a country trades with other nations. The performance of a country's agricultural exports can reflect its competitiveness in international markets, which can provide insights into the efficiency and quality of its agricultural production. When a country excels in exporting agricultural goods, it demonstrates the ability to produce high-quality, desirable products at competitive prices. This can enhance the country's economic standing and improve its balance of trade. Moreover, a strong export performance can signify the country's capacity to diversify its agricultural products and cater to the varying demands of global markets<sup>26</sup>.

On the other hand, agricultural import indices provide information about the types and volumes of agricultural goods a country brings in from other nations. These imports can indicate the country's reliance on foreign produce to meet domestic demand or to supplement local

production. A higher volume of imports could suggest potential areas for improvement in the country's agricultural sector, such as addressing gaps in local production or enhancing food security. Additionally, import indices can help identify emerging trends in consumer preferences and guide policymakers in developing strategies for self-sufficiency or international collaboration. Together, these indices are vital for understanding a country's position in the global agricultural trade landscape and guiding policy decisions<sup>27</sup>.

### **Land Productivity:**

Land productivity is a critical measure in agriculture, representing the efficiency with which land resources are used to produce crops, livestock, or other agricultural products. It is calculated as the total output (e.g., kilograms of crops or livestock products) per unit of land area (e.g., hectare or acre). High land productivity indicates that the land is being used efficiently to generate a significant amount of agricultural output, which is essential for meeting food demand and supporting the livelihoods of farmers. Improving land productivity is a key goal for agricultural practices worldwide, as it can contribute to food security and sustainable development<sup>28</sup>.

There are several factors that can influence land productivity, including soil quality, climate conditions, irrigation practices, and the use of modern agricultural technologies. For instance, fertile soils, adequate rainfall, and efficient irrigation systems can all enhance land productivity. Similarly, the use of improved seeds, fertilizers, and pest management techniques can boost crop yields per unit of land. Additionally, proper land management and conservation practices can prevent soil degradation and maintain the long-term productivity of the land. By focusing on optimizing land productivity, farmers can maximize their output while minimizing negative impacts on the environment and ensuring sustainable agricultural practices for future generations<sup>29</sup>.

**Crop Yield:**

Crop yield measures the quantity of crops produced per unit area. Higher yields typically indicate improved agricultural practices and inputs. Crop yield refers to the quantity of crops produced per unit area of land, typically measured in terms of weight (such as kilograms) per hectare or acre. High crop yield is a key indicator of agricultural efficiency and productivity, suggesting that the farmers have optimized their use of resources such as water, soil nutrients, and sunlight. Improved agricultural practices, such as precision farming, the use of high-yielding crop varieties, and the implementation of advanced irrigation and pest control methods, often lead to higher crop yields. Additionally, the use of fertilizers, herbicides, and pesticides can contribute to maximizing crop production<sup>30</sup>.

Higher crop yields are not only beneficial for the farmers' profitability, but they also play a critical role in ensuring food security for growing populations. By producing more crops on the same amount of land, farmers can help meet the demand for food, particularly in regions where land is scarce. Moreover, improving crop yield can help reduce the pressure on natural ecosystems, as less land needs to be cleared for agriculture. However, it is important to balance the pursuit of higher yields with sustainable practices to avoid potential negative impacts on soil health, water quality, and biodiversity<sup>31</sup>.

**Investment in Agriculture:**

This index measures the level of public and private investment in the agricultural sector. Investment is essential for technological advancement and modernization. Investment in

agriculture is a crucial indicator of a country's commitment to developing and sustaining its agricultural sector. This index measures the level of public and private funding allocated to agricultural activities, including research and development, infrastructure, machinery, irrigation systems, and other technological advancements. By investing in these areas, countries can enhance agricultural productivity, increase efficiency, and support the adoption of modern farming techniques. This is especially important as agriculture faces challenges such as climate change, resource scarcity, and the need to feed a growing global population<sup>32</sup>.

Moreover, robust investment in agriculture can lead to increased food security and rural development. By providing farmers with the necessary resources and tools, they can produce more food and improve the quality of their products. This, in turn, can stimulate economic growth, create job opportunities, and improve the livelihoods of rural communities. Additionally, public and private investments can facilitate the adoption of sustainable agricultural practices, which can mitigate environmental impacts and ensure the long-term health of the sector. In summary, investment in agriculture is a key driver of progress and resilience in the industry, ultimately benefiting both the local and global economy<sup>33</sup>.

### **Consumer Price Index for Food (CPI-F):**

The CPI-F measures changes in the prices of food items over time. It reflects inflation and the cost of living related to food. The Consumer Price Index for Food (CPI-F) is a measure of changes in the average price level of food items over time. This index is part of the broader Consumer Price Index (CPI), which tracks price changes across a range of goods and services. The CPI-F specifically focuses on the food sector, capturing fluctuations in the prices of various food products, including groceries, beverages, and dining out. This index provides insights into

the inflationary trends in the food industry and serves as a key indicator of the cost of living for households in relation to food expenses<sup>33</sup>.

By tracking the CPI-F, policymakers, economists, and businesses can gauge the overall economic health of a region or country. It helps identify patterns of inflation within the food market and can influence decisions related to monetary policy, budgeting, and food assistance programs. For consumers, changes in the CPI-F can impact their purchasing power and household budgets, affecting decisions about food consumption and spending<sup>33</sup>.

### **Nigeria's Agricultural Production**

Throughout history, agriculture has been a fundamental component of Nigeria's economy, making substantial contributions to its Gross Domestic Product (GDP), employment, and food security. The complete quantity of agricultural products produced during a specific period is referred to as agricultural output. This comprises a diverse array of forestry products, fisheries, livestock, and crops in Nigeria<sup>15,16</sup>. It is imperative to comprehend the dynamics of agricultural output in order to resolve the country's economic diversification, rural development, and food security.

A substantial portion of Nigeria's GDP and export revenues were derived from agriculture prior to the 1950s, when oil was discovered. Nigeria was a prominent global producer of essential agricultural commodities, including cocoa, groundnuts, palm oil, and rubber. Nevertheless, the oil surge resulted in a decrease in agricultural productivity as the government and private sector redirected their attention to the petroleum industry. This neglect resulted in a decrease in agricultural output and an increase in food imports<sup>15</sup>.

Agriculture continues to be a substantial contributor to Nigeria's economy, employing more than 60% of the labour force and contributing approximately 23% to the country's GDP. In the 1960's,

agriculture contributed up to 64% to the total GDP but gradually declined in the 1970's to 48% and it continued in 1980 to 20% and 19% in 1985, this was as a result of oil glut of the 1980's<sup>14</sup>. Recently, Nigeria's agricultural sector contributes a significantly 20.34% in 2018, and 20.87%, 22.88%, 21.92% from 2019 to 2021 respectively<sup>14</sup>. Nigeria's agricultural output encompasses a diverse array of forestry products, fisheries, livestock, and food and cash commodities.

### **Factors Influencing Nigeria's Agricultural Production**

In Nigeria, agricultural output is influenced by a variety of factors:

- a) Land Availability and Quality: The availability of fertile land is essential for the productivity of agriculture. Nevertheless, the availability of arable land has been diminished as a result of land fragmentation, soil degradation, and urbanisation, which has had an impact on output. Nigeria's agricultural output is significantly influenced by rainfall patterns, as a significant portion of the cultivation is rain-fed. Agricultural productivity is significantly threatened by climate change, which results in unpredictable weather, droughts, and flooding<sup>34</sup>.
- b) Input Accessibility: The availability and utilisation of modern farming equipment, fertilisers, pesticides, and quality seedlings have a substantial impact on agricultural output. Due to inadequate distribution systems and exorbitant costs, smallholder farmers frequently encounter obstacles in obtaining these inputs<sup>34</sup>.
- c) Infrastructure: The capacity of farmers to access markets and increase output is restricted by inadequate rural infrastructure, including roads, storage facilities, and irrigation systems. Enhanced productivity and reduced post-harvest losses can be achieved through the implementation of improved infrastructure<sup>34, 35</sup>.
- d) Limited access to credit and financial services restricts agricultural output. In order to acquire inputs, invest in technology, and expand their operations, farmers require financing<sup>34</sup>.

e) Extension Services and Education: The provision of information, training, and technical assistance to producers by agricultural extension services is essential for the enhancement of agricultural output. Nevertheless, these services are frequently inadequately funded and improperly administered in Nigeria<sup>35</sup>.

f) Government Policies: Agricultural output is directly influenced by government policies regarding subsidies, trade, land tenure, and rural development. Poor policies can stifle development, while effective policies can promote increased production<sup>36</sup>.

### **Nigeria's Agricultural Exports**

The Nigerian economy is significantly reliant on agricultural exports, which provide a substantial source of foreign exchange, employment, and income for millions of Nigerians. In the past, Nigeria was a prominent exporter of agricultural commodities, including cocoa, palm oil, groundnuts, and rubber. Nevertheless, the economic focus was redirected in the 1950s with the discovery of oil, resulting in a decrease in agricultural exports<sup>37</sup>. However, agriculture continues to be a major sector in Nigeria's economic diversification endeavours. Agriculture was the foundation of Nigeria's economy during the pre-independence and immediate post-independence periods. The nation was distinguished for its export of numerous essential commodities which include cocoa, palm oil, groundnut, rubber, among others<sup>38</sup>. Nevertheless, the agricultural sector was neglected during the energy boom of the 1970s, resulting in a decrease in both production and export volumes of these commodities. The emphasis on hydrocarbons led to a decrease in investment in agriculture, which in turn weakened competitiveness in global markets<sup>39</sup>.

### **Factors Influencing Agricultural Exports in Nigeria**

Agricultural exports in Nigeria are influenced by a variety of factors:

- a) Global Demand: The demand for Nigerian agricultural products in international markets is a critical factor in determining the volume of exports and the revenue generated<sup>39, 40</sup>.
- b) Commodity Prices: The value of agricultural exports is significantly influenced by fluctuations in global commodity prices<sup>41</sup>.
- c) Exchange Rates: The competitiveness of agricultural exports is influenced by the value of the Nigerian Naira in relation to significant currencies<sup>42</sup>.
- d) Government Policies: Agricultural exports are influenced by policies focused on trade, export promotion, subsidies, and tariffs<sup>43</sup>.
- e) Infrastructure: The capacity to efficiently produce, store, and transport agricultural products for export is influenced by the quality of infrastructure, which includes roads, ports, and storage facilities<sup>44</sup>.
- f) Access to Finance: The provision of credit and financial services to producers and exporters is essential for the expansion of production and the fulfilment of export demands<sup>44</sup>.

### **Agricultural Sector Policies in Nigeria**

Agricultural policies in Nigeria encompasses the strategic framework and action plans implemented by the government to achieve comprehensive growth and development in the agricultural sector. The policies are designed to achieve sustainable growth in all agricultural sub-sectors and the essential structural transformation for the country's socio-economic development, as well as to enhance the quality of life for Nigerians. Agricultural policies and projects in Nigeria have experienced significant transformations, particularly during the post-colonial period. These changes have simply mirrored changes in government or administration<sup>45</sup>. This is due to the fact that these policies and programs differ solely in terms of their names and organisational structure. Both of these entities share similar

goals, which include ensuring food security and sufficiency for the nation's population, as well as exporting any surplus to other countries. Additionally, they aim to offer rural residents and farmers with extension services, agricultural support, and rural development services. The Olusegun Obasanjo administration initiated Operation Feed the Nation in 1976, with the objective of promoting self-sufficiency in food production and increasing involvement in agricultural activities<sup>46</sup>. During the period from 1976 to 1980, the country implemented several initiatives, including the Agricultural Credit Guarantee Schemes, the establishment of agricultural commodities marketing and pricing boards, and the introduction of the land use policy. Furthermore, a policy for agricultural extension and technology transfer, a policy for input supply and distribution, and a program for agricultural research were also implemented. In addition, the government implemented the establishment of River Basin Development Authorities, a policy on agricultural cooperatives, and a strategy on agricultural mechanization<sup>47</sup>. The Structural Adjustment Programme (SAP) was implemented from 1980 to 1989, on the recommendation of the International Monetary Fund (IMF)<sup>48</sup>. The primary objective of SAP was to shift agriculture from small-scale peasant farming to a more commercial or large-scale production model. This transformation aimed to enhance the sector's contribution to the Gross Domestic Product (GDP), generate employment opportunities, and achieve food self-sufficiency. The government not only implemented the Green Revolution policy but also established various agricultural research institutes including the National Cereal Research Institute (NCRI), National Agricultural Extension and Research Liaison Service (NAERLS), Veterinary Research Institute (VRI), Cocoa Research Institute of Nigeria (CRIN), Forestry Research Institute of Nigeria (FRIN), and Rubber Research Institute of Nigeria (RRIN). These institutes were created with the objective of promoting agricultural research and fostering the study of agriculture in tertiary

institutions<sup>48</sup>,

49.

The 1988 National Agricultural Policy document, created by the Federal Ministry of Agriculture and Natural Resources (FMARD), was mandated by the Federal Government of Nigeria to be implemented for a minimum duration of fifteen (15) years. Its primary objective is to enhance agricultural productivity and establish export markets. The policy document of 1988, which was implemented in 1989 underwent a review and was replaced by a new Agricultural Policy document in 2001. The primary objective of the new policy was to attain food self-sufficiency and food security<sup>50</sup>,

51,

52.

The Nigerian Agricultural Transformation Agenda (ATA) was established in 2011 with the aim of rejuvenating the agricultural industry<sup>53</sup>. The objective of ATA was to attain food security in Nigeria by developing a robust agricultural sector that promotes economic growth, facilitates the achievement of food and nutritional stability, creates job opportunities, and positions Nigeria as a prominent participant in the global food market, thereby improving the financial status of millions of farmers<sup>54</sup>. The Agricultural Promotion Policy (APP) of 2016–2020, also known as Green Alternative, was formulated by President Muhammadu Buhari's government as the primary national agricultural policy framework aimed at fostering the expansion and advancement of agriculture in Nigeria. It leveraged the achievements of ATA with a specific focus on generating an ample supply of fresh and top-notch food for the Nigerian market, while also guaranteeing food security<sup>55</sup>. Despite the lofty goals of these policies, reforms, and programs, Nigeria still lacks self-sufficiency in food production, and the majority of its inhabitants are both impoverished and food insecure <sup>56,57</sup>.

## 2.2 Theoretical Review

Several economic theories explore the relationship between employment and output growth. These theories provide various perspectives on how employment levels influence economic output and vice versa. Such theories include:

### 2.2.1. Keynesian Theory

Keynesian theory was founded by John Maynard Keynes and emphasizes the role of aggregate demand in determining output and employment. According to Keynesian theory, higher aggregate demand leads to higher output and, consequently, increased employment. Conversely, insufficient demand can result in unemployment. During periods of low demand, government intervention through fiscal policy (such as increased public spending and tax cuts) can stimulate demand, boost output, and reduce unemployment<sup>58</sup>.

In the Keynesian theory, employment depends upon effective demand. Effective demand results in output. Output creates income. Income provides employment. Since Keynes assumes all these four quantities, viz., effective demand (ED), output (Q), income (Y) and employment (N) equal to each other, he regards employment as a function of income<sup>58, 59</sup>.

### 2.2.2. Classical Theory

The classical economists upheld the notion of full employment. Pigou argues that when the demand for labour equals the supply of labour, the economic system naturally achieves full employment in the labour market. Unemployment arises due to the inflexibility in the wage system and intervention in the functioning of the free market system, such as trade union laws and minimum wage laws. Full employment is achieved when all individuals who desire employment at the prevailing wage rate are able to find work. Individuals who are unwilling to work at the current salary level are not considered unemployed, as they have chosen to be

voluntarily unemployed. Full employment refers to a state in which there is no involuntary unemployment, meaning that individuals are willing to work at the prevailing wage rate but are unable to obtain job<sup>60</sup>.

The classical theory of output and employment is based on the following assumptions:

- a) There is the existence of full employment without inflation.
- b) There is a laissez-faire capitalist economy without government interference.
- c) It is a closed economy without foreign trade.
- d) There is perfect competition in labour and product markets.
- e) Labour is homogeneous.
- f) Total output of the economy is divided between consumption and investment expenditures.
- g) The quantity of money is given and money is only the medium of exchange.
- h) Wages and prices are perfectly flexible.
- i) There is perfect information on the part of all market participants.
- j) Money wages and real wages are directly related and proportional.
- k) Savings are automatically invested and equality between the two is brought about by the rate of interest
- l) Capital stock and technical knowledge are given.

In the classical theory, output and employment are determined by the production function and the demand for labour and the supply of labour in the economy. Given the capital stock,

technical knowledge and other factors, a precise relation exists between total output and amount of employment, i.e., number of workers<sup>60, 61</sup>. This is shown in the form of the following

$$\text{production function: } Q=f(K, T, N) \dots\dots\dots(2.1)$$

where total output (Q) is a function (f) of capital stock (K), technical knowledge (T), and the number of workers (N).

### 2.2.3. Endogenous growth theory

This theory posits that long-term economic growth is driven by activities that generate new technological knowledge. Endogenous growth refers to the sustained expansion of an economy over time, which is influenced by internal factors within the economic system. These factors primarily involve the opportunities and incentives for generating technological knowledge<sup>62</sup>.

Endogenous growth theory contradicts the neoclassical perspective by suggesting that economic considerations might influence the rate of technological advancement and, consequently, the long-term rate of economic growth. The premise is that technological advancement occurs through innovations, which might manifest as new products, methods, and markets, often arising from economic endeavours<sup>63</sup>.

Furthermore, economic policies on trade, competition, education, taxes, and intellectual property can impact the rate of innovation by altering the private costs and rewards associated with conducting research and development (R&D). This is significant because numerous advancements stem from R&D investments made by profit-driven companies. AK theory refers to the theory of knowledge, which explores the nature, scope, and limitations of knowledge and how it is acquired, justified, and applied<sup>64</sup>.

The initial iteration of endogenous growth theory was AK theory, which did not explicitly differentiate between the accumulation of capital and technical advancement. Essentially, it combined the physical and human capital, which is analysed in neoclassical theory, with the intellectual capital that is acquired through innovations<sup>65</sup>. Technical advancements counteract the natural decline in the productivity of capital over time. In the specific scenario when the marginal product of capital remains constant, the total output Y is directly proportional to the total stock of capital K.

This relationship can be expressed as  $Y = AK$ .....(2.2)

where A is a positive constant. Therefore, the term 'AK theory' is used. The empirical validity of endogenous growth theory has been questioned, however, its advocates have responded by introducing revisions to the theory that align it with the facts presented by the detractors.

#### 2.2.4. Solow–Swan Growth Theory

The neoclassical growth model theory was first developed by Solow in 1956 and Swan in 1956. Solow formulated a growth analysis that shares numerous close connections with the neoclassical model. Swan provided a somewhat comparable analysis, albeit with less mathematical clarity. The Solow–Swan model demonstrates the interplay between increases in the capital stock, expansion of the labour force, and advancements in technology, and their impact on a country's overall output<sup>66</sup>.

The model possesses a stock of commodities derived from a production function that exhibits continuous returns to scale. Labour experiences consistent growth, technology remains unchanged over time, the saving rate remains constant, and capital depreciates at a positive and

constant rate. This means that at any moment in time, a fixed proportion of the capital stock becomes unusable and cannot be employed for output. The capital stock plays a crucial role in determining the economy's output at any given time. However, it is important to note that the capital stock is not fixed and can undergo changes, which in turn can contribute to economic growth. Since the work of Solow and Swan, growth theory has expanded into a large body of literature, with various generations of models being explored<sup>66</sup>. Solow expanded upon the Harrod-Domar model by incorporating labour as a productive factor and introducing variable capital-output ratios, in contrast to the fixed ratios in the Harrod-Domar model. These modifications enable the differentiation between the increase in capital intensity and technological progress. Solow regards the fixed proportions production function as a "critical assumption" for the instability outcomes in the Harrod-Domar model. The author's research builds on this by examining the consequences of several specifications, including the Cobb-Douglas and the more comprehensive constant elasticity of substitution (CES) models<sup>67</sup>. In the Solow-Swan growth model, a fundamental assumption is that capital in a closed economy experiences diminishing returns. Given a constant supply of labour, the effect on production of the most recent unit of accumulated capital will always be lower than the previous one. Assuming no technical development or labour force expansion, decreasing returns suggest that there will come a time where the production of new capital is only sufficient to compensate for the loss of current capital owing to depreciation<sup>67</sup>.

Assuming that labour growth rates are not zero, the situation becomes more complex. However, the fundamental reasoning still holds true. In the near term, the rate of growth decreases as diminishing returns come into play, and the economy reaches a stable "steady-state" rate of

growth where there is no economic growth per capita<sup>68</sup>.

### 2.2.5. Okun's Law of Unemployment and Output

Arthur Okun, a distinguished economist and professor at Yale University, conducted research on the correlation between unemployment and productivity. Okun, a proponent of Keynesian economics, advocated for the use of fiscal policy as a means to regulate inflation and bolster employment. In the 1960s, he initially postulated the correlation between unemployment and a nation's Gross Domestic Product (GDP). Overall, Okun's research revealed a positive correlation between a decrease in unemployment and an increase in a country's productivity<sup>69</sup>. Okun's law is an observed empirical correlation between unemployment and declines in a nation's output. According to the "gap version," if the unemployment rate increases by 1%, a country's GDP will decrease by approximately an additional 2% compared to its potential GDP<sup>70</sup>. As unemployment rises, there is a decrease in the multiplier effect caused by the movement of money from workers. Unemployed individuals have the option to withdraw from the labour force, meaning they stop actively looking for work. Once they do this, they are no longer included in the unemployment statistics. Employed individuals have the option to work fewer hours. The productivity of labour may decline, potentially due to companies keeping more workers on staff than necessary. A corollary of Okun's law is that if labour productivity increases or the labour force expands, real net output might grow without a corresponding decrease in unemployment rates, resulting in "jobless growth"<sup>71</sup>. In a similar vein, several economic theories explore the relationship between employment and exports, highlighting how international trade can influence labor markets and economic performance. Some of such theories are:

### 2.2.6. The Heckscher–Ohlin Model

It is a comprehensive mathematical model of international trade, established by Eli Heckscher and Bertil Ohlin at the Stockholm School of Economics. It expands upon David Ricardo's theory of comparative advantage by forecasting trade and production patterns using the resources available in a specific trading area. The concept posits that countries tend to export goods that rely on their abundant and inexpensive resources, while importing goods that rely on their scarce resources<sup>72</sup>.

A country's comparative advantage is determined by the relative endowments of the factors of production, namely land, labour, and capital. Countries has comparative advantages in items that have a higher availability of locally abundant factors of production. The profitability of commodities is defined by the costs associated with their production. Goods that necessitate the use of readily available resources in a certain area are more cost-effective to manufacture compared to goods that rely on limited resources in that same area<sup>73</sup>.

Comparative advantage arises from the diverse elements of production that nations possess. The endowment of factors refers to the quantity of resources, such as land, labour, and capital, that a country possesses. Countries possess several characteristics that account for the disparity in the costs of a specific component when a more abundant and less expensive factor is available. According to the notion, countries will export items that utilize the resources that are plentiful in their land and import things that require resources that are scarce. This theory seeks to elucidate the pattern of international trade observed in the global economy. The idea proposed by Ohlin and Heckscher asserts that the arrangement of global trade is influenced by disparities in factor endowments rather than disparities in productivity<sup>74, 75</sup>. The assumptions are enumerated below.

- i. Both countries possess the same level of technology.

- ii. The production output is anticipated to demonstrate continuous returns to scale
- iii. The technologies employed in the production of the two commodities vary.
- iv. Factor mobility within countries

### 2.2.7. New Trade Theory

The concept of “new” new trade theory was first proposed by a prominent scholar<sup>76</sup>. New trade theorists relaxed the assumption of constant returns to scale, and showed that increasing returns can drive trade flows between similar countries, without differences in productivity or factor endowments. With increasing returns to scale, countries that are identical still have an incentive to trade with each other. Industries in specific countries concentrate on specific niche products, gaining economies of scale in those niches. Countries then trade these niche products to each other – each specializing in a particular industry or niche product. Trade allows the countries to benefit from larger economies of scale<sup>77</sup>.

Economist Paul Krugman based this theory on certain assumptions. The assumptions of the new trade theory are the following:

- a) With specializations of firms, they increase their economies of scale.
- b) Learning by doing has excellent effects on productivity.
- c) First-mover advantage allows new competitors.
- d) The government’s role in industrialization is significant.

- e) Economies of scale is a key to stopping new entrants and turning firms into monopolies.
- f) Product differentiation and product specialization become essential in the growth of a firm.

### 2.2.8. Gravity Model of Trade

The Gravity Model of Trade predicts bilateral trade flows based on the economic size (GDP) and distance between countries: Larger economies and closer geographical proximity lead to higher trade volumes. Countries with strong trade relationships may experience employment growth in export-oriented sectors due to increased trade volumes<sup>78</sup>.

### 2.2.9. Export-Led Growth Hypothesis

The export-led growth hypothesis (ELGH) postulates that export expansion is one of the main determinants of growth. It holds that the overall growth of countries can be generated not only by increasing the amounts of labour and capital within the economy, but also by expanding exports<sup>79</sup>. The export-led growth hypothesis (ELGH) postulates that export expansion is one of the main determinants of growth. It holds that the overall growth of countries can be generated not only by increasing the amounts of labour and capital within the economy, but also by expanding exports. According to its advocates, exports can perform as an “engine of growth”. The association between exports and growth is often attributed to the possible positive externalities for the domestic economy arising from participation in world markets, for instance

from the reallocation of existing resources, economies of scale and various labour training effects<sup>79, 80</sup>.

This hypothesis posits that exports are a key driver of economic growth. Export expansion leads to higher GDP growth by increasing production, creating economies of scale, and fostering technological advancements: Export growth can lead to job creation in export-oriented industries, enhancing overall employment levels. Increased exports can lead to technology transfer, skill development, and improvements in productivity, further boosting employment<sup>80</sup>.

These theories provide a comprehensive understanding of how exports can influence employment patterns, highlighting the complex interplay between international trade and labor markets. The impact of exports on employment depends on various factors, including the structure of the economy, the nature of export goods, and the flexibility of the labor market.

## **2.3 Review of Empirical Studies**

### **2.3.1 Effect of Employment on Agricultural Output in Nigeria**

There is a plethora of studies on the relationship between employment and agricultural output across different countries. A study investigated the impact of inclusive growth determinants on agricultural output in Nigeria from 1981 to 2015. The annual time series data utilized in the study were exposed to unit root test using Augmented Dickey fuller (ADF) and Johansen co-integration test. Thereafter, the study adopted Error correction mechanism (ECM). The ECM finding revealed that as unemployment and poverty rates declines, agricultural output increases and thus, per-capita income increases. This implies that agriculture offers a feasible measure to actualizing the anticipated inclusive growth. The study concluded by recommending that adequate focus should be given to growth of agricultural sector by the entire stakeholders<sup>81</sup>

A study examined the impact of agricultural export on Nigeria's economic growth. This study used the Autoregressive Distributed Lag (ARDL) econometric technique to analyze the long run relationship and the impact of agricultural exports on Nigeria's economic growth. Economic growth is the dependent variable, and is proxied by the real gross domestic product, the explanatory variables include agricultural export, foreign direct investment, inflation rate and the labour force. The results from the ARDL technique revealed that agricultural exports significantly affect Nigeria's economic growth; this suggests that, a percent increase in - agricultural export will boost economic growth in Nigeria by approximately 25 percent. Therefore, from the results, the study recommended that agricultural export need to be promoted through the increase in agricultural production base <sup>82</sup>.

A study was carried out to investigated the effects of government expenditure on agriculture and its impact on unemployment reduction in Nigeria within a time frame 1999- 2015. The study proxied the dependent variable, unemployment, by unemployment rate, and the independent variable, government expenditure on agriculture, by government recurrent expenditure on agriculture and government capital expenditure on agriculture; and employed gross domestic product as a control variable. It sourced time-series data from Central Bank of Nigeria (CBN) Statistical Bulletin and reports of National Bureau of Statistics, and estimated them using ordinary least squares method. The study found that, government expenditure on agriculture did not have significant effects on unemployment in Nigeria<sup>83</sup>.

A study examined the effect of agricultural development on unemployment reduction in Nigeria. The study adopted an ex-post research design, utilizing Error Correction Mechanism (ECM), and Error Correction Mechanism Granger causality test. The annual time series data utilized in the study were verified for unit root test using Augmented Dickey-Fuller test (ADF). The variables

(Unemployment rate [UEMP], Public Expenditure on Agriculture [PEA], Bank Lending to Agriculture [BLA], Inflation Rate [INF], Exchange rate [EXR] and Share of Agriculture to Gross Domestic Product [SAG]) were found to be stationary at the same order of integration 1(1). This finding gives credence to the adoption of ECM approach. The parsimonious ECM result showed that PEA, INF and EXR exert negative effects on UEMP. Hence, the negative dimension of INF and EXR conforms to the a priori expectation, while PEA did not conform to the a priori expectations. On the other hand, the study also found that BLA and SAG exert positive effect on UEMP. The Granger causality result showed a bi-directional causation between UEMP and SAG. The study concluded that current unemployment rate can be reduced through agricultural development in Nigeria<sup>84</sup>.

In a study carried out on employment intensity of agricultural growth in Nigeria adopted Vector error correction model (VECM). The finding revealed that, Agricultural sectoral employment depended on Gross Value Added growth, inflation rate and the inter-temporal relationships. Employment in agriculture depended on previous year's wage rate in agriculture and previous year's agricultural output. Previous two years' employment in agriculture, previous year's agricultural output and previous year's wage rate limit current year's agricultural employment. Gross Value Added growth affected agricultural employment negatively in the period under review. Wage, inflation, and interest rates reduced employment<sup>85</sup>.

A study on effect of agricultural growth on unemployment and poverty in Nigeria (1980 -2012). The economic burden of unemployment and poverty on a country necessitated this study. The objectives of the study were to examine the dimension and linkage between agricultural growth and poverty and also unemployment and to evaluate the effect of poverty and unemployment on agricultural production in Nigeria. Time series data were employed for the study from the year

1980- 2012 which was sourced from central bank of Nigeria, annual abstract of statistics of the Nigeria federal office of statistics, Nigeria Bureau of Statistics and United Nations Publications. Granger causality and co-integration model were the analytical tools used. Some of the recommendations given are that agriculture in Nigeria should be given a top priority and that government bodies should encourage the poor farmers by absorbing the excess inventory of agricultural output in order to distribute it to the total populace and thus increase in agricultural production will create more employment and as a result alleviate poverty<sup>86</sup>.

The impact of agriculture sector growth on unemployment level as well as the direction of causality between agricultural sector output and unemployment level was analysed for Nigeria. Secondary annual time series data between 1981 and 2016 were used for the study. Data on unemployment rate, agriculture sector output, public expenditure and industrial output were obtained from the Central Bank of Nigeria's statistical Bulletin while data on FDI and population growth were obtained from the World Bank World Development Indicators. The data were analyzed using Autoregressive distributed lag Bounds test of cointegration, Autoregressive distributed lag error correction model estimation and Granger causality. The Autoregressive distributed lag error correction model estimation revealed that change in agriculture output in the current period is negative and significant for current unemployment level in Nigeria, while the change in one period lagged agriculture output was positive and significant for current unemployment level in Nigeria. Also the error correction term indicated that about 74.10 percent of the disequilibrium in the system in the previous year would be corrected in the current year. Granger causality test results revealed bi-directional causality between agriculture output and unemployment level in Nigeria<sup>87</sup>.

A study investigated the determinants of agricultural sector growth in upper middle-income countries using (panel annual data ranging from 2005 to 2020. The impact of the complementarity between financial and human capital development on agricultural sector growth was also explored in the case of upper middle-income countries. Agricultural sector growth was positively and significantly influenced by its own lag under the dynamic generalized methods of moments (GMM) approach. Fixed effects show that financial development had a significant deleterious impact on agricultural sector growth whilst a significant positive relationship running from financial development towards agricultural sector growth was observed under the pooled ordinary least squares (OLS). The dynamic GMM and the pooled OLS indicates that economic growth's influence on agricultural sector growth was significantly negative. Fixed effects, random effects and pooled effects show that trade openness's influence on agriculture sector growth was found to be significantly positive. Fixed and random effects noted that population growth had a significant positive impact on agricultural sector growth whilst population growth's influence on agricultural sector growth was observed to be significantly deleterious<sup>88</sup>.

Another study examined the economic determinants of agricultural productivity in Nigeria from 1981-2017, using ARDL technique. The outcome of the study confirms the long run linkage among the variables of the model. The estimated ARDL result reveals that the labor force and real exchange rate influence agricultural productivity positively, while the inflation rate has a negative effect on agricultural productivity in Nigeria<sup>89</sup>.

In another research carried out, the study employed secondary time series data in examining the determinants of agricultural output growth in Nigeria between the period 1970 to 2019. The ARDL regression analysis was conducted to examine both long-run and short-run relationship between variables. In view of this analysis, real agricultural output annual growth rate was

found to have undesired effect on gross fixed capita formation, labour force growth, non-agricultural GDP as well as foreign direct investment, while real agricultural output annual growth rate was found to have desired effect on real effective exchange rate of Naira, agricultural input and bank credit facilities to agriculture (CRE) on agricultural output growth in the Nigeria agricultural sector<sup>90</sup>.

A study investigated the impact of agricultural financing and agricultural output growth on employment generation in Nigeria from 1981 to 2017. The study employed the Auto Regressive Distributed Lag (ARDL) Model for analysis. The empirical results show that while agricultural financing increases employment generation in both the short run and long run, the lag of agricultural output growth increases employment generation mainly in the short run. Other variables found to have significant effect on employment generation were price and agricultural output while labor force population, wages and aggregate expenditure were insignificant<sup>91</sup>.

In a study to examine the relationship between agricultural development and employment generation in Nigeria from 2008-2017, Error correction mechanism and granger causality test revealed that, agricultural sector growth and other explanatory variables contributed significantly to employment generation in Nigeria<sup>92</sup>.

In another study to examine the impact of agricultural sector growth on unemployment level in Nigeria. Annual time series data ranging from 1981 to 2016 were utilized for the study. Autoregressive distributed lag (ARDL) and Granger causality test were utilized in the study. The study outcome showed that current time variation in agricultural output is negative and significant for current unemployment stage while variation in one lagged agricultural output time was positive and significant for current unemployment stage in Nigeria. The Granger causality

test results showed a bi-directional causality between agriculture output and unemployment level<sup>93</sup>.

Another study assessed the performance of the Nigerian agricultural sector, with a focus on the relationship between agricultural funding-based contributions and performance of the Nigerian agricultural sector from 1986 to 2018. Total government expenditure (TGE), agricultural credits (ACG) and foreign direct investment (FDI) were used as the independent variables; while crop production (CRP), livestock production (LSP), forestry production (FRP) and fishing production (FSP) represent the dependent variables. The study utilizes the Fully Modified Ordinary Least Square (FMOLS) and Engle-Granger Single Equation co-integration Tests for the search of possible link between the sets of variables. From the analyses, the results of the study reveal that TGE and AGS are significantly and positively related to CRP, LSP and FSP while FDI maintains a negative relationship with them. On another hand, TGE and FDI have negative relationship with FRP, but AGS is positively related to FRP. The Co-integration analysis reveals that there is a long run relationship between all the variables used in the four models. On this basis, the study concludes that agricultural funding-based contributions have significant and long run relationship with the performance of the Nigerian agricultural sector<sup>94</sup>.

In a research to investigate the role of agriculture in generating employment in post SAP era Nigeria, a study was motivated as a result of lack of sufficient studies regarding this subject matter in the recent time. The study employed Co-integration, DOLS and Granger Causality Approach to address the objective of this study. Consequently, the major findings that emerged in this study are as follows: agricultural sector contributed to employment generation in the country, though not significant in the post SAP era. Similarly, inflation rate has a positive impact on employment generation in the economy. However, the contribution of agricultural

expenditure to the employment generation was negative in the country. Furthermore, one-way feedback flows from employment to agricultural expenditure and expenditure on agriculture granger causes inflation rate in the economy <sup>95</sup>.

### **2.3.2 Effect of Employment on Agricultural Export in Nigeria**

The second strand of literature examines the effect of employment on agricultural exports in Nigeria. In this regard, a study examined the determinants of Ethiopian agricultural exports using the imperfect substitutes' model as a theoretical framework and system generalized moment method as an analytical model for the period 1998–2018. The regression result of the two-step system generalized moment method showed that gross domestic product, exchange rate, road network, corruption index of Ethiopia, lagged export value, indirect tax revenue and domestic saving are the major determinants of agricultural exports in Ethiopia. However, foreign direct investment and labour force are negatively and significantly related to Ethiopian agricultural exports<sup>96</sup>.

While considering the importance of agri-food exports for Nigeria in the face of dwindling revenue from its oil exports, a study provides empirical insights on the determinants and potential of agri-food exports from Nigeria to 70 major trading countries between 1995 and 2019 by applying a Stochastic Frontier Analysis (SFA) on a gravity model. While employing variety of estimation techniques including the fixed effects, Ordinary Least Square (OLS), Pseudo Poisson Maximum Likelihood (PPML), and Heckman models to confirm the robustness of results, it was discovered that the economic size (GDP) of Nigeria and its trading countries, importers' population, EU membership, ECOWAS membership and contiguity stimulate agri-food export. Also, bilateral distance, domestic population, exchange rate, language, and landlocked adversely affect agri-food exports<sup>97</sup>.

Another scholar examined the key determinants and efficiency of China's agricultural exports with its 114 importing countries by applying the Stochastic Frontier Analysis (SFA) on an augmented gravity model for the period of 2000–2019. The Poisson Pseudo Maximum Likelihood (PPML) and the fixed effect models were also estimated simultaneously to confirm the robustness of our findings. The results reveal that China's economic size (GDP) and its importing countries, the Belt and Road Initiative (BRI), common border, and the Chinese language positively determine China's agricultural export flows. The results, on the other hand, also reveal that China's agricultural export is adversely influenced by the income (per capita GDP) of China and its trade partners, currency depreciation, distance, and landlocked<sup>98</sup>.

Another study employed the autoregressive distributed lag bound test analysis given that all the macroeconomic series used in the study are of mixed integrated order of stationarity. A Granger causality was also carried out in order to examine whether there is any predictive power of crude oil price for agricultural export. The findings showed that there exists a significant relationship between the agricultural export which is the dependent variable and the exchange rate but not in the case of the crude oil price. It also revealed that the variables do cause each other in some directions. In conclusion, there is long run relationship between exchange rates and agricultural export in Nigeria<sup>99</sup>.

While employing secondary data from the World Development Indicators (WDI) and Food and Agriculture Organization (FAO), a study examined the factors driving the growth of non-traditional agricultural exports (NTAE) in Ghana using an Autoregressive Distributive Lag (ARDL) model. While the study identified real GDP to be a significant determinant of NTAE's growth in both contemporaneous and lag forms, other variables including inflation, gross capital formation and foreign direct investment influence NTAE's growth through their lag values.

Exchange rate, inflation and RGDP significantly determine the growth of NTAEs in the long-run<sup>100</sup>.

Similarly, using the ARDL approach to examine linkages between energy consumption, industrialization, carbon emission and agricultural product exports, a scholar revealed that in the long-run, energy consumption has significant positive nexus with agricultural products export, whereas urbanization, transportation, and carbon emission influenced agricultural products export in Pakistan. In the short-run, there was a reverse of the long-run situation where industrialization, transportation, and energy consumption impacted positively on the export of agricultural products with carbon emission and urbanization posing a deleterious impact on the export of agricultural products<sup>101</sup>.

Similarly, another researcher explored the factors affecting the exports of agricultural products in Vietnam employing the gravity model and identified among other factors that Vietnam's GDP, economic development, exchange rate, population, the openness of the economy, and the exporting country's membership to World Trade Organization (WTO) exerted a positive and significant impact on agricultural exports turnover in Vietnam. The study further found that the size of agricultural land and the distance between the agricultural products and the importing country impacted negatively on Vietnam's agricultural exports<sup>102</sup>.

A scholar deployed the ARDL approach to reexamine factors that affect agricultural product exports in Pakistan. The co-integration test showed a long-run relationship between agricultural product exports and the hypothesized variables such as agricultural credit, cereal production, population, area sown, FDI and agricultural employment. The study revealed that only the area sown (cultivated land size) and cereal production had a positive significant impact on agricultural product exports and this impact was only seen in the short-run. None of the

hypothesized variables had a significant effect on agricultural product exports in the long-run. The study further examined the causal relationship between agricultural product exports and the aforementioned hypothesized variables. The authors discovered a unidirectional or one-way causality running from cereal production to agricultural export products without reverse causality. A unidirectional causality was also revealed from agricultural product export to population, and FDI to population<sup>103</sup>.

A study examined the factors that determine East African exports using a panel ARDL approach with heterogeneous panel data. The study revealed that trade openness, RGDP, supply of labour, domestic demand and GCF significantly affect agricultural exports in East Africa in the short-run. Also, in the long-run, factors such as GCF, FDI, final consumption, RGDP of importing and exporting countries and trade openness significantly affected the performance of East African exports<sup>104</sup>.

A research work was conducted to identify some of the main determinants of agricultural export in Ethiopia for the period 1993-2013. The results from the co-integration and error correction models revealed that real GDP, fertilizer input and export diversification are significantly affected agricultural export performance in the long run except real effective exchange rate, trade openness and institutional quality. In the short run, real gross domestic product (RGDP), real effective exchange rate, and export diversification became significant. On the other hand, out of the variables significantly affected agricultural export both in the long run and short run; real GDP and export diversification affected agricultural export positively as expected<sup>105</sup>.

A study estimated short and long run relationships between trade liberalization and agricultural export performance in Nigeria from 1999-2020. The short-run and long-run agricultural GDP performance with respect to the macro-economic variables were analyzed using the techniques of

co-integration and error correction models. Result revealed that, at the long run, coefficients of agricultural export, agricultural degree of openness, national agricultural productivity and agricultural capital formation were positively significant at 1 and 10 percent levels respectively. Agricultural import and exchange rate were negative but significant at 1 and 5% respectively. At the short-run, result shows a negative but significant relationship with respect to agricultural capital formation, agricultural export and exchange rate. Result revealed negative relationship between national agricultural productivity, exchange rate, agricultural import, agricultural export and agricultural capital formation at one year lagged<sup>106</sup>.

The main objective of the paper has been to empirically investigate the determinants of agricultural exports in Nigeria. The research covered the period between 1980 and 2015. The Ordinary Least Squares technique was used to analyze the data. The cointegration and ECM models as well as the granger causality tests were adopted. The result shows that the immediate past value of agricultural exports has a significant and positive impact on the current level of agricultural exports. The result shows that the one period lagged value of the Nominal Effective Exchange Rate has a significant and positive impact on the level of agricultural exports in Nigeria. The result shows that agricultural output has a significant and positive impact on agricultural exports in Nigeria. The result revealed that oil export has an insignificant and positive impact on the level of agricultural exports in Nigeria. The openness of the Nigerian economy to the outside World through international trade has a significant and positive impact on the level of agricultural exports in Nigeria. The ECM shows a satisfactory speed of adjustment between the short run and long run period<sup>107</sup>.

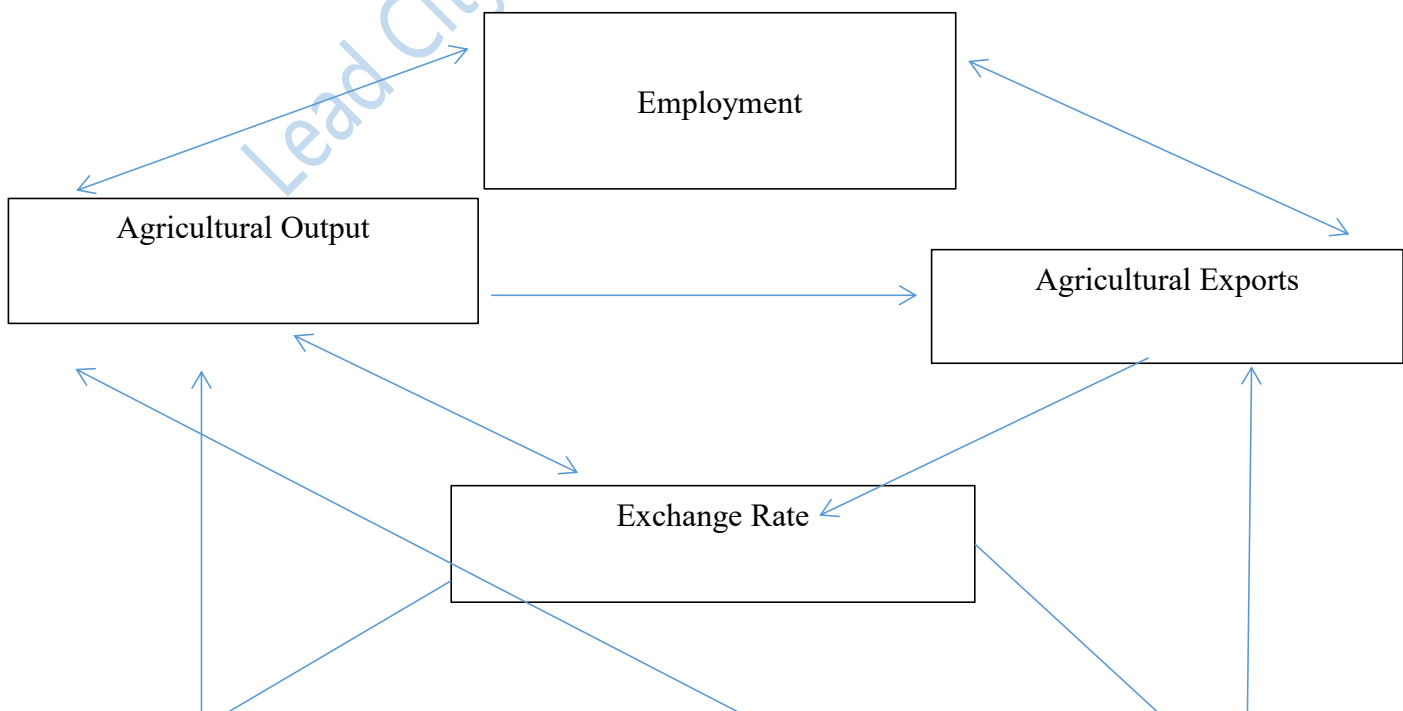
In another research, some scholars attempt to identify and examine the determinants of agricultural exports in Tunisia. The study used annual data for the period 1972 – 2017 and seven

ad hoc specifications. Empirical results of each specification show us that gross domestic product in the agricultural sector, agricultural imports, bank loans to the agricultural sector and imports of agricultural machinery have a positive effect on agricultural exports in the long run. Conversely, domestic investment in the agricultural sector and the exploitation of agricultural land have a negative effect on agricultural exports in the long term. In the short term, only domestic investments in the agricultural sector cause agricultural exports. Findings and interpretations provide evidence that is very substantial to inspire validity planning and reforms to ameliorate agricultural investment and agricultural trade, so it can uphold economic development in Tunisia<sup>108</sup>.

A study examined the effect of exchange rate variation on the export of agricultural produce in Nigeria. This study adopted the VAR estimation technique in ascertaining the nexus between exchange rate variation and the export of agricultural produce in Nigeria. Data for this study were sourced from World Development Indicators, WDI, a publication of the World Bank; Central Bank of Nigeria, CBN, Statistical Bulletin and Annual Reports for the various years; and the National Bureau of Statistics. The data covered a period of 35 years 1986 – 2021. The variables of the model include agricultural exports, exchange rate, trade openness, agricultural finance and agricultural employment. The results show that exchange rate, trade openness, agricultural finance and agricultural employment exert a positive effect on agricultural exports. The study therefore concludes that exchange rate, trade openness, agricultural finance and agricultural employment play a vital role in enhancing the export of agricultural produce in Nigeria<sup>109</sup>.

## 2.4 Conceptual Framework (Model)

The conceptual framework aims to illustrate the dynamic relationships between employment, agricultural output, and agricultural exports in Nigeria. It highlights the inter-dependencies and feedback loops among these variables, providing a comprehensive understanding of how they influence each other.



Employment is central to the framework and it interacts with agricultural output and exports, influencing the capacity and productivity of the agricultural sector. Agricultural output affects and is being affected by employment, agricultural exports, GFCF, and inflation. It drives economic activity in the sector and contributes to foreign exchange through exports. Agricultural Exports is facilitated by agricultural output and exchange rate, contributing to foreign exchange earnings and stimulating further investment in agriculture. Exchange rate influences the competitiveness of agricultural exports and the cost of imported inputs, affecting agricultural output and inflation. Inflation is affected by exchange rate and investment levels, impacting agricultural costs and output. Investment in the agricultural sector, influenced by inflation and exchange rate, drives agricultural productivity and output.

Agricultural output influences employment as higher agricultural production typically requires more labor, thus increasing employment in the agricultural sector. Conversely, employment can also influence agricultural output as more labor availability may lead to higher production. Increased agricultural output can lead to higher agricultural exports since surplus production may be sold abroad. Higher agricultural exports might encourage further agricultural output to meet export demands. Increased agricultural output can help reduce inflation by increasing the supply of agricultural goods, which may lower prices. Conversely, inflation can affect agricultural output as higher inflation rates might increase the costs of production inputs, potentially reducing output.

A favorable exchange rate (a weaker domestic currency) can boost agricultural exports by making them cheaper for foreign buyers. Higher agricultural exports can influence the exchange rate by increasing the demand for domestic currency as foreign buyers need to convert their money to make purchases. A weaker domestic currency can make imports more expensive,

contributing to higher inflation. Inflation can, in turn, affect the exchange rate as higher inflation may lead to a depreciation of the domestic currency.

A favorable exchange rate can encourage gross fixed capital formation (investment in fixed assets) by making capital goods more affordable. Gross Fixed Capital Formation can influence the exchange rate by attracting foreign investment, which increases demand for the domestic currency. Increased agricultural output can lead to higher gross fixed capital formation as profits from agriculture might be reinvested in fixed assets. Conversely, increased Gross Fixed Capital Formation (e.g., investments in agricultural machinery) can lead to higher agricultural output.

## **2.5. Gaps in Literature**

There exists a plethora of studies on the contribution of the agricultural sector to employment generation across countries<sup>83, 84, 85, 86, 87, 91, 93</sup>. However, not so many studies have examined the effect of employment on agricultural sector performance<sup>81, 88, 89, 91</sup>. Given the transition of employment from production in the real sectors of agriculture and manufacturing to the service sector, it becomes imperative to examine the role of employment on agricultural sector performance in Nigeria.

Similarly, the study unbundled agricultural sector performance into agricultural output and agricultural exports in examining the effect of employment on these two major indicators of performance. Existing studies in this regard have only focused on agricultural output as a measure of agricultural performance. In addition, there are few studies that have examined the response of agricultural output and exports to employment shocks in the Nigerian economy. This study therefore adds to the body of knowledge in this regard.

## Endnotes

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## Chapter Three

### Methodology

This chapter explains the research methodology employed in this study to examine the nexus between employment and agricultural performance in Nigeria, while using agricultural output and exports as indicators of agricultural performance. The chapter involves the specification of empirical models, a-priori expectations, data sources and definitions and estimation techniques.

#### 3.1 Model Specification

##### 3.1.1 Model for Examining the Effect of Employment on Agricultural Output in Nigeria

The model hinges on the theoretical foundation as premised on Okun's Law which provides a quantitative framework for analysing the relationship between unemployment(employment) and agricultural output growth as expressed in the conceptual framework. In examining the relationship between employment and agricultural output, the study aligns with the model specified by previous studies with some modifications<sup>1, 2, 3</sup>.

The model is formulated functionally as follows:

$$AGOUTPUT_t = f(EMP_t, GFCF_t, EXC_t, INF_t) \text{-----}(3.1)$$

The econometric specification of the model is specified as :

$$\ln AGOUTPUT_t = \beta_0 + \beta_1 \ln EMP_t + \beta_2 \ln GFCF_t + \beta_3 \ln EXC_t + \beta_4 \ln INF_t + \mu_t \text{ (3.2)}$$

Where: *AGOUTPUT* denotes agricultural output; EMP represents employment in agriculture; GFCF is gross fixed capital formation; EXC is exchange rate and INF is inflation rate. Similarly, Also,  $\beta_0$  is the constant, and  $\beta_1-\beta_4$  are the coefficient estimates, while  $\mu_t$  is the error term.

### 3.1.2 Model for Examining the Effect of Employment on Agricultural Exports in Nigeria

This model follows the Heckscher–Ohlin theory as specified by some scholars<sup>4,5</sup>. These studies argued that countries will export items that utilize the resources that are plentiful in their land and import things that require resources that are scarce. This theory seeks to elucidate the pattern of international trade observed in the global economy. The idea proposed by Ohlin and Heckscher asserts that the arrangement of global trade is influenced by disparities in factor endowments rather than disparities in productivity. Thus, the model is specified functionally as:

$$AGEXPORT_t = f(EMP_t, AGOUTPUT_t, EXC_t, AGCRD_t) \dots\dots\dots (3.3)$$

The econometric specification of the model is specified as :

$$\ln AGEXPORT_t = \beta_0 + \beta_1 \ln EMP_t + \beta_2 \ln AGOUTPUT_t + \beta_3 \ln EXC_t + \beta_4 \ln AGCRD_t + \mu_t \dots\dots\dots (3.4)$$

Where: *AGEXPORT* denotes agricultural exports; EMP represents employment in agriculture; *AGOUTPUT* is agricultural output, AGCRD represents agricultural credit. Similarly,  $\beta_0$  is the constant, and  $\beta_1-\beta_4$  are the coefficient estimates, while  $\mu_t$  is the error term.

### 3.1.3 Model for determining the response of agricultural exports and output to employment shocks

The VAR model provides a comprehensive framework for analyzing the dynamic interactions among agricultural output, agricultural exports, employment, gross fixed capital formation,

exchange rate, and inflation in Nigeria. The model captures the inter-dependencies and can be used for forecasting, policy analysis, and understanding the transmission of shocks across these variables. A VAR model captures the linear inter-dependencies among multiple time series. Each variable in the system is treated as endogenous and modeled as a linear function of its own past values and the past values of all other variables. For a system with  $n$  variables and  $p$  lags, the VAR model can be written as:

$$Y_t = \theta_1 Y_{t-1} + \theta_2 Y_{t-2} + \dots + \theta_p Y_{t-p} + \mu_t \dots \dots \dots (3.5)$$

Where:

$Y_t$  is a vector of all endogenous variables at time  $t$

$\theta_i$  are coefficient matrices for each lag  $i$ .

$\mu_t$  is a vector of error terms (innovations) at time  $t$ .

### 3.2 A’Piori Expectation

For the first model, the theoretical expectation regarding employment and agricultural output in Nigeria, it is expected that there should exist a positive relationship between employment and agricultural output. This relationship is underpinned by the marginal productivity of labor, where an increase in labor inputs (employment) typically enhances output, assuming other factors remain constant. It is expected that there should be a positive relationship between gross fixed capital formation (GFCF) and agricultural output. Increased investment in agricultural infrastructure and capital is expected to boost agricultural productivity and output.

The relationship between exchange rate and agricultural output could be ambiguous, given that a depreciating exchange rate can both positively (through increased export competitiveness) and negatively (through higher input costs) affect agricultural output. Theoretically from the Cost-

Push theory of inflation, there should be a negative relationship between inflation and agricultural output. Higher inflation, particularly cost-push inflation, is expected to reduce agricultural output by increasing the cost of inputs. Higher prices for inputs such as seeds, fertilizers, and fuel reduce farmers' purchasing power, potentially lowering output. If inflation is demand-pull, driven by increased consumer demand, it could temporarily boost agricultural output as farmers respond to higher prices. However, sustained high inflation generally erodes purchasing power and leads to economic instability, which can negatively affect agricultural output in the long run.

For the second model, the theoretical expectation regarding employment and agricultural export; it is expected that as employment in agriculture increases, it boosts productivity and output, leading to higher exportable surpluses. This aligns with the labor productivity theory. Higher employment, especially in the agricultural sector, suggests an increase in the labor force available for agricultural activities. As more people are employed, agricultural productivity could rise, leading to increased production and surplus for export.

Similarly, higher agricultural output leads to greater availability of products for export, thus increasing the volume of agricultural exports. This aligns with the Export-Led Growth theory. Higher agricultural output can drive exports by ensuring that there is enough quality produce to meet international market standards and demands, fostering economic growth through export revenues.

For exchange rate and agricultural exports, a competitive (weaker) exchange rate makes Nigerian agricultural products cheaper in international markets, increasing demand and exports. Similarly, better access to agricultural credit enhances production capacity, leading to higher agricultural output and exports.

### **3.3 Estimation Technique**

#### **3.3.1. Pre -Estimation Test**

##### **Unit Root Test**

The unit-root test is adopted to test the time-series properties of the data. A unit root test in econometrics is a statistical test used to determine whether a time series is non-stationary and possesses a unit root. A time series with a unit root is characterized by a stochastic trend, meaning that shocks to the system have a permanent effect and the series does not revert to a long-term mean. The Augmented-Dickey Fuller and Phillip Perron test are employed in testing the unit-root properties of the data.

##### **Bounds Test for Co-integration**

The Bounds Test for co-integration is used in the context of an Autoregressive Distributed Lag (ARDL) model to determine whether there is a long-run relationship between variables in a time series model. The Bounds Test provides two sets of critical values; the lower bound which assumes all variables are  $I(0)$  (stationary) and the upper bound which assumes all variables are  $I(1)$  (non-stationary).

If the F-statistic is above the Upper Bound, the null hypothesis, indicating evidence of co-integration is rejected. However, if the F-statistic is below the lower bound, we fail to reject the

null hypothesis, indicating no co-integration. If co-integration is found, the relationship between the variables is stable over the long term, allowing for the estimation of both short-run and long-run dynamics. This co-integration approach has several key advantages: First, this method tests for co-integration between variables integrated of order zero i.e. I(0) and order one I(1) <sup>6</sup>.

### 3.3.2. Auto-Regressive Distributed Lag Method (ARDL)

The Autoregressive Distributed Lag (ARDL) estimation technique is a popular econometric method used to analyze the dynamic relationship between variables in the context of time series data. It is particularly useful for examining the short-run and long-run relationships between variables that may be integrated at different orders, i.e., a mix of I(0) and I(1) variables.

Unlike other cointegration techniques, such as the Engle-Granger or Johansen cointegration tests, which require all variables to be integrated of the same order, the ARDL model can handle variables with different integration orders (I(0) and I(1)). The ARDL model estimates both short-run and long-run coefficients simultaneously, allowing for a comprehensive understanding of the relationships between variables. Similarly, the ARDL estimation technique performs well even with small sample sizes, which is particularly useful for developing countries with limited data. For the purpose of this study, two ARDL models are estimated to analyse the effect of employment on agricultural output and exports in Nigeria.

The first ARDL model is given as:

$$\begin{aligned} \ln AGOUTPUT_t = & \beta_0 + \sum_{i=1}^n \beta_1 \Delta \ln AGOUTPUT_{t-1} + \sum_{i=1}^n \beta_2 \Delta \ln EMP_{t-1} + \sum_{i=1}^n \beta_3 \Delta \ln GF CF_{t-1} + \\ & \sum_{i=1}^n \beta_4 \Delta \ln EXC_{t-1} + \sum_{i=1}^n \beta_5 \Delta \ln INF_{t-1} + \theta_1 \ln EMP_{t-1} + \theta_2 \ln GF CF_{t-1} + \theta_3 \ln EXC_{t-1} + \theta_4 \ln INF_{t-1} + \\ & \theta_5 ECM_{t-1} + \mu_t \dots \dots \dots (3.6) \end{aligned}$$

Where  $\beta_1$  to  $\beta_5$  are the short run coefficients and  $\theta_1$  to  $\theta_4$  are the long run coefficients of the variables.

The second ARDL model is given as:

$$\ln AGEXPORT_t = \beta_0 + \sum_{i=1}^n \beta_1 \Delta \ln AGEXPORT_{t-1} + \sum_{i=1}^n \beta_2 \Delta \ln EMP_{t-1} + \sum_{i=1}^n \beta_3 \Delta \ln AGOUTPUT_{t-1} + \sum_{i=1}^n \beta_4 \Delta \ln EXC_{t-1} + \sum_{i=1}^n \beta_5 \Delta \ln AGCRD_{t-1} + \theta_1 \ln EMP_{t-1} + \theta_2 \ln AGOUTPUT + \theta_3 \ln EXC_{t-1} + \theta_4 \ln AGCRD_{t-1} + \theta_5 ECM_{t-1} + \mu_t \dots \dots \dots (3.7)$$

Where  $\beta_1$  to  $\beta_5$  are the short run coefficients and  $\theta_1$  to  $\theta_4$  are the long run coefficients of the variables.

### 3.3.3 . VAR Variance Decomposition and Impulse Response Function

The VAR variance decomposition and impulse response function are employed to determine the response of agricultural exports and agricultural output to shocks in employment. The impulse response function graphs gives more understanding about the interaction between variables in the short - run. At large IRF analysis in time series analysis is important in determining the effects of external innovations on the variables of the system. The VAR system of equations is given as:

$$Y_t = \theta_1 Y_{t-1} + \theta_2 Y_{t-2} + \dots + \theta_p Y_{t-p} + \mu_t \dots \dots \dots (3.8)$$

Where:

$Y_t$  is a vector of all endogenous variables at time t

$\theta_i$  are coefficient matrices for each lag i.

$u_t$  is a vector of error terms (innovations) at time t.

### 3.4 Sources and Measurements of Data

The study employed secondary data obtained from the Central Bank of Nigeria (CBN), Statistical Bulletin and World Development Indicators. The data spans from 1991 through 2022.

The dependent variables considered for this study include agricultural output and agricultural exports while the explanatory variables are employment in agriculture, gross fixed capital formation, exchange rate, inflation and agricultural credit.

**Table 3.1: Data Sources and Definition**

S/N	Variables	Label	Description (Measurement)	Source
1.	Dependent Variable	Agricultural Output Growth	Agricultural output is the total of crop and livestock products. It is measured as agriculture, forestry, and fishing value added (annual % growth)	World Development Indicators.(2023)
2.	Dependent Variable	Agricultural Exports	Agricultural commodities sold to other countries. It is measured as agricultural raw materials exports (% of merchandise exports)	WDI, 2023
3.	Independent Variable	Employment	Employment is defined as persons of working age who are engaged in any activity to produce goods or provide services for pay or profit. It is measured as employment in the agricultural sector (% of total employment).	WDI, 2023
4.	Control Variable	Gross Fixed Capital Formation	Gross fixed capital formation (GFCF), also called "investment", is defined as the acquisition of produced assets (including purchases of second-hand assets), including the production of such assets by producers for their own use, minus disposals. It is measured as Gross Fixed Capital Formation (annual % growth)	WDI, 2023
5.	Control Variable	Exchange Rate	This refers to the rate of exchange of one country's currency (naira) to another country's currency (dollars)	WDI(2023)
6.	Control Variable	Inflation	Inflation is the rate of increase in prices over a given period of time. It is measured as consumer Prices (annual %)	WDI(2023)
7.	Control Variable	Agricultural Credit	Agricultural credit refers to one of several credit vehicles used to finance	CBN(2023)

agricultural transactions. These vehicles include loans, notes, bills of exchange, and banker's acceptances. It is measured as Agricultural Credit Guarantee Scheme (ACGS).

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**Source: Author's Illustration 2024**

### **Endnotes**

<sup>1</sup>A.O. Abdulkareem. *Effect of Unemployment on Output Growth in Nigeria : Evidence from Okun's Law.* **AJEC**, 5(1), 2024, 2734-2670.

<sup>2</sup>M.B. Ado & B.M. Bello. "Economic Determinants of Agricultural Productivity in Nigeria." **International Journal of Research and Innovation in Social Science**, 1(2), 2020, 418-423.

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<sup>6</sup>Damodar N. Gujarati <http://www.abebooks.com/9780072478525/Basic-Econometrics-Gujarati-Damodar-N-0072478527/plp> 1995

## Chapter Four

### Results and Discussion of Findings

This chapter provides the details of data presentation, estimation, and the results of the empirical analysis between employment and agricultural sector performance (agricultural output and agricultural exports) in Nigeria. Empirical analysis involves the summary statistics, correlation matrix, unit root test, co-integration test, ARDL results and VAR impulse response and variance decomposition results on the variables employed from 1991-2022 .

#### 4.1. Descriptive Statistics

This is done to summarize the basic features of the data. The results of the descriptive statistics are presented in Table 4.1. below.

Table 4.1. **Summary Statistics**

	AGEXPOR T	GFCF	INF	LEXC	LNAGCR D	LNEM P	AGRIC_OTGR W
Mean	0.976	1.331	18.609	4.598	4.6727	3.790	5.781
Median	0.281	2.342	13.006	4.861	4.216	3.790	3.792
Maximum	7.268	40.388	72.835	6.054	7.502	3.958	55.578
Minimum	0.006	- 23.746	5.388	2.293	1.612	3.637	1.874
Std. Dev.	1.681	12.432	16.480	1.069	1.604	0.125	9.408
Skewness	2.759	0.493	2.105	-0.674	0.019	0.052	5.003
Kurtosis	9.942	5.053	6.372	2.255	2.014	1.354	27.037
Jarque- Bera	101.578	6.699	37.595	3.066	1.257	3.513	875.598
Probability	0.000	0.035	0.000	0.216	0.533	0.172	0.000

**Source:** Author's computation 2024.

This table provides descriptive statistics for seven variables: AGEXPORT (Agricultural Export), GFCF (Gross Fixed Capital Formation), INF (Inflation Rate), LEXC (Log of Exchange Rate), LNAGCRD (Log of Agricultural Credit), LNEMP (Log of Employment), and AGRIC\_OTGRW (Agricultural Output Growth). Agricultural Export shows a mean value of 0.976, while the median is much lower at 0.281, indicating that the data might be skewed. Minimum and maximum values of between 0.006 to 7.268 shows significant variability in agricultural export data. A Kurtosis value of 9.942, indicates a distribution with a long right tail. The Jarque-Bera probability of 0.000, suggests the data is not normally distributed.

Gross Fixed Capital Formation shows a mean value of 1.331, with a median higher at 2.342, indicating some skewness. Maximum and Minimum values range from -23.746 to 40.388, indicating substantial fluctuations. Slight positive skewness of 0.493 and higher kurtosis (5.053), indicates the presence of outliers, while the Jarque-Bera p-value of 0.035 indicates non-normality in the data.

Inflation rate has a high mean (18.609) with a lower median (13.006), suggesting skewness. The minimum and maximum values of inflation also shows high variability in inflation rates. The distribution is highly positively skewed (2.105) with high kurtosis (6.372), indicating a distribution with a long right tail and heavy tails. Similarly, the Jarque-Bera p-value of 0.000, shows the data is not normally distributed.

Exchange Rate has a mean of 4.598, with a median close at 4.861, indicating less skewness. Maximum and minimum values show a moderate range from 2.293 to 6.054. A slight negative skewness (-0.674) and kurtosis near 2.255, indicates a fairly symmetric distribution with lighter tails. The Jarque-Bera probability of 0.216 suggests the data might be normally distributed.

Agricultural Credit has mean and median values of 4.6727 and 4.216 respectively, indicating a nearly symmetric distribution. Maximum and minimum values range from 1.612 to 7.502. Near-zero skewness (0.019) and kurtosis close to 2.014, indicates a nearly normal distribution. Jarque-Bera probability value of 0.533 suggests normality in the data.

The mean (3.790) for employment is close to the median (3.790), indicating symmetry in the distribution. The maximum and minimum values show a narrow range from 3.637 to 3.958. Employment also shows a nearly symmetric distribution with skewness (0.052) and kurtosis (1.354) indicating light tails. Jarque-Bera probability of 0.172 suggests normality in employment data.

Agricultural Output Growth has a mean of 5.781 with a much lower median of 3.792, indicating a high degree of skewness. Maximum and Minimum values show a very wide range from 1.874 to 55.578, showing extreme variability. Highly positively skewed (5.003) with extremely high kurtosis (27.037) values, indicates a distribution with a long right tail and extremely heavy tails. The Jarque-Bera probability is 0.000, strongly indicating that the data is not normally distributed.

#### **4.2. Correlation Analysis**

The correlation analyses of the variables are presented in Table 4.2. The coefficients show the level of association between employment, agricultural performance and other control variables in Nigeria.

Table 4.2. Correlation Matrix for Employment and Agricultural Output

	GFCF	INF	LEXC	LNEMP	AGRIC_OTGRW
GFCF	1				
INF	-0.110	1			
LEXC	-0.028	-0.533	1		
LNEMP	0.011	0.479	-0.481	1	
AGRIC_OTGRW	0.156	-0.126	0.041	0.123	1

**Source:** Author's computation 2024.

The table shows the correlation matrix between five variables: GFCF (Gross Fixed Capital Formation), INF (Inflation), LEXC (Exchange Rate), LNEMP (Log of Employment), and AGRIC\_OTGRW (Agricultural Output Growth). The table shows a very weak negative relationship between GFCF and inflation. A correlation of -0.028, indicates virtually no linear relationship between GFCF and the exchange rate. For GFCF and employment, the matrix suggests almost no relationship. There exists a weak positive relationship between GFCF and agricultural output growth.

A Correlation of -0.533, indicates a moderate negative relationship between inflation and the exchange rate, while a correlation of 0.479, shows a moderate positive relationship between inflation and employment. However, there is a weak negative relationship between inflation and agricultural output growth.

There is a moderate negative relationship between the exchange rate and employment, while a correlation coefficient of 0.041, indicates almost no relationship between the exchange rate and agricultural output growth. There also exists a weak positive relationship between employment and agricultural output growth.

**Table 4.3. Correlation Matrix for Employment and Agricultural Export**

	LEXC	LNEMP	AGEXPORT	AGRIC_OTGRW	LNAGCRD
LEXC	1				
LNEMP	-0.381	1			
AGEXPORT	-0.028	-0.167	1		
AGRIC_OTGRW	0.041	0.123	-0.061	1	
LNAGCRD	0.605	-0.546	0.071	-0.098	1

**Source:** Author's computation 2024.

A strong relationship is observed between the exchange rate (LEXC) and agricultural credit (LNAGCRD) with a correlation of 0.605. This suggests a significant positive relationship, indicating that as the exchange rate increases, agricultural credit also tends to increase. A moderate negative relationship exists between employment (LNEMP) and the exchange rate (LEXC) with a correlation of -0.381, indicating that an increase in the exchange rate is associated with a decrease in employment.

There is also a moderate negative correlation between employment (LNEMP) and agricultural credit (LNAGCRD) at -0.546, suggesting that higher employment is associated with lower agricultural credit. The relationships between other variables are either weak or negligible, indicating little to no linear correlation.

### **4.3 Pre-Estimation Tests**

#### **4.3.1. (Unit Root Test)**

The Augmented Dickey Fuller (ADF) and Philip Perron test for unit root were employed to test whether or not the variables are stationary and also determine the order of integration of the variables.

**Table 4.4: Unit Root Test Results**

Variables	Augmented Dickey Fuller (ADF)		Phillip-Perron (PP)		I(d)
	Levels	1stDifference	Levels	1stDifference	
	AGRIC_OTGRW	-5.164***	----	-5.164***	
AGEXPORT	-3.282	-5.039***	-2.091	-5.304***	I(1)
EMP	-4.069**	----	-4.306***	----	I(0)
EXC	-10.686***	----	-2.506	-5.481***	I(0)
AGCRD	-3.364	-6.193***	-3.335	-6.880***	I(1)
GFCF	-9.382***	----	-9.811***	----	I(0)
INF	-2.545	-5.236***	-2.883	-8.423***	I(1)
Critical Value:1%	-4.296	-4.309	-4.284	-4.297	
5%	-3.568	-3.574	-3.563	-3.568	
10%	-3.218	-3.221	-3.215	-3.218	

**Note:** \*\*\*, \*\* and \* signify significance level at 1%, 5% and 10% respectively.

**Sources:** Author's computation (2024).

### 4.3.2. Bound Test for Co-integration

**Table 4.5:** Existence of Long-Run Cointegration Between Employment and Agricultural Performance in Nigeria

Test Statistic	Value	K
F-statistics (agric_otgrw   emp, gfcf, exc, inf)	10.984	4
F-statistics (agexport   emp, agric_otgrw, exc, agrcd)	16.135	4
<b>Critical Value Bounds</b>		
Significance	I0 Bound	I1 Bound
10%	2.2	3.09
5%	2.56	3.49
2.50%	2.88	3.87

**Source:** Author's computation 2024.

The table shows the results of the ARDL Bounds Test, which is used to determine whether a long-run relationship (co-integration) exists between variables. The F-Statistics is used to compare against the critical value bounds. Higher values indicate stronger evidence against the null hypothesis.

For the first model, since 10.984 is greater than the upper bound (I1 Bound) at all significance levels, we reject the null hypothesis, indicating there is a long-run relationship between agricultural output growth and the independent variables (employment, GFCF, exchange rate, and inflation).

For the second model, since 16.135 is also greater than the upper bound at all significance levels, this indicates a long-run relationship between agricultural exports and the independent variables (employment, agricultural output growth, exchange rate, and agricultural credit).

#### 4.4 Presentation of Results

4.4.1. ARDL Result on the effect of employment on agricultural output in Nigeria.

**Table 4.6.** ARDL result on the effect of employment on agricultural output in Nigeria.

ARDL Error Correction Regression				
Dependent Variable: AGRIC OUTPUT				
Selected Model: ARDL(3, 3, 3, 3, 3)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
<b>SHORT RUN</b>				
D(AGRIC_OTGRW(-1))	0.546	0.132	4.145	0.009
D(AGRIC_OTGRW(-2))	0.232	0.110	2.105	0.089
D(LNEMP)	586.729	189.313	3.099	0.027
D(LNEMP(-1))	218.772	227.858	0.960	0.381
D(LNEMP(-2))	-625.472	145.913	-4.287	0.008
D(GFCF)	-0.718	0.1429	-5.025	0.004
D(GFCF(-1))	2.152	0.216	9.938	0.000
D(GFCF(-2))	0.979	0.163	5.998	0.002
D(LEXC)	-14.633	3.786	-3.865	0.012
D(LEXC(-1))	-23.465	3.745	-6.266	0.001
D(LEXC(-2))	-29.612	4.671	-6.340	0.001
D(INF)	-0.139	0.093	-1.488	0.197
D(INF(-1))	0.843	0.109	7.751	0.000
D(INF(-2))	0.517	0.094	5.486	0.003
ECT(-1)	-0.939	0.118	-7.966	0.000
<b>LONG RUN</b>				

LNEMP	72.627	16.579	4.380	0.007
GFCF	-2.094	0.587	-3.565	0.016
LEXC	0.329	4.191	0.078	0.940
INF	-0.593	0.267	-2.223	0.077
C	-249.789	75.270	-3.318	0.021
R-squared	0.962	Mean dependent var		-0.017
Adjusted R-squared	0.909	S.D. dependent var		14.535
S.E. of regression	4.381	Akaike info criterion		6.076
Sum squared resid	191.958	Schwarz criterion		6.808
Log likelihood	-60.953	Hannan-Quinn criter.		6.279
Durbin-Watson stat	2.409			

**Source:** Author's computation 2024.

The table presents the short and long run results of the ARDL model where the dependent variable is agricultural output. The short run estimates show that the one lag value of agricultural output growth has a positive and significant effect on the current agricultural output growth. A 1% increase in the previous period's agricultural output growth (lagged by one period) increases current agricultural output by 0.546%. Similarly, the two period lagged value of agricultural output growth affects the current agricultural output growth positively and the relationship is significant at 10% level, suggesting that a 1% increase in agricultural output growth two periods ago increases current output by 0.232%.

The coefficient of employment is positive and statistically significant at 5 percent and this indicates that a 1% increase in employment leads to a significant increase in agricultural output by approximately 586.73 percent in the short run. Conversely, the two lagged value of employment has a negative and significant effect on agricultural output at 1 percent. A

percentage increase in employment in the two lagged period will reduce agricultural output by approximately 625 percent.

Similarly, gross fixed capital formation exerts a negative influence on agricultural output and is statistically significant at 1 percent. A 1% increase in gross fixed capital formation (GFCF) decreases agricultural output by 0.718% in the short run. However, GFCF in its one and two lagged periods have both coefficients positive and statistically significant at 1 percent respectively. This suggests that while the immediate effect of GFCF is negative, its lagged effects positively influence agricultural output, possibly due to the time needed for capital investments to take effect.

The coefficient of exchange rate is negative and statistically significant at 5 percent, indicating that a percentage increase in the exchange rate (LEXC) reduces agricultural output by 14.6 percent in the short run. In the same vein, the one and two lagged values of exchange rate are negative and statistically significant. This shows that the negative impact of exchange rate changes persists over time. The current value of inflation has no significant effect on agricultural output, while inflation in both one and two lagged periods have positive and statistically significant effect on agricultural output.

The error correction term is negative and highly significant. This indicates that deviations from the long-run equilibrium are corrected by 93.9% each period, which is a strong indication of a rapid adjustment towards long-term equilibrium.

The long-run estimates revealed that employment has a positive and significant relationship with agricultural output at 1 percent. A 1% increase in employment is associated with an increase of

72.63 percent in agricultural output in the long run. However, gross fixed capital formation has a negative and significant relationship with agricultural output at 5 percent. A percentage increase in gross fixed capital formation will reduce agricultural output by 2.09 percent in the long run. This could imply inefficiencies in capital allocation or over-investment in non-productive capital.

Inflation has a negative and significant relationship with agricultural output at the 10% level. A percentage increase in inflation will reduce agricultural output by 0.59 percent in the long run. However, exchange rate positively influence agricultural output in the long run, but the effect is not statistically significant. The R-squared indicates that 96.2% of the variation in agricultural output is explained by the independent variables in the model. A Durbin-Watson value of close to 2 also suggests that there is no significant autocorrelation in the residuals.

### Post-Estimation Diagnostic Test

Table 4.7. Serial Correlation Test.

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	2.240619	Prob. F(2,3)	0.2539
Obs*R-squared	14.97492	Prob. Chi-Square(2)	0.0006

**Source:** Author's computation (2024)

This test is used to detect the presence of serial correlation in the residuals of a regression model. A high p-value (typically above 0.05) suggests that we fail to reject the null hypothesis, meaning there is no evidence of serial correlation in the residuals. Since the probability value (0.2539) is greater than (0.05), we conclude that there is no evidence of serial correlation.

Table 4.8. Heteroskedasticity Test

Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	0.373142	Prob. F(19,5)	0.9462
Obs*R-squared	14.66061	Prob. Chi-Square(19)	0.7439
Scaled explained SS	0.852516	Prob. Chi-Square(19)	1

**Source:** Author's computation 2024.

The Breusch-Pagan-Godfrey test is used to detect the presence of heteroskedasticity in a regression model. Heteroskedasticity occurs when the variance of the errors is not constant across observations, which can lead to inefficient estimates and affect the validity of statistical tests. The probability value of 0.9462 is much greater than 0.05, indicating that we fail to reject the null hypothesis of homoskedasticity. This means there is no strong evidence of heteroskedasticity based on the F-statistic.

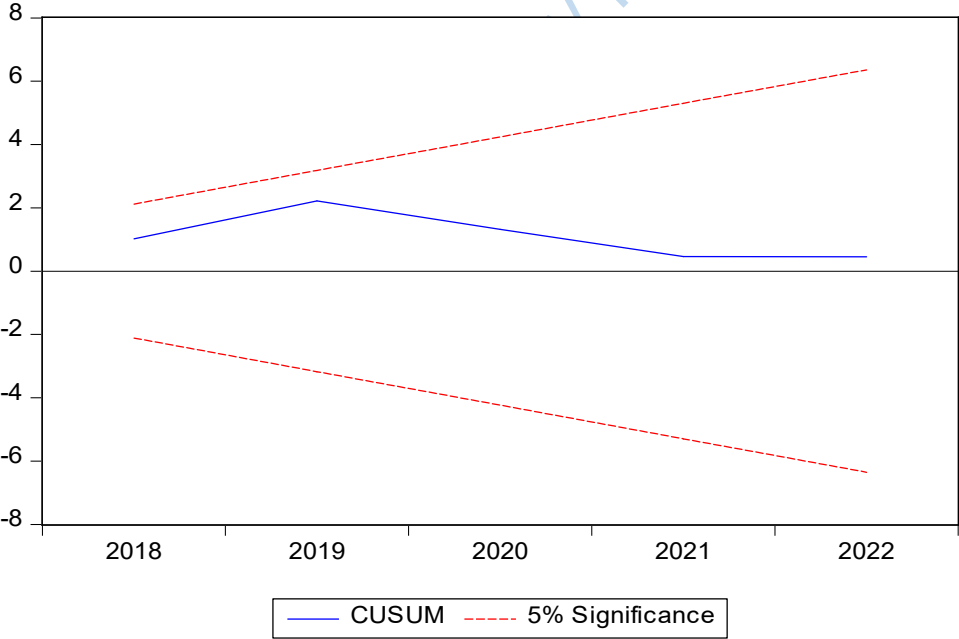


Figure 4.1. CUSUM Test Result

CUSUM test is used to establish the stability of the estimated ARDL model. The blue line represents the cumulative sum of the residuals from the regression model over time. This line tracks how much the residuals have deviated from their expected value (which should be zero if the model is stable). The red dotted lines represent the confidence bounds, usually set at the 5% significance level. If the blue line remains within these bounds, it suggests that the model parameters are stable over time. If the blue line crosses the red bounds, it indicates that there is a structural break in the model, meaning that the relationship between the dependent and independent variables has changed at some point during the sample period.

The graph presented shows that the blue line (CUSUM statistic) remains well within the red dotted lines (5% significance level). This suggests that there is no evidence of instability in the model's parameters over time. The model appears to be stable, with no significant structural breaks detected.

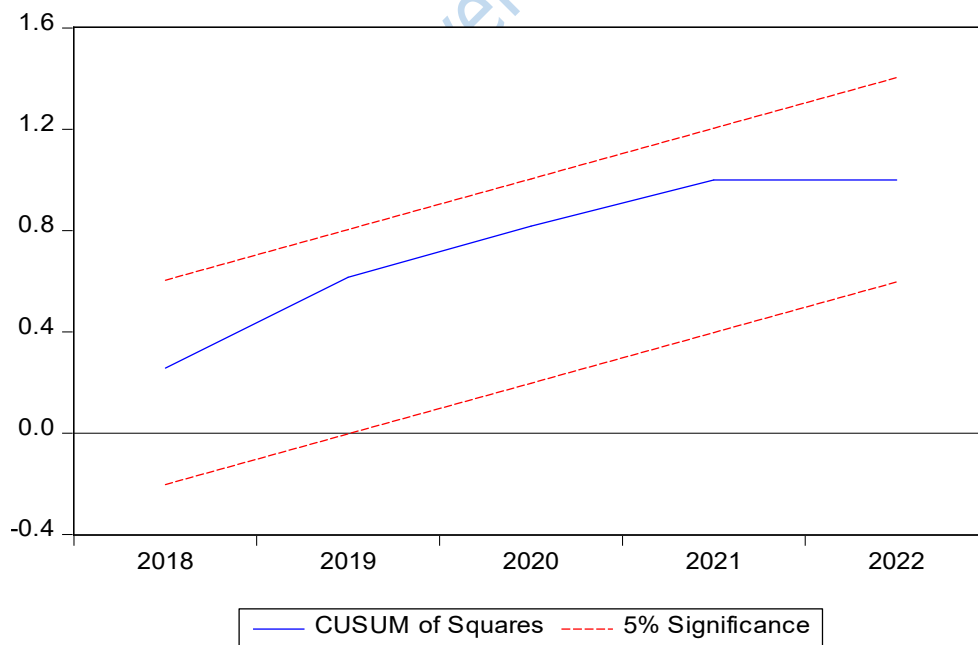


Figure 4.2. CUSUM of Squares Test Result

The CUSUM of Squares Test is used to test the stability of the variance of the residuals in a regression model over time. The blue line represents the cumulative sum of squared residuals over time. It shows how the variance of the residuals accumulates as the model progresses. The red dotted lines represent the 5% significance bounds. These bounds are critical for determining whether the variance of the residuals has remained stable over the period being analyzed. If the blue line crosses the red bounds, it indicates a potential structural break in the variance of the residuals, suggesting that the variance of the model's errors has changed over time.

The graph shows that the blue line (CUSUM of Squares) does not cross the red dotted lines and is within the 5% significance bounds throughout the period. This suggests that the variance of the residuals is stable, and there is no significant evidence of heteroscedasticity, hence the model appears to be consistent and reliable.

#### 4.4.2. ARDL Result on the effect of employment on agricultural exports in Nigeria.

Table 4.9 ARDL result

ARDL Error Correction Regression				
Dependent Variable: D(AGEXPORT)				
Selected Model: ARDL(3, 3, 3, 1, 3)				
<b>SHORT RUN</b>				
Variable	Coefficient	Std. Error	T-Statistic	Prob.
D(AGEXPORT(-1))	0.067	0.062	1.085	0.313
D(AGEXPORT(-2))	0.205	0.069	2.927	0.022
D(LNEMP)	-46.093	9.736	-4.733	0.002
D(LNEMP(-1))	44.545	10.868	4.098	0.004
D(LNEMP(-2))	-16.173	8.674	-1.864	0.104
D(LNAGCRD)	0.540	0.159	3.393	0.011
D(LNAGCRD(-1))	1.096	0.183	5.965	0.000
D(LNAGCRD(-2))	1.449	0.312	4.644	0.002
D(LEXC)	0.608	0.198	3.059	0.018
D(AGRIC_OTGRW)	0.003	0.003	0.872	0.412
D(AGRIC_OTGRW(-1))	-0.015	0.004	-3.252	0.014
D(AGRIC_OTGRW(-2))	-0.018	0.004	-3.822	0.006
ECT(-1)*	-0.981	0.076	-12.882	0.000
<b>LONG RUN</b>				

LNEMP	-12.700	4.138	-3.068	0.018
LNAGCRD	-0.708	0.411	-1.721	0.129
LEXC	-0.515	0.279	-1.843	0.108
AGRIC_OTGRW	0.018	0.024	0.752	0.476
C	53.512	17.272	3.098	0.017
R-squared	0.976	Mean dependent var		-0.288
Adjusted R-squared	0.952	S.D. dependent var		1.035
S.E. of regression	0.225	Akaike info criterion		0.163
Sum squared resid	0.608	Schwarz criterion		0.797
Log likelihood	10.963	Hannan-Quinn criter.		0.339

**Source:** Author's computation 2024.

Short run estimates reveal that the second lag of agricultural export exerts positive and significant effect on the current agricultural exports at 5 percent level of significance. A percentage increase in agricultural exports in the two lagged period will increase current agricultural export by 0.2 percent. Employment in the current year has a negative and significant relationship with agricultural exports at 1 percent. A percentage increase in employment, will reduce agricultural exports by 46 percent. However, the first lag of employment has a negative but insignificant relationship with agricultural exports.

Agricultural credit in the current year as well as first and second lags have positive and statistically significant effect on agricultural exports with the coefficients revealing that a percentage increase in agricultural credit in these periods will increase agricultural exports by 0.54, 1.09 and 1.45 percent respectively. Similarly, exchange rate has a significant positive effect on agricultural exports, with a percentage increase in exchange rate leading to 0.61 percent increase in agricultural exports.

While the current agricultural output growth exhibits no significant effect on agricultural exports, its first and second lags have negative and significant effect on agricultural exports. This means that a percentage increase in agricultural output growth in the first and second lag periods will reduce agricultural exports by 0.01 percent in both cases. The Error Correction (ECM) coefficient (-0.98139) is negative and highly significant (p-value = 0.000). This suggests that the system corrects 98.1% of the disequilibrium in each period, indicating a strong adjustment speed back to the long-run equilibrium.

For the long run analysis, results showed that the coefficient of employment is negative and statistically significant at the 5% level. This suggests that a 1% increase in employment is associated with a decrease in agricultural by approximately 12.7 percent. However, the effect of agricultural credit, agricultural output growth as well as exchange rate on agricultural exports is not statistically significant.

The long run result suggest that only employment has a strong and significant effect on agricultural exports, while the other variables (agricultural credit, exchange rates, and agricultural output growth) do not show significant effect.

#### **Post-Estimation Diagnostic Test:**

Table 4.10. Serial Correlation Test:

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	2.47907	Prob. F(2,5)	0.1786
Obs*R-squared	12.44746	Prob. Chi-Square(2)	0.002

**Source:** Author's computation 2024.

This test is used to detect the presence of serial correlation in the residuals of a regression model. A high p-value (typically above 0.05) suggests that we fail to reject the null hypothesis, meaning there is no evidence of serial correlation in the residuals. Since the probability value (0.17) is greater than (0.05), we conclude that there is no evidence of serial correlation.

Table 4.11. Heteroskedasticity Test:

F-statistic	0.538618	Prob. F(17,7)	0.8593
Obs*R-squared	14.16844	Prob. Chi-Square(17)	0.6551
Scaled explained SS	3.518854	Prob. Chi-Square(17)	0.9998

**Source:** Author's computation 2024.

The Breusch-Pagan-Godfrey test is used to detect the presence of heteroskedasticity in a regression model. Heteroskedasticity occurs when the variance of the errors is not constant across observations, which can lead to inefficient estimates and affect the validity of statistical tests. The probability value of 0.85 is much greater than 0.05, indicating that we fail to reject the null hypothesis of homoskedasticity. This means there is no strong evidence of heteroskedasticity based on the F-statistic.

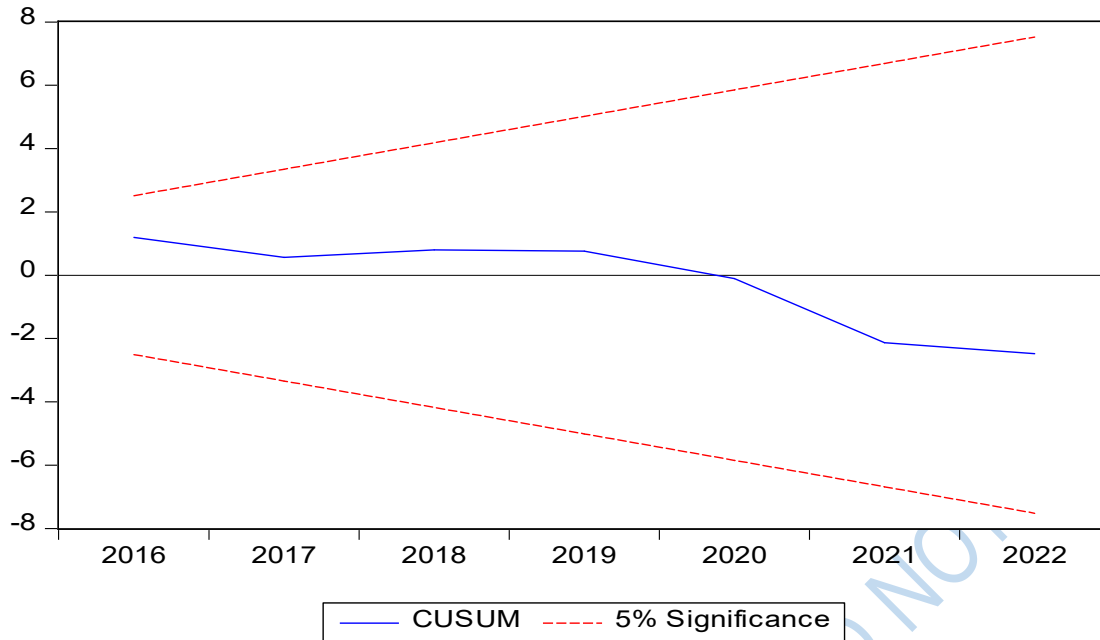


Figure 4.3. CUSUM Test Result

The graph presented shows that the blue line (CUSUM statistic) remains well within the red dotted lines (5% significance level). This suggests that there is no evidence of instability in the model's parameters over time. The model appears to be stable, with no significant structural breaks detected.

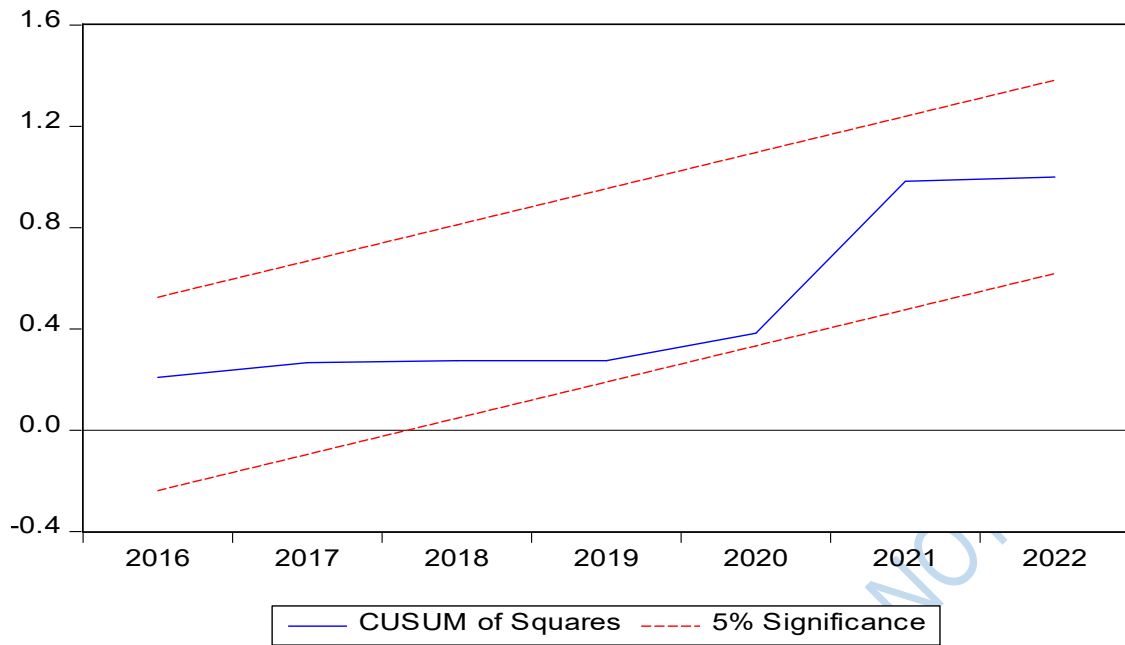


Figure 4.4. CUSUM of Squares Test Result

The graph shows that the blue line (CUSUM of Squares) does not cross the red dotted lines and is within the 5% significance bounds throughout the period. This suggests that the variance of the residuals is stable, and there is no significant evidence of heteroscedasticity, hence the model appears to be consistent and reliable.

#### 4.4.3. Response of Agricultural Output to Employment Shocks

Table 4.12. Variance Decomposition Analysis

Variance Decomposition of AGRIC_OTGRW:					
Period	S.E.	AGRIC O...	LNEMP	GFCF	LEXC
1	10.04364	100.0000	0.000000	0.000000	0.000000
2	10.57490	93.79797	0.917057	4.648690	0.609073
3	11.13798	85.26582	2.140416	4.899240	7.053122
4	11.51056	80.47300	4.231328	6.058028	7.663406
5	11.88262	75.96124	4.021053	7.851899	7.627642
6	12.10570	73.39251	4.742344	8.060977	7.620299
7	12.37579	70.28475	5.515832	9.686737	7.729810
8	12.44709	69.54214	5.452985	10.29087	7.644659
9	12.46316	69.45913	5.503716	10.31017	7.661426
10	12.56934	68.29594	5.848819	11.31159	7.533406

The table above shows the variance decomposition of agricultural output growth (AGRIC\_OTGRW). Variance decomposition is used in Vector Autoregressive (VAR) models to understand how much of the forecast error variance of a particular variable (in this case, agricultural output growth) can be attributed to shocks in itself and other variables over different periods.

The variance decomposition shows that shocks to agricultural output growth itself explain the largest portion of its variance initially, but this effect diminishes over time as other variables start contributing more significantly. In the first period, agricultural output growth is entirely explained by its own shocks (100%). This is typical for the first period since there is no time for other variables to have an impact yet. In the second period, agricultural output growth still explains the majority (91.79%) of its variance. However, employment (EMP) starts to have a small impact (2.91%), Gross Fixed Capital Formation (GFCF) contributes around 4.85% and exchange rate (LEXC) starts to contribute around 5.81%.

In the fifth period, the influence of agricultural output growth's own shocks decreases to 75.59%, while the influence of employment shocks to agricultural output increased to 4.02%. For GFCF, the influence increased to 7.55%. while exchange rate's impact grows slightly to 7.83%. For the tenth period, the effect of its own shock declined to 69.29%. However, the effect of employment shocks to agricultural output increased marginally to 5.18%, the contribution of GFCF also grows to 7.31%, while exchange rate's contribution remains steady at 7.55%.

It is evident from the table that employment's contribution to the variance increases gradually over time, indicating that labor has a growing, albeit moderate, impact on agricultural output growth. The impact of gross fixed capital formation (investment in physical assets) also grows, suggesting that capital investment becomes more important in explaining agricultural output growth as time progresses. The effect of exchange rate also grows steadily, indicating its significant role in agricultural output growth, likely due to its effect on the cost of agricultural inputs and competitiveness of agricultural exports.

## Result from Impulse Response

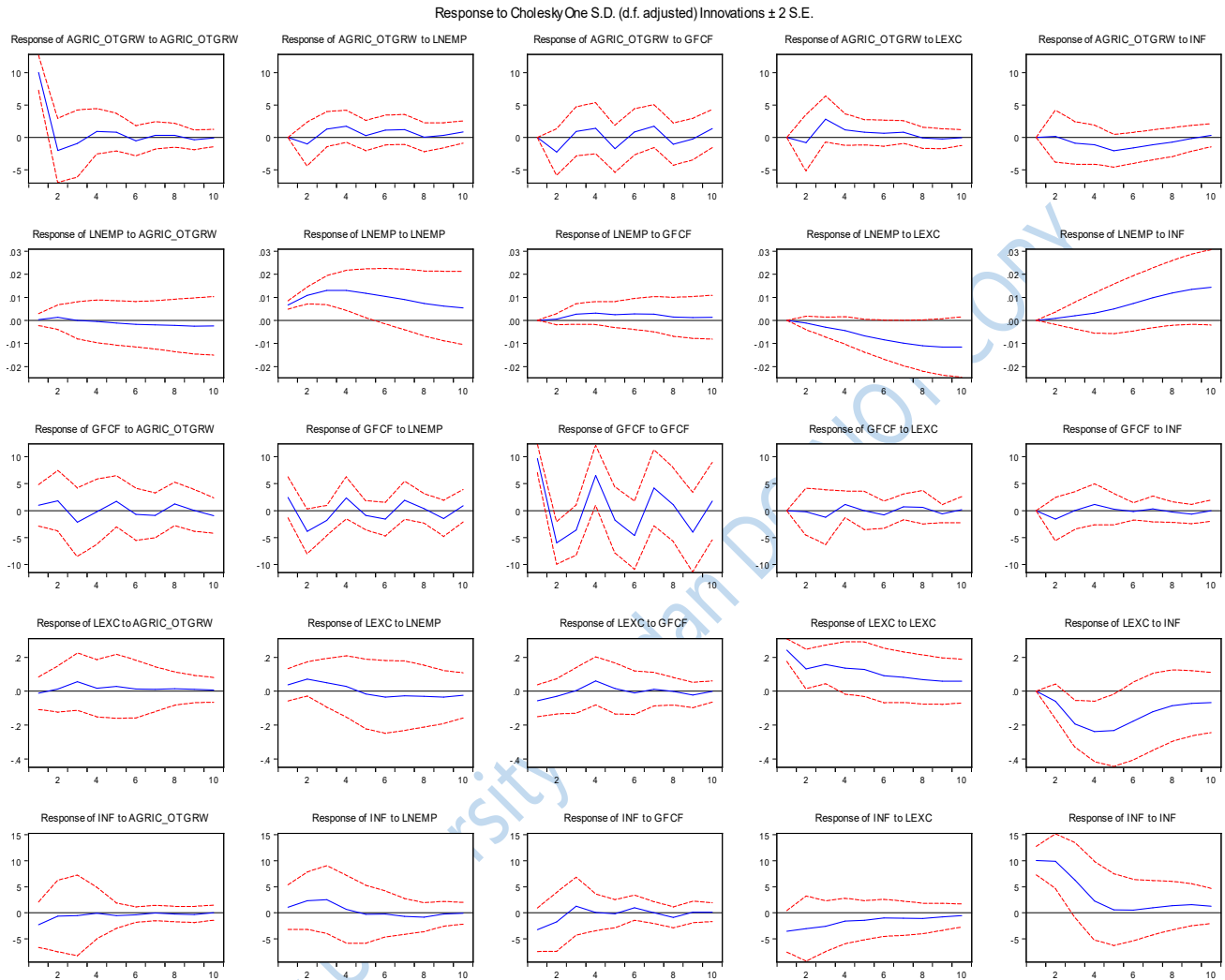


Figure 4.5. Impulse Response Test

The Impulse Response Functions (IRFs) show the response of each variable to a shock in another variable over time, with the blue line representing the point estimate and the red dashed lines indicating the confidence intervals. The graph shows the response of agricultural output to employment shocks. An increase in employment has a positive but short-lived impact on agricultural output. This suggests that while increasing labor inputs can boost output initially, other factors may limit long-term gains.

The response of employment to a shock in agricultural output shows a more gradual adjustment, indicating that changes in output influence employment decisions over time. Similarly, an unfavorable exchange rate shock may negatively impact agricultural output due to increased costs of imported inputs. Inflation often show significant responses to shocks, reflecting its sensitivity to changes in output, exchange rates, and investment.

#### 4.4.4. Response of Agricultural Exports to Employment Shocks

Table 4.13. Variance Decomposition Analysis

Variance Decomposition of AGEXPORT:					
Period	S.E.	AGEXPORT	LNEMP	LEXC	AGRIC O...
1	0.725168	100.0000	0.000000	0.000000	0.000000
2	1.010881	97.63205	0.102186	0.797011	0.625816
3	1.057979	96.50976	0.187663	1.635015	0.577824
4	1.084229	91.91320	0.179068	2.083915	1.220891
5	1.123604	86.53220	0.710543	2.271640	1.691041
6	1.149371	82.89512	1.853718	2.237605	2.329050
7	1.163096	81.06708	2.801488	2.205572	3.049827
8	1.172602	80.26981	3.214191	2.450365	3.361613
9	1.179548	79.67825	3.312238	2.997798	3.399382
10	1.183526	79.17806	3.325854	3.523155	3.382005

Variance Decomposition of LNEMP:					
Period	S.E.	AGEXPORT	LNEMP	LEXC	AGRIC O...
1	0.004956	9.699520	90.30048	0.000000	0.000000
2	0.009321	25.96117	70.06494	3.852402	0.103028
3	0.014698	36.10555	50.59778	10.32407	2.340765
4	0.019547	37.78748	42.86403	15.48136	2.408897

The result shows that in the initial period, 100% of the variance in agricultural exports is attributed to its own shocks, which is typical because, in the first period, the effect of other variables were not accumulated. Over time, the percentage of variance explained by agricultural exports' own shocks decreases, while the contribution from other variables (employment, exchange rate and agricultural output growth) gradually increases. In the tenth period, about 79.18% of the variance is still explained by agricultural exports itself, with about 3.32%

accounted for by employment, 3.52% for exchange rate and 3.38% for agricultural output growth.

It is evident that agricultural exports is largely self-driven, as indicated by the high proportion of variance explained by its own shocks, even in later periods.

### Result from Impulse Response

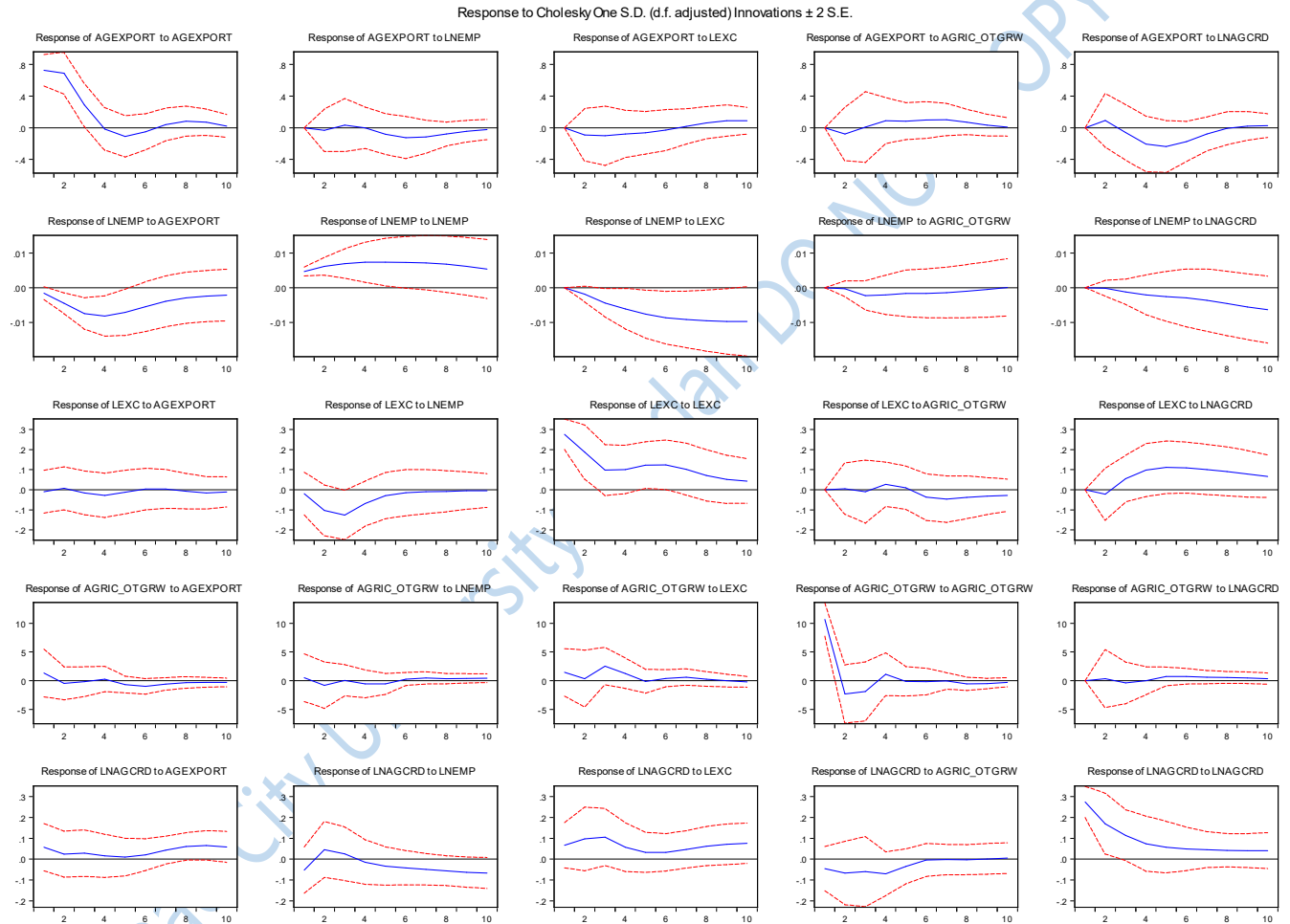


Figure 4.6. Impulse Response Test

The figure shown above depicts the response of agricultural exports to a one standard deviation shock of employment. It shows that employment shocks is statistically significant and exert negative effect on agricultural exports in most periods. In the initial period, the response of agricultural exports to employment shocks revolves around the mean, while becoming slightly positive in the third period. However, between the fifth and ninth periods, response of agricultural exports to employment shocks was negative, before again reverting to the mean in the tenth period. The negative shocks persisted between the fifth and ninth period.

The response of agricultural exports to exchange rate shocks however was negative from the initial period to the sixth period, reverting to the mean and becoming slightly positive between the eighth and tenth periods. Similarly, the response of agricultural exports to agricultural output shocks are mostly positive, while the response to agricultural credit shocks is mostly negative.

#### **4.5. Discussion of Findings**

Findings on the effect of employment on agricultural output in Nigeria showed that in the short run, employment has a positive and significant effect on agricultural output in Nigeria. This conforms with a-priori expectation as posited by the labour productivity theory. Higher employment, especially in the agricultural sector, suggests an increase in the labor force available for agricultural activities. As more people are employed, agricultural productivity will rise, leading to increased production. The findings aligns with some studies established in literature<sup>1, 2, 3, 4</sup>.

Similarly, Gross Fixed Capital Formation (GFCF) in the one and two lagged periods exert positive influence on agricultural output in Nigeria. GFCF represents investment in physical

assets like machinery, buildings, and infrastructure. Investment in capital assets complements labor inputs, increasing the efficiency and productivity of agricultural activities. This leads to higher output levels. Higher investment in agricultural infrastructure (e.g., irrigation systems, storage facilities, and roads) is expected to enhance productivity and, consequently, agricultural output. The Nigerian government's investment in agricultural infrastructure, supported by policies such as the Green Alternative Policy, contributed to agricultural productivity in the last few years. This conforms with findings by some scholars<sup>5, 6, 7</sup>.

Exchange rate in the current, one and two lagged periods have a negative relationship with agricultural output. A weaker naira increases the cost of imported agricultural inputs such as fertilizers, machinery, and seeds. Higher input costs can reduce profitability and constrain agricultural output. Findings are consistent with some studies established in literature<sup>8, 9, 10, 11</sup>. Inflation in the one and two lagged periods have a positive effect on agricultural output for Nigeria in the short run. Demand-pull inflation driven by increased consumer demand could temporarily boost agricultural output as farmers respond to higher prices. The findings of this study deviates from most studies that have established a negative relationship between inflation and agricultural output<sup>12, 13, 14</sup>.

The long run analysis shows that employment has a positive effect on agricultural output following policies such as the Agricultural Transformation Agenda (ATA) and the Anchor Borrowers' Program (ABP) that have generated more employment opportunities in agriculture and increased output. Other Nigerian government policies aimed at increasing employment in the agricultural sector, such as the Green Alternative initiative and youth-focused programs like the

N-Power Agro program, were also designed to bolster labor availability and productivity. These policies, in turn, support higher levels of agricultural output.

However, for the long run analysis, gross fixed capital formation exerts a negative influence on agricultural output. Similarly, the long run analysis showed that inflation has a negative effect on agricultural output in Nigeria. Higher inflation, particularly cost-push inflation, is expected to reduce agricultural output by increasing the cost of inputs and creating economic instability.

The short run findings from the effect of employment on agricultural exports shows that the current employment rate exerts a negative effect on agricultural exports. The negative relationship between employment in agriculture and agricultural exports in Nigeria likely stems from a combination of low productivity, structural inefficiencies, inadequate infrastructure, policy constraints, and a focus on subsistence farming rather than export-oriented agriculture. A large proportion of the agricultural workforce in Nigeria is engaged in subsistence farming, where the primary goal is to produce food for household consumption. This limits the amount of agricultural produce available for export.

Agricultural credit in the current, one and two lagged periods have positive effect on agricultural exports in Nigeria. Programmes such as the Anchor Borrowers' Program (ABP) and the Nigeria Incentive-Based Risk Sharing System for Agricultural Lending (NIRSAL) provide targeted credit to farmers, which can boost production and, consequently, exports. These schemes are designed to address financial barriers that limit farmers' ability to produce for export markets. The findings conform with a-priori expectation, while corroborating findings established in literature<sup>15, 16, 17</sup>.

In the short run, exchange rate has a positive and significant effect on agricultural exports in Nigeria. A depreciated exchange rate makes Nigerian agricultural products cheaper and more competitive in international markets, potentially boosting demand for these exports. When the exchange rate favors exporters, the volume of agricultural exports is expected to increase. The findings aligns with some existing studies<sup>18, 19, 20</sup>.

Agricultural output in the one and two lagged periods have negative and significant effect on agricultural exports in Nigeria. The negative relationship between agricultural output growth and agricultural exports in Nigeria can be attributed to a combination of factors including increased domestic demand, poor quality and standards, infrastructure challenges, global market conditions, policy and regulatory constraints, amongst other factors. Poor transportation, storage, and distribution infrastructure have created bottlenecks that prevent increased agricultural output from reaching export markets. Similarly, as agricultural output grows in Nigeria, there is an increase in domestic demand due to population growth and urbanization. The domestic market absorbs more of the increased output, less is available for export, leading to a potential decline in the proportion of agricultural output that is exported<sup>21, 22</sup>.

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## Chapter Five

### Conclusion

#### 5.1 Summary of Findings

This study examined the effect of employment on agricultural sector performance in Nigeria, while unbundling agricultural performance into agricultural output and agricultural exports. The study also analysed the response of agricultural output and exports to employment shocks in Nigeria. The study employed secondary data obtained from the Central Bank of Nigeria (2022) and World Development Indicators (2023) spanning from 1991 to 2022. The ARDL and VAR Impulse Response and Variance Decomposition analyses were utilized in estimating the objectives of the study.

For the first objective which examined the effect of employment on agricultural output in Nigeria, the short run estimates show that the one and two lag value of agricultural output growth has a positive and significant effect on the current agricultural output growth. Similarly, employment has a positive and statistically significant effect on agricultural output. The two lagged value of employment has a negative and significant effect on agricultural output at 1 percent. Gross fixed capital formation exerts a negative influence on agricultural output and is statistically significant at 1 percent. Exchange rate also has a negative and statistically significant effect on agricultural output at 5 percent.

The long-run estimates revealed that employment has a positive and significant relationship with agricultural output at 1 percent. However, gross fixed capital formation has a negative and significant relationship with agricultural output at 5 percent. Inflation has a negative and significant relationship with agricultural output at the 10% level. However, exchange rate positively influence agricultural output in the long run, but the effect is not statistically significant.

The second objective analysed the effect of employment on agricultural exports in Nigeria. Short run estimates reveal that the second lag of agricultural export exerts positive and significant effect on the current agricultural exports at 5 percent level of significance. However, employment in the current year has a negative and significant relationship with agricultural exports at 1 percent. Agricultural credit in the current year as well as first and second lags have positive and statistically significant effect on agricultural exports. Similarly, exchange rate has a significant positive effect on agricultural exports. While the current agricultural output growth exhibits no significant effect on agricultural exports, its first and second lags have negative and significant effect on agricultural exports.

The long run result suggest that only employment has a significant and negative effect on agricultural exports, while the other variables (agricultural credit, exchange rates, and agricultural output growth) do not show significant effect.

The third objective examined the response of agricultural output and exports to shocks in employment. Variance decomposition analysis revealed that employment's contribution to the variance in agricultural output increases gradually over time, indicating that labor has a growing, albeit moderate, impact on agricultural output growth. Similarly, the impulse response analysis showed that an increase in employment has a positive but short-lived impact on agricultural

output. Variance decomposition also reported that agricultural exports in Nigeria is largely self-driven, as indicated by the high proportion of variance explained by its own shocks, with a very marginal contribution by employment shocks.

## **5.2 Conclusion**

This study investigates the relationship between employment and agricultural sector performance (measured by agricultural output and agricultural exports) between 1991 and 2022 using the ARDL and VAR approaches. From the empirical model, employment has a positive and statistically significant effect on agricultural output in the short run. Gross fixed capital formation and exchange rate also exerts a negative influence on agricultural output in the short run. The long-run estimates also revealed that employment has a positive and significant relationship with agricultural output in Nigeria. Gross fixed capital formation and inflation have a negative and significant relationship with agricultural output.

The short run estimates in the second model that examined agricultural exports reported that employment in the current year has a negative and significant effect on agricultural exports. The long run result also suggests that employment has a negative and significant effect on agricultural exports in Nigeria. Agricultural credit in the current year as well as first and second lags have positive and statistically significant effect on agricultural exports.

Similarly, exchange rate has a significant positive effect on agricultural exports. While the current agricultural output growth exhibits no significant effect on agricultural exports, its first and second lags have negative and significant effect on agricultural exports. The study also established the fact that employment shocks has a positive but short-lived impact on agricultural

output, while agricultural exports in Nigeria is mostly explained by its own shocks, with a very marginal contribution by employment shocks.

### **5.3 Recommendations**

From the findings emanating from this study, the following policy recommendations are made:

- i. Given the positive effect of employment on agricultural output in Nigeria, more policies aimed at increasing employment in the agricultural sector, similar to the Green Alternative initiative and youth-focused programs like the N-Power Agro programme, should be designed to encourage employment, particularly youth employment in agriculture.
- ii. To encourage agricultural exports, policies should be designed to create employment in the agricultural sector. For instance, the Nigeria Export Promotion Council (NEPC) should support small-scale farmers and agro-processors in accessing foreign markets, which could boost employment in rural areas.
- iii. The Nigerian government should invest in agricultural infrastructure to improve agricultural productivity, thereby increasing output. Private sector investment in agriculture should be encouraged through incentives and favorable policies that can drive up capital investment, further boosting output.
- iv. A stable and competitive exchange rate that can promote agricultural exports should be maintained by the Central Bank of Nigeria (CBN). By allowing the Naira to depreciate moderately, the CBN can make Nigerian exports more attractive in global markets.

- v. Government subsidies on agricultural inputs and price controls on essential goods will help mitigate the adverse effects of inflation on agricultural output, ensuring that farmers can maintain or increase production levels.
- vi. Inflation should be kept in check through the CBN's monetary policy. This will help the agricultural sector to thrive better due to stable input costs and improved planning capabilities.
- vii. Access to credit is crucial for farmers to finance the purchase of inputs (e.g., seeds, fertilizers, machinery), which are necessary to increase agricultural output for export. Policies encouraging microfinance institutions and agricultural cooperatives to extend credit to small-scale farmers will significantly boost agricultural exports by increasing the resources available for production.

#### **5.4 Contribution to Knowledge**

This study contributes to the existing body of knowledge in the following ways:

- a) Unlike previous studies that have employed agricultural output growth as the only measure of agricultural sector performance, this study unbundles agricultural performance using two indicators, vis-a-vis agricultural output growth and agricultural exports.
- b) The study also contributes to knowledge by examining the response of agricultural output and exports to employment shocks in the Nigerian economy. Existing studies in this regard is scanty for the Nigerian economy.
- c) Introduce facilities that will encourage youths in joining agriculture while proffering policies to land acquisition and favourable land tenure system.

#### **5.5. Suggestions for Further Studies**

From the findings of this study, suggestions for areas of future studies include:

- a) Future research should be conducted on the effect of employment on other sectors of the economy (manufacturing and service) so as to determine the individual effect of employment on the respective sectors.

- b) Other measures of agricultural performance such as food security index, sectoral productivity, agricultural investment among others could also be employed for a more robust analysis.
- c) The effect of the several agricultural policies implemented by the government on the sector's performance can also be investigated in future studies.

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## Appendices

### Appendix I: Statistical Output

Null Hypothesis: AGRIC OTGRW has a unit root  
Exogenous: Constant, Linear Trend  
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-5.164746	0.0012
Test critical values:		
1% level	-4.284580	
5% level	-3.562882	
10% level	-3.215267	

Null Hypothesis: LNEMP has a unit root  
 Exogenous: Constant, Linear Trend  
 Lag Length: 6 (Automatic - based on SIC, maxlag=7)

	t-Statistic	Prob.*
<b>Augmented Dickey-Fuller test statistic</b>	<b>-4.069569</b>	<b>0.0266</b>
Test critical values: 1% level	-4.616209	
5% level	-3.710482	
10% level	-3.297799	

Null Hypothesis: AGRIC OTGRW has a unit root  
 Exogenous: Constant, Linear Trend  
 Bandwidth: 0 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
<b>Phillips-Perron test statistic</b>	<b>-5.164746</b>	<b>0.0012</b>
Test critical values: 1% level	-4.284580	
5% level	-3.562882	
10% level	-3.215267	

Null Hypothesis: LNEMP has a unit root  
 Exogenous: Constant, Linear Trend  
 Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
<b>Phillips-Perron test statistic</b>	<b>-1.305668</b>	<b>0.8663</b>
Test critical values: 1% level	-4.309824	
5% level	-3.574244	
10% level	-3.221728	

Null Hypothesis: D(LNEMP) has a unit root  
 Exogenous: Constant, Linear Trend  
 Bandwidth: 0 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
<b>Phillips-Perron test statistic</b>	-1.980486	0.5853
Test critical values:		
1% level	-4.339330	
5% level	-3.587527	
10% level	-3.229230	

Null Hypothesis: GFCF has a unit root  
 Exogenous: Constant, Linear Trend  
 Lag Length: 1 (Automatic - based on SIC, maxlag=7)

	t-Statistic	Prob.*
<b>Augmented Dickey-Fuller test statistic</b>	-9.381918	0.0000
Test critical values:		
1% level	-4.296729	
5% level	-3.568379	
10% level	-3.218382	

Null Hypothesis: GFCF has a unit root  
 Exogenous: Constant, Linear Trend  
 Bandwidth: 4 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
<b>Phillips-Perron test statistic</b>	-9.811325	0.0000
Test critical values:		
1% level	-4.284580	
5% level	-3.562882	
10% level	-3.215267	

Null Hypothesis: LENDING has a unit root  
 Exogenous: Constant, Linear Trend  
 Lag Length: 3 (Automatic - based on SIC, maxlag=7)

	t-Statistic	Prob.*
<b>Augmented Dickey-Fuller test statistic</b>	-4.556995	0.0058
Test critical values:		
1% level	-4.323979	
5% level	-3.580623	
10% level	-3.225334	

Null Hypothesis: LENDING has a unit root  
 Exogenous: Constant, Linear Trend  
 Bandwidth: 0 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
<b>Phillips-Perron test statistic</b>	<b>-3.934698</b>	<b>0.0224</b>
Test critical values:		
1% level	-4.284580	
5% level	-3.562882	
10% level	-3.215267	

Null Hypothesis: LNAGCRD has a unit root  
 Exogenous: Constant, Linear Trend  
 Lag Length: 0 (Automatic - based on SIC, maxlag=7)

	t-Statistic	Prob.*
<b>Augmented Dickey-Fuller test statistic</b>	<b>-3.364561</b>	<b>0.0748</b>
Test critical values:		
1% level	-4.284580	
5% level	-3.562882	
10% level	-3.215267	

Null Hypothesis: D(LNAGCRD) has a unit root  
 Exogenous: Constant, Linear Trend  
 Lag Length: 0 (Automatic - based on SIC, maxlag=7)

	t-Statistic	Prob.*
<b>Augmented Dickey-Fuller test statistic</b>	-6.192668	0.0001
Test critical values:		
1% level	-4.296729	
5% level	-3.568379	
10% level	-3.218382	

Null Hypothesis: LNAGCRD has a unit root  
 Exogenous: Constant, Linear Trend  
 Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
<b>Phillips-Perron test statistic</b>	-3.335105	0.0793
Test critical values:		
1% level	-4.284580	
5% level	-3.562882	
10% level	-3.215267	

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Null Hypothesis: D(LNAGCRD) has a unit root  
 Exogenous: Constant, Linear Trend  
 Bandwidth: 9 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-6.880366	0.0000
Test critical values:		
1% level	-4.296729	
5% level	-3.568379	
10% level	-3.218382	

\*MacKinnon (1996) one-sided p-values.

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Null Hypothesis: D(LNAGCRD) has a unit root  
 Exogenous: Constant, Linear Trend  
 Bandwidth: 9 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-6.880366	0.0000
Test critical values:		
1% level	-4.296729	
5% level	-3.568379	
10% level	-3.218382	

\*MacKinnon (1996) one-sided p-values.

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Null Hypothesis: INF has a unit root  
 Exogenous: Constant, Linear Trend  
 Lag Length: 0 (Automatic - based on SIC, maxlag=7)

	t-Statistic	Prob.*
<b>Augmented Dickey-Fuller test statistic</b>	-2.545568	0.3058
Test critical values: 1% level	-4.284580	
5% level	-3.562882	
10% level	-3.215267	

Null Hypothesis: D(INF) has a unit root  
 Exogenous: Constant, Linear Trend  
 Lag Length: 4 (Automatic - based on SIC, maxlag=7)

	t-Statistic	Prob.*
<b>Augmented Dickey-Fuller test statistic</b>	-5.235890	0.0014
Test critical values: 1% level	-4.356068	
5% level	-3.595026	
10% level	-3.233456	

\*MacKinnon (1996) one-sided p-values.

Null Hypothesis: INF has a unit root  
 Exogenous: Constant, Linear Trend  
 Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
<b>Phillips-Perron test statistic</b>	<b>-2.883018</b>	<b>0.1813</b>
Test critical values: 1% level	-4.284580	
5% level	-3.562882	
10% level	-3.215267	

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Null Hypothesis: D(INF) has a unit root  
 Exogenous: Constant, Linear Trend  
 Bandwidth: 12 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
<b>Phillips-Perron test statistic</b>	<b>-8.423321</b>	<b>0.0000</b>
Test critical values: 1% level	-4.296729	
5% level	-3.568379	
10% level	-3.218382	

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Null Hypothesis: LEXC has a unit root  
 Exogenous: Constant, Linear Trend  
 Lag Length: 7 (Automatic - based on SIC, maxlag=7)

	t-Statistic	Prob.*
<b>Augmented Dickey-Fuller test statistic</b>	<b>-10.68660</b>	<b>0.0000</b>
Test critical values: 1% level	-4.394309	
5% level	-3.612199	
10% level	-3.243079	

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Null Hypothesis: LEXC has a unit root  
 Exogenous: Constant, Linear Trend  
 Bandwidth: 1 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
<b>Phillips-Perron test statistic</b>	<b>-2.506534</b>	<b>0.3230</b>
Test critical values: 1% level	-4.284580	
5% level	-3.562882	
10% level	-3.215267	

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Null Hypothesis: D(LEXC) has a unit root  
 Exogenous: Constant, Linear Trend  
 Bandwidth: 4 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
<b>Phillips-Perron test statistic</b>	<b>-5.480965</b>	<b>0.0006</b>
Test critical values:		
1% level	-4.296729	
5% level	-3.568379	
10% level	-3.218382	

Null Hypothesis: AGEXPORT has a unit root  
 Exogenous: Constant, Linear Trend  
 Lag Length: 1 (Automatic - based on SIC, maxlag=7)

	t-Statistic	Prob.*
<b>Augmented Dickey-Fuller test statistic</b>	<b>-3.282173</b>	<b>0.0886</b>
Test critical values:		
1% level	-4.296729	
5% level	-3.568379	
10% level	-3.218382	

Null Hypothesis: D(AGEXPORT) has a unit root  
 Exogenous: Constant, Linear Trend  
 Lag Length: 1 (Automatic - based on SIC, maxlag=7)

	t-Statistic	Prob.*
<b>Augmented Dickey-Fuller test statistic</b>	<b>-5.039294</b>	<b>0.0018</b>
Test critical values: 1% level	-4.309824	
5% level	-3.574244	
10% level	-3.221728	

Null Hypothesis: AGEXPORT has a unit root  
 Exogenous: Constant, Linear Trend  
 Bandwidth: 6 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
<b>Phillips-Perron test statistic</b>	<b>-2.091103</b>	<b>0.5304</b>
Test critical values: 1% level	-4.284580	
5% level	-3.562882	
10% level	-3.215267	

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Null Hypothesis: D(AGEXPORT) has a unit root  
 Exogenous: Constant, Linear Trend  
 Bandwidth: 29 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
<b>Phillips-Perron test statistic</b>	-5.303967	0.0009
Test critical values:		
1% level	-4.296729	
5% level	-3.568379	
10% level	-3.218382	

Null Hypothesis: LNLAND has a unit root  
 Exogenous: Constant, Linear Trend  
 Lag Length: 0 (Automatic - based on SIC, maxlag=7)

	t-Statistic	Prob.*
<b>Augmented Dickey-Fuller test statistic</b>	-4.021816	0.0184
Test critical values:		
1% level	-4.284580	
5% level	-3.562882	
10% level	-3.215267	

\*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LNLAND has a unit root  
Exogenous: Constant, Linear Trend  
Bandwidth: 8 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
<u>Phillips-Perron test statistic</u>	<u>-7.187509</u>	<u>0.0000</u>
Test critical values:		
1% level	-4.284580	
5% level	-3.562882	
10% level	-3.215267	

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	AGEXPORT	AGRIC OT...	GFCF	INF	LENDING	LEXC	LNAGCRD	LNEMP	LNLAND
Mean	0.976110	5.781678	1.331433	18.60941	18.52405	4.598457	4.672715	3.790714	4.281228
Median	0.281333	3.792027	2.342505	13.00697	17.58500	4.861535	4.215656	3.790433	4.289117
Maximum	7.268343	55.57805	40.38866	72.83550	31.65000	6.054390	7.502446	3.958077	4.322399
Minimum	0.005946	1.874200	-23.74670	5.388008	11.48313	2.293493	1.611975	3.637198	4.178348
Std. Dev.	1.681384	9.408490	12.43208	16.48096	3.944184	1.069874	1.604154	0.125836	0.037555
Skewness	2.758864	5.003007	0.492897	2.105593	1.154374	-0.674523	0.019714	0.052584	-1.282626
Kurtosis	9.942356	27.03668	5.053103	6.372264	5.445094	2.255919	2.014255	1.354074	3.942587
Jarque-Bera Probability	101.5788 0.000000	875.5982 0.000000	6.699904 0.035086	37.59557 0.000000	14.60720 0.000673	3.065878 0.215900	1.257113 0.533361	3.513504 0.172605	9.647446 0.008037
Sum	30.25941	179.2320	41.27442	576.8918	574.2457	142.5522	144.8542	117.5121	132.7181
Sum Sq. Dev.	84.81155	2655.591	4636.702	8148.666	466.6975	34.33892	77.19933	0.475040	0.042312
Observations	31	31	31	31	31	31	31	31	31

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Covariance Analysis: Ordinary

Date: 08/06/24 Time: 18:02

Sample: 1991 2022

Included observations: 31

Balanced sample (listwise missing value deletion)

Covariance Correlation	AGEXPORT	AGRIC OT...	GFCF	INF	LENDING	LEXC	LNAGCRD	LNEMP	LNLAND
AGEXPORT	2.735856 1.000000								
AGRIC OTGRW	-0.933354 -0.060968	85.66421 1.000000							
GFCF	-0.978968 -0.048395	17.66935 0.156098	149.5710 1.000000						
INF	0.239610 0.008935	-18.92517 -0.126118	-21.83569 -0.110124	262.8602 1.000000					
LENDING	-0.493568 -0.076907	9.921629 0.276278	2.682754 0.056535	31.62918 0.502792	15.05476 1.000000				
LEXC	-0.048677 -0.027962	0.398021 0.040860	-0.364989 -0.028356	-9.096695 -0.533100	-2.496962 -0.611452	1.107707 1.000000			
LNAGCRD	0.186519 0.071458	-1.431854 -0.098033	-1.720405 -0.089142	-11.11770 -0.434537	-4.574286 -0.747069	1.503997 0.905542	2.490301 1.000000		
LNEMP	-0.034277 -0.167408	0.141373 0.123390	0.016211 0.010708	0.961887 0.479267	0.344706 0.717676	-0.114839 -0.881440	-0.184786 -0.945930	0.015324 1.000000	
LNLAND	0.000648 0.010601	0.005502 0.016091	-0.005403 -0.011958	-0.343083 -0.572776	-0.103836 -0.724369	0.035786 0.920333	0.053073 0.910315	-0.003903 -0.853338	0.001365 1.000000

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Covariance Analysis: Ordinary

Date: 08/06/24 Time: 18:09

Sample: 1991 2022

Included observations: 31

Balanced sample (listwise missing value deletion)

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Covariance								
Correlation	AGEXPORT	AGRIC_OT...	GFCF	INF	LENDING	LEXC	LNAGCRD	LNEMP
AGEXPORT	2.735856 1.000000							
AGRIC_OTGRW	-0.933354 -0.060968	85.66421 1.000000						
GFCF	-0.978968 -0.048395	17.66935 0.156098	149.5710 1.000000					
INF	0.239610 0.008935	-18.92517 -0.126118	-21.83569 -0.110124	262.8602 1.000000				
LENDING	-0.493568 -0.076907	9.921629 0.276278	2.682754 0.056535	31.62918 0.502792	15.05476 1.000000			
LEXC	-0.048677 -0.027962	0.398021 0.040860	-0.364989 -0.028356	-9.096695 -0.533100	-2.496962 -0.611452	1.107707 1.000000		
LNAGCRD	0.186519 0.071458	-1.431854 -0.098033	-1.720405 -0.089142	-11.11770 -0.434537	-4.574286 -0.747069	1.503997 0.905542	2.490301 1.000000	
LNEMP	-0.034277 -0.167408	0.141373 0.123390	0.016211 0.010708	0.961887 0.479267	0.344706 0.717676	-0.114839 -0.881440	-0.184786 -0.945930	0.015324 1.000000

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\* p-value incompatible with t-Bounds distribution.

Levels Equation				
Case 3: Unrestricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNEMP	72.62685	16.57992	4.380411	0.0072
GFCF	-2.094186	0.587467	-3.564772	0.0161
LEXC	0.328932	4.190762	0.078490	0.9405
INF	-0.592978	0.266758	-2.222901	0.0768

$$EC = AGRIC \text{ OTGRW} - (72.6269 \cdot LNEMP - 2.0942 \cdot GFCF + 0.3289 \cdot LEXC - 0.5930 \cdot INF)$$

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
Asymptotic: n=1000				
F-statistic	13.17014	10%	2.45	3.52
k	4	5%	2.86	4.01
		2.5%	3.25	4.49
		1%	3.74	5.06
Finite Sample: n=30				
Actual Sample Size	25	10%	2.752	3.994
		5%	3.354	4.774
		1%	4.768	6.67

t-Bounds Test Null Hypothesis: No levels relationship

Breusch-Godfrey Serial Correlation LM Test:

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F-statistic	2.240619	Prob. F(2,3)	0.2539
Obs*R-squared	14.97492	Prob. Chi-Square(2)	0.0006

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Heteroskedasticity Test: Breusch-Pagan-Godfrey

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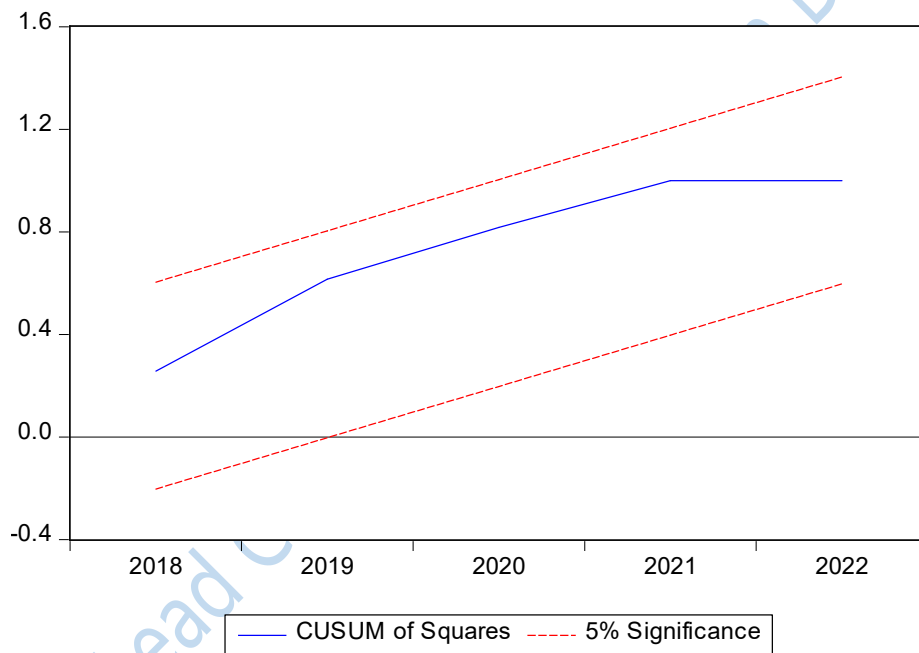
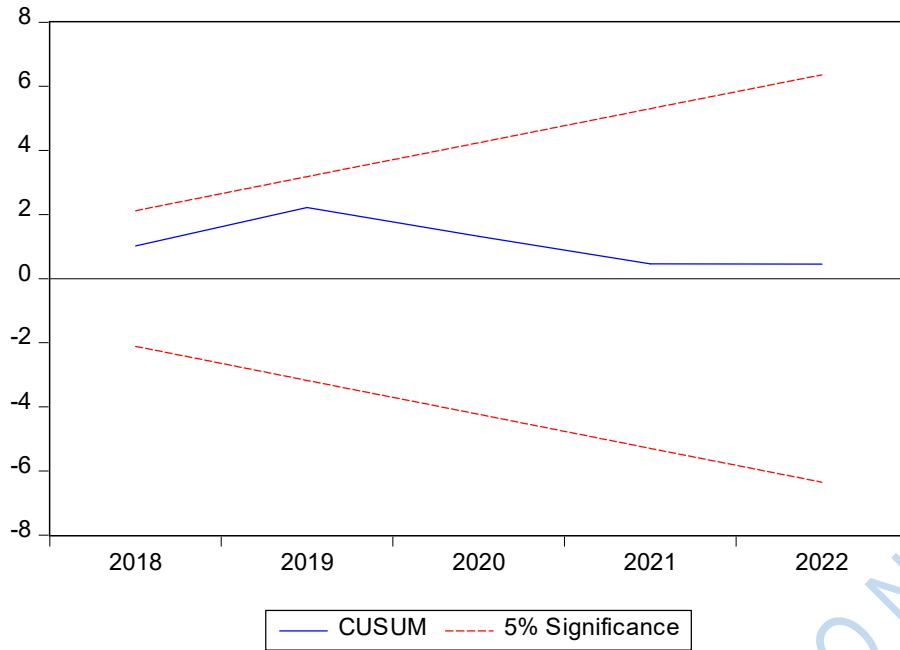
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F-statistic	0.373142	Prob. F(19,5)	0.9462
Obs*R-squared	14.66061	Prob. Chi-Square(19)	0.7439
Scaled explained SS	0.852516	Prob. Chi-Square(19)	1.0000

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Levels Equation				
Case 3: Unrestricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNEMP	-12.70007	4.138227	-3.068965	0.0181
LEXC	-0.515892	0.279904	-1.843102	0.1079
AGRIC OTGRW	0.018211	0.024196	0.752670	0.4762
LNAGCRD	-0.708253	0.411521	-1.721062	0.1289

EC = AGEXPORT - (-12.7001\*LNEMP -0.5159\*LEXC + 0.0182  
\*AGRIC OTGRW -0.7083\*LNAGCRD )

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
Asymptotic: n=1000				
F-statistic	19.03041	10%	2.45	3.52
k	4	5%	2.86	4.01
		2.5%	3.25	4.49
		1%	3.74	5.06
Finite Sample: n=30				
Actual Sample Size	25	10%	2.752	3.994
		5%	3.354	4.774
		1%	4.768	6.67

ARDL Error Correction Regression  
 Dependent Variable: D(AGEXPORT)  
 Selected Model: ARDL(3. 3. 1. 3. 3)  
 Case 3: Unrestricted Constant and No Trend  
 Date: 08/07/24 Time: 03:33  
 Sample: 1991 2022  
 Included observations: 25

ECM Regression  
 Case 3: Unrestricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	52.51678	4.279873	12.27064	0.0000
D(AGEXPORT(-1))	0.067440	0.065267	1.033296	0.3358
D(AGEXPORT(-2))	0.204609	0.073306	2.791184	0.0269
D(LNEMP)	-46.09325	10.81012	-4.263898	0.0037
D(LNEMP(-1))	44.54513	11.45755	3.887842	0.0060
D(LNEMP(-2))	-16.17385	9.329534	-1.733619	0.1266
D(LEXC)	0.608139	0.228200	2.664941	0.0322
D(AGRIC OTGRW)	0.003469	0.004264	0.813449	0.4427
D(AGRIC OTGRW(-1))	-0.015807	0.005342	-2.959160	0.0211
D(AGRIC OTGRW(-2))	-0.018247	0.005341	-3.416344	0.0112
D(LNAGCRD)	0.540341	0.199586	2.707305	0.0303
D(LNAGCRD(-1))	1.096830	0.213465	5.138216	0.0013
D(LNAGCRD(-2))	1.449784	0.378887	3.826431	0.0065
CointEq(-1)*	-0.981390	0.080257	-12.22803	0.0000
R-squared	0.976319	Mean dependent var		-0.288566
Adjusted R-squared	0.948333	S.D. dependent var		1.035089
S.E. of regression	0.235280	Akaike info criterion		0.242942
Sum squared resid	0.608926	Schwarz criterion		0.925513
Log likelihood	10.96322	Hannan-Quinn criter.		0.432258
F-statistic	34.88540	Durbin-Watson stat		2.679602
Prob(F-statistic)	0.000000			

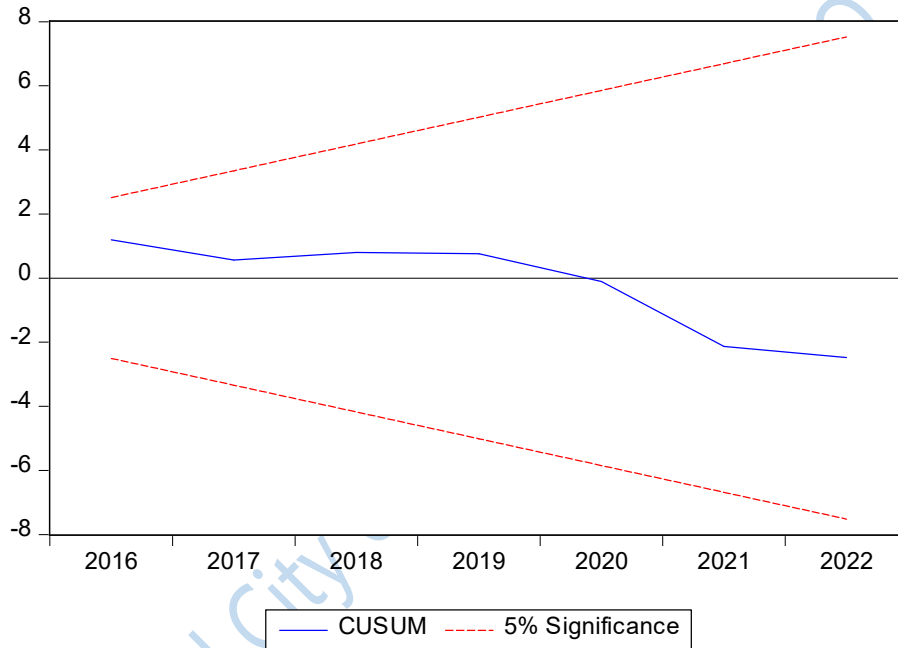
\* p-value incompatible with t-Bounds distribution.

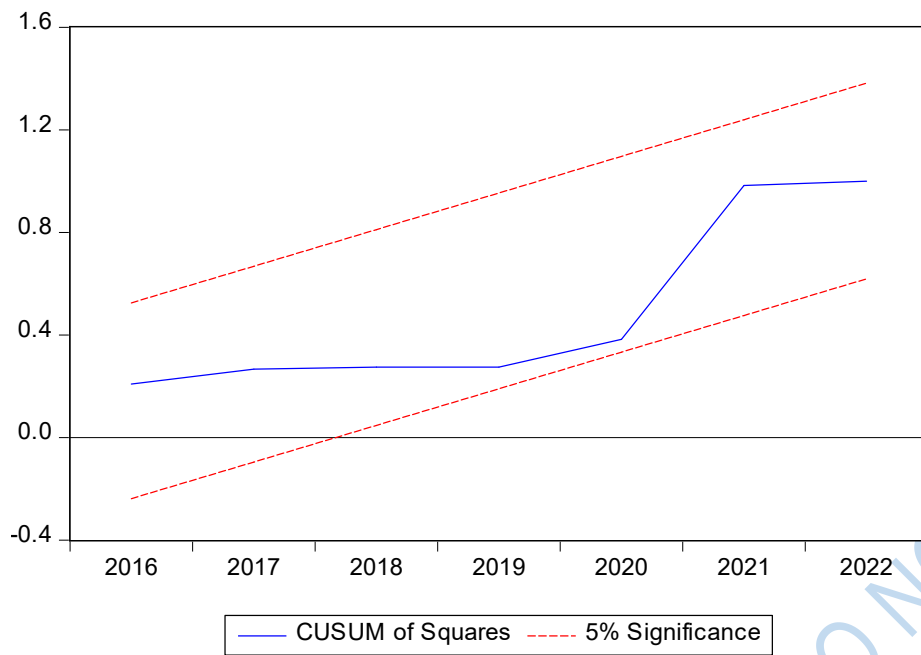
Breusch-Godfrey Serial Correlation LM Test:

F-statistic	2.479070	Prob. F(2,5)	0.1786
Obs*R-squared	12.44746	Prob. Chi-Square(2)	0.0020

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.538618	Prob. F(17,7)	0.8593
Obs*R-squared	14.16844	Prob. Chi-Square(17)	0.6551
Scaled explained SS	3.518854	Prob. Chi-Square(17)	0.9998





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Vector Autoregression Estimates

Date: 08/07/24 Time: 03:50

Sample (adjusted): 1993 2022

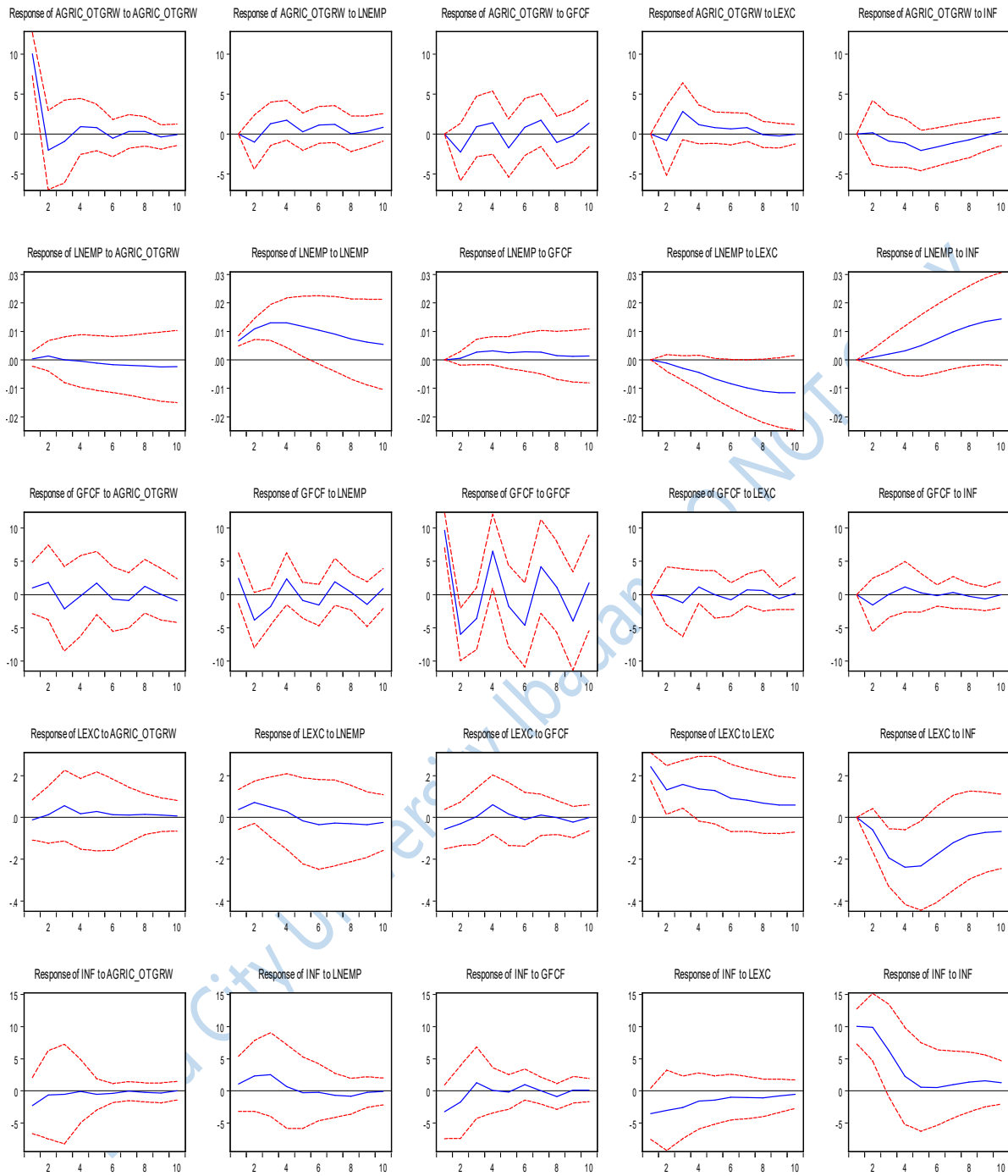
Included observations: 27 after adjustments

Standard errors in ( ) & t-statistics in [ ]

	AGRIC OT...	LNEMP	GFCF	LEXC	INF
AGRIC OTGRW(-1)	-0.173718 (0.24041) [-0.72259]	0.000100 (0.00016) [0.62330]	0.218861 (0.24049) [0.91007]	0.000383 (0.00602) [0.06355]	0.143888 (0.27329) [0.52651]
AGRIC OTGRW(-2)	-0.088780 (0.24640) [-0.36031]	-0.000219 (0.00016) [-1.32976]	0.063450 (0.24648) [0.25743]	0.001975 (0.00617) [0.31983]	-0.113416 (0.28009) [-0.40492]
LNEMP(-1)	-44.73735 (246.221) [-0.18170]	1.594258 (0.16468) [9.68103]	-272.4026 (246.301) [-1.10598]	10.08476 (6.16917) [1.63470]	116.8098 (279.893) [0.41734]
LNEMP(-2)	124.6877 (238.151) [0.52357]	-0.643346 (0.15928) [-4.03906]	209.1389 (238.228) [0.87789]	-10.78396 (5.96697) [-1.80727]	-113.1204 (270.720) [-0.41785]
GFCF(-1)	-0.247962 (0.19417) [-1.27703]	6.43E-05 (0.00013) [0.49515]	-0.692386 (0.19423) [-3.56469]	-0.002547 (0.00487) [-0.52357]	0.164577 (0.22073) [0.74562]
GFCF(-2)	-0.094225 (0.21442) [-0.43945]	0.000247 (0.00014) [1.72358]	-0.790783 (0.21449) [-3.68688]	-0.004061 (0.00537) [-0.75596]	0.320168 (0.24374) [1.31357]
LEXC(-1)	-3.155276 (8.93677) [-0.35307]	-0.003434 (0.00598) [-0.57446]	-3.235055 (8.93967) [-0.36188]	0.455714 (0.22391) [2.03521]	1.847895 (10.1589) [0.18190]
LEXC(-2)	10.36078 (8.12975) [1.27443]	-0.001540 (0.00544) [-0.28316]	-5.759810 (8.13240) [-0.70825]	0.199784 (0.20369) [0.98080]	-2.688631 (9.24156) [-0.29093]
INF(-1)	0.017382 (0.19936) [0.08719]	9.05E-05 (0.00013) [0.67843]	-0.157988 (0.19942) [-0.79222]	-0.005937 (0.00500) [-1.18850]	0.987178 (0.22662) [4.35605]
INF(-2)	-0.155174 (0.19605) [-0.79151]	-3.81E-05 (0.00013) [-0.29044]	0.050456 (0.19611) [0.25728]	-0.011987 (0.00491) [-2.44028]	-0.323799 (0.22286) [-1.45292]
C	-325.3635 (170.434) [-1.90903]	0.204358 (0.11399) [1.79276]	283.9387 (170.490) [1.66543]	4.824564 (4.27031) [1.12979]	-5.042454 (193.742) [-0.02603]
R-squared	0.385920	0.998226	0.643208	0.959838	0.716466
Adj. R-squared	0.002119	0.997118	0.420213	0.934737	0.539257
Sum sq. resids	1613.996	0.000722	1615.046	1.013228	2085.634
S.E. equation	10.04364	0.006717	10.04691	0.251648	11.41719
F-statistic	1.005522	900.4316	2.884407	38.23876	4.043059
Log likelihood	-93.53487	103.8348	-93.54364	6.005056	-96.99572
Akaike AIC	7.743324	-6.876652	7.743973	0.369996	7.999683
Schwarz SC	8.271257	-6.348718	8.271907	0.897929	8.527617
Mean dependent	6.092975	3.784267	1.712411	4.717014	18.32333
S.D. dependent	10.05430	0.125120	13.19466	0.985053	16.82014
Determinant resid covariance (dof adj.)		2.513643			
Determinant resid covariance		0.183690			
Log likelihood		-168.6808			
Akaike information criterion		16.56895			
Schwarz criterion		19.20862			
Number of coefficients		55			

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Response to Cholesky One S.D. (d.f. adjusted) Innovations  $\pm 2$  S.E.



Variance Decomposition of AGRIC OTGRW:

Period	S.E.	AGRIC O...	LNEMP	GFCF	LEXC
1	10.04364	100.0000	0.000000	0.000000	0.000000
2	10.57490	93.79797	0.917057	4.648690	0.609073
3	11.13798	85.26582	2.140416	4.899240	7.053122
4	11.51056	80.47300	4.231328	6.058028	7.663406
5	11.88262	75.96124	4.021053	7.851899	7.627642
6	12.10570	73.39251	4.742344	8.060977	7.620299
7	12.37579	70.28475	5.515832	9.686737	7.729810
8	12.44709	69.54214	5.452985	10.29087	7.644659
9	12.46316	69.45913	5.503716	10.31017	7.661426
10	12.56934	68.29594	5.848819	11.31159	7.533406

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Vector Autoregression Estimates

Date: 08/07/24 Time: 03:54

Sample (adjusted): 1993 2022

Included observations: 27 after adjustments

Standard errors in ( ) & t-statistics in [ ]

	AGEXPORT	LNEMP	LEXC	AGRIC OT...	LNAGCRD
AGEXPORT(-1)	0.918398 (0.12566) [ 7.30853]	-0.003433 (0.00086) [-3.99765]	-0.017287 (0.04792) [-0.36071]	-0.571576 (1.88014) [-0.30401]	0.031580 (0.05126) [ 0.61613]
AGEXPORT(-2)	-0.461341 (0.15708) [-2.93699]	0.000768 (0.00107) [ 0.71530]	-0.120636 (0.05991) [-2.01372]	0.452166 (2.35022) [ 0.19239]	0.057235 (0.06407) [ 0.89331]
LNEMP(-1)	-3.969672 (26.2869) [-0.15101]	1.292964 (0.17965) [ 7.19697]	-19.84585 (10.0253) [-1.97958]	-124.3685 (393.304) [-0.31622]	17.86932 (10.7222) [ 1.66657]
LNEMP(-2)	-2.275587 (24.4029) [-0.09325]	-0.406397 (0.16678) [-2.43675]	17.74939 (9.30677) [ 1.90715]	212.0928 (365.116) [ 0.58089]	-18.40218 (9.95374) [-1.84877]
LEXC(-1)	-0.376254 (0.56909) [-0.66115]	-0.006365 (0.00389) [-1.63649]	0.698801 (0.21704) [ 3.21969]	2.082552 (8.51473) [ 0.24458]	0.222002 (0.23213) [ 0.95638]
LEXC(-2)	0.208138 (0.60022) [ 0.34677]	-0.002020 (0.00410) [-0.49246]	-0.296582 (0.22891) [-1.29562]	8.180955 (8.98043) [ 0.91098]	0.145249 (0.24482) [ 0.59328]
AGRIC OTGRW(-1)	-0.006057 (0.01585) [-0.38207]	-3.01E-05 (0.00011) [-0.27742]	0.000134 (0.00605) [ 0.02220]	-0.211178 (0.23720) [-0.89028]	-0.003623 (0.00647) [-0.56033]
AGRIC OTGRW(-2)	0.005308 (0.01586) [ 0.33470]	-0.000216 (0.00011) [-1.99700]	-0.001127 (0.00605) [-0.18629]	-0.228503 (0.23726) [-0.96308]	-0.001659 (0.00647) [-0.25653]
LNAGCRD(-1)	0.338699 (0.61658) [ 0.54932]	-0.000462 (0.00421) [-0.10965]	-0.082197 (0.23515) [-0.34955]	1.340036 (9.22528) [ 0.14526]	0.617733 (0.25150) [ 2.45621]
LNAGCRD(-2)	-0.763402 (0.58337) [-1.30860]	-0.002676 (0.00399) [-0.67113]	0.305254 (0.22249) [ 1.37201]	-1.647618 (8.72840) [-0.18877]	0.053572 (0.23795) [ 0.22514]
C	26.67428 (20.7815) [ 1.28356]	0.481020 (0.14203) [ 3.38678]	9.782128 (7.92565) [ 1.23424]	-371.1620 (310.933) [-1.19370]	2.185475 (8.47661) [ 0.25782]
R-squared	0.850740	0.999034	0.951491	0.283365	0.976176
Adj. R-squared	0.757452	0.998431	0.921173	-0.164532	0.961286
Sum sq. resids	8.413899	0.000393	1.223804	1883.542	1.399865
S.E. equation	0.725168	0.004956	0.276564	10.84995	0.295790
F-statistic	9.119544	1655.529	31.38381	0.632657	65.55903
Log likelihood	-22.57099	112.0454	3.455942	-95.61982	1.641381
Akaike AIC	2.486740	-7.484844	0.558819	7.897764	0.693231
Schwarz SC	3.014674	-6.956911	1.086753	8.425698	1.221165
Mean dependent	0.748644	3.784267	4.717014	6.092975	4.848224
S.D. dependent	1.472449	0.125120	0.985053	10.05430	1.503310
Determinant resid covariance (dof adj.)		7.56E-06			
Determinant resid covariance		5.52E-07			
Log likelihood		2.967380			
Akaike information criterion		3.854268			
Schwarz criterion		6.493936			
Number of coefficients		55			

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Variance Decomposition of AGEXPORT:					
Period	S.E.	AGEXPORT	LNEMP	LEXC	AGRIC O...
1	0.725168	100.0000	0.000000	0.000000	0.000000
2	1.010881	97.63205	0.102186	0.797011	0.625816
3	1.057979	96.50976	0.187663	1.635015	0.577824
4	1.084229	91.91320	0.179068	2.083915	1.220891
5	1.123604	86.53220	0.710543	2.271640	1.691041
6	1.149371	82.89512	1.853718	2.237605	2.329050
7	1.163096	81.06708	2.801488	2.205572	3.049827
8	1.172602	80.26981	3.214191	2.450365	3.361613
9	1.179548	79.67825	3.312238	2.997798	3.399382
10	1.183526	79.17806	3.325854	3.523155	3.382005

Variance Decomposition of LNEMP:					
Period	S.E.	AGEXPORT	LNEMP	LEXC	AGRIC O...
1	0.004956	9.699520	90.30048	0.000000	0.000000
2	0.009321	25.96117	70.06494	3.852402	0.103028
3	0.014698	36.10555	50.59778	10.32407	2.340765
4	0.019547	37.78748	42.86403	15.48136	2.408897

## Bio-data

### A. Personal Data

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### B. Professional Experience

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### C. Educational Background

Educational Institutions Attended with Date:

**2011-2016** Federal University of Agriculture, Makurdi

Bachelor's in Agricultural Economics

**2010 Greenfield International Secondary School, Lagos, Nigeria**

Secondary School Leaving Certificate

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**D. Extra-Curricular Activities**

Outdoor exercise

**References**

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**Signature**

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**Date**

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### **The University Compliance Certification**

This is to certify that this thesis by Markson Onuh ONDAH with matriculation number LCU/PG/ 002952 in the Department of Economics, Lead City University, Ibadan is in full compliance with the approved University format and style.

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**Signature**

**Date**

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