THE IMPACT OF AGRICULTURE FUNDING ON FOOD PRODUCTION IN NIGERIA

BY

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DEPARTMENT OF ECONOMICS

FACULTY OF SOCIAL SCIENCES

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CERTIFICATION

This is to certify that this project work titled; **THE IMPACT OF AGRICULTURE FUNDING ON FOOD PRODUCTION IN NIGERIA** was carried out by **Williams Oshoke KABIRU** with matriculation number **SSC1909374.** It has been read and recommended for acceptance in partial fulfillment of the requirement for the award of Bachelor of Science (B.Sc.) Degree in Economics.

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Date:_____

DEDICATION

This project is dedicated to Almighty God, the one in whom we live and move and have our being and who has made it possible for me to achieve this much. And to my parents Mr. and Mrs. Kabiru who sacrificed materially for my success in school.

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TABLE OF CONTENTS

CHAPTER TWO: LITERATURE REVIEW

ABSTRACT

This study investigates the impact of agricultural funding on food production in Nigeria from 1990 to 2022, focusing on key variables including agricultural machinery, deposit money banks' loan to the agricultural sector, federal government's annual agriculture expenditure, and agricultural credit guarantee scheme. Using Ordinary Least Squares (OLS) regression analysis, the study provides valuable insights into the relationship between these factors and food production outcomes. The results reveal a significant positive influence of agricultural machinery on food production, highlighting the importance of mechanization in enhancing agricultural productivity. Additionally, higher government expenditure on agriculture is found to positively influence food production levels. However, the relationship between bank loans to the agricultural sector and food production is inconclusive, warranting further investigation. The presence of an agricultural credit guarantee scheme shows a significant but unexpected negative impact on food production, calling for deeper exploration. Based on these findings, policy recommendations are proposed, including prioritizing investments in agricultural machinery, increasing government expenditure on agriculture, and revamping agricultural credit schemes. These measures aim to enhance agricultural productivity, ensure food security, and contribute to sustainable economic development in Nigeria.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

The food economy which encompasses all economic activities involved in the production, distribution, and consumption of food within a specific region or country, plays a pivotal role in overseeing various aspects of food production, encompassing farm-level activities like processing, packaging, transportation, distribution, and retailing. In Nigeria, the Agricultural sector employs an estimated 85 million individuals (Osabuohien, Okorie 2018), with over 75 percent of the workforce engaged in agriculture. Approximately 65 percent of this employment is concentrated in local communities, while the remaining 20 percent is distributed among food processing, marketing, and transportation activities beyond localities (Alola & Alola, 2019). Conversely, food production in Africa has witnessed a decline, leading to a surge in food imports. The expenditure on food imports reached approximately 35 billion USD in 2017, and projections indicate it may escalate to around 110 billion USD by 2025 (Allen, Heinrigs & Heo, 2018). Notably, the continent possesses 60% of the world's uncultivated arable land, estimated at 600 million hectares (Nevin et al., 2019).

Challenges in the food cultivation and production processes in Africa stem from a lack of credit and machinery, leading to a predominant reliance on subsistence methods. These approaches are characterized by limited technical expertise and a heavy dependence on manual labor (Osabohien 2020). The Nigerian agricultural sector, constituting a declining

share of the GDP, has experienced reduced productivity due to factors such as low engagement in agriculture, inflation-induced increases in machinery costs (Matthew et al., 2019), internal challenges like crises and conflicts, and a lack of social protection to address the impact of climate change. These issues collectively contribute to making agriculture less attractive for employment

Nigeria, despite being a nation rich in agricultural potential, has faced challenges in achieving self-sufficiency in food production. The country has historically been heavily reliant on food imports, with the import value reaching nearly two trillion Nigerian Naira (NGN) in 2021, representing 4.8 billion U.S. dollars. While there was a decrease in imports from 481 billion NGN in the second quarter of 2017 to 349.9 billion NGN in the second quarter of 2018, recent trends indicate a gradual increase, emphasizing the need for strategic measures to control food imports (Omondi, 2019).

In response to the challenges posed by rising food imports, there is a growing consensus that enhancing local food production is crucial. Agricultural financing plays a pivotal role in this endeavor, yet recent data reveals a decline in agricultural funding in Nigeria. This decline is evident in the budgetary allocations, with the agriculture budget consistently falling below the recommended standard set by the Maputo Declaration on Agriculture and Food Security. The Maputo Declaration advocates for the allocation of at least 10% of the annual national budget to agriculture. However, Nigeria's commitment to this declaration is reflected in budgetary allocations accounting for only 2.2% of the proposed

N9.12 trillion budget for 2018, with N0.20 trillion allocated to agriculture (Osabohien 2020). Similarly, the agriculture budget was 1.3% of the total budget of N7.44 trillion in 2017, highlighting a persistent underfunding of the agricultural sector (Nevin et al., 2019). Agricultural credit, a critical component of funding for farmers, has also witnessed a decline. From 83.20% in 2013, agricultural credit fell to 66.64% in 2014 and further dropped to 40.62% in 2015. Over the period from 2013 to 2016, agricultural finance in Nigeria experienced a significant decrease of 42.58% (Nevin et al., 2019).

Recognizing the importance of increasing agricultural financing, the Nigerian government implemented several programs such as the Agricultural Transformation Agenda (ATA), Anchor Borrowers, Commercial Agriculture Credit Scheme (CACS), and Agricultural Credit Guarantee Scheme Fund (ACGSF). Despite these efforts, the challenge persists, and credit access to agriculture remains limited. The Central Bank of Nigeria's CACS report reveals that approximately 74% of the 200 billion Naira special credit intervention fund was disbursed to 191 businesses between 2009 and 2016, with a focus on crop production, livestock production, and agricultural processing. However, credit to agriculture accounted for only 3.26% of total credit to the private sector in 2016 and 3.36% in 2017, underscoring the limited access to credit for the agricultural sector (National Bureau of Statistics 2019).

Despite the government's initiatives, challenges persist in increasing productivity and curbing the reliance on food imports. The agricultural sector continues to receive the least

credit allocation from banks compared to other industries, despite its significant contribution to the GDP. In light of these challenges, this study aims to investigate the impact of agricultural funding on food production in Nigeria, shedding light on the complex relationship between financial support, agricultural productivity, and the nation's ability to reduce food imports and achieve food security.

1.2 Statement of the Research Problem

The agricultural sector holds significant prominence in Africa, being the largest single contributor to the continent's GDP and engaging a substantial portion of the population, employing approximately 65-70 percent of individuals who use labor-intensive methods. Despite its crucial role in the economy, the productive capacity of the agricultural sector has witnessed a decline in recent years, exacerbated by factors such as post-harvest losses attributed to challenges in road networks. The significance of the sector is underscored by its contribution of over 40% to the GDP in the region (Omondi, 2019).

The nexus between the agricultural sector's access to credit facilities and its impact on agricultural output and food production has been a subject of extensive research in both developed and developing countries. Numerous studies conducted by researchers from diverse perspectives have explored this relationship, including Ozurumba & Uzomaka (2011), Agbada (2015), Udoka & Duke (2015), Tandan (2012), Obilor (2013), Imosi, Sogules & Itoro (2012), Ojeigbe & Duruechi (2015), Egwu (2016), Reuben, Nyam & Rukwe (2020), Osabohien, Adeleye & Alwis (2020), Osabohien, Afolabi & Godwin

(2018), Orji, Ogbuabor, Anthony-Orji & Alisigwe (2020), Sulaimon (2021), Orok & Ayim (2017), Okafor (2020), Nnamocha & Eke (2015), Islam (2020), and Anh, Gan & Anh (2020). However, the findings from these studies present varying and sometimes conflicting results, indicating the need for further investigation.

In light of these diverse outcomes and the complexities surrounding the relationship between agricultural funding and food production, this study aims to scrutinize the impact of agricultural funding on food production in Nigeria. By addressing this gap in the existing literature, the research seeks to provide a comprehensive understanding of the dynamics at play in the Nigerian context, contributing valuable insights to the ongoing discourse on sustainable agricultural development.

1.3 Research Questions

This research project is being utilized as a veritable instrument of analysis to analyze and provide possible solutions to the questions below

i. What is the effect of agricultural credit guarantee scheme on food production in Nigeria?

ii. To what extent does deposit money banks' loan to agricultural sector affect food production in Nigeria?

iii. What is the relationship between federal governments annual agriculture expenditure and food production in Nigeria?

iv. What is the effect of agricultural machinery on food production in Nigeria?

1.4 Objectives of the Study

The broad objectives of this study is to establish the impact of agricultural funding and food production in Nigeria. The specific objectives include:

i. to investigate the effects of agricultural credit guarantee scheme on food production in Nigeria;
ii. to investigate the effects of deposit money banks' loan to agricultural sector on food production in Nigeria;
iii. to investigate the effects of federal governments annual agriculture expenditure on food production in Nigeria; and
iv. to investigate the effects of agricultural machinery on food production in Nigeria.

1.5 Research Hypotheses

$H0_1$: Agricultural credit guarantee scheme does not have an effect on food production in Nigeria.

$H0_2$: Deposit money banks' loan does not have an effect on food production in Nigeria.

$H0_3$: Federal governments' annual agriculture expenditure does not have an effect on food production in Nigeria.

$H0_4$: Agricultural machinery does not have an effect on food production in Nigeria

1.6 Significance of the Study

The significance of the study on the impact of agricultural funding on food production in Nigeria is multifaceted, encompassing its potential to address critical issues and contribute to the enhancement of the agricultural sector. One of the primary implications lies in its influence on policy formulation. The findings of the study can serve as a crucial guide for policymakers, offering insights that can inform decisions related to the allocation of resources and the design of effective interventions. This, in turn, has the potential to shape agricultural policies in Nigeria to better support the sector's growth.

Furthermore, the study holds significance in the context of strategic planning for food security. As a top priority for any nation, achieving food security requires a comprehensive understanding of the factors influencing domestic food production. The study provides a basis for the development of strategic plans aimed at increasing agricultural productivity and reducing dependency on food imports. By identifying key areas for improvement, it contributes to the overarching goal of ensuring a reliable and sustainable food supply for the nation.

The insights derived from the study also have practical implications for the allocation of financial resources. Understanding the dynamics between agricultural funding and food production can guide policymakers in optimizing the use of available resources. This optimization is essential for directing funds towards initiatives that have the greatest

impact on enhancing food production, thereby fostering economic growth in the agricultural sector.

Investors, both within and outside the agricultural sector, stand to benefit significantly from the study's findings. The relationship between funding and food production is crucial information for making informed investment decisions. By providing insights into the challenges and opportunities in agricultural funding, the study contributes to creating an environment conducive to sustainable economic growth and development.

Agricultural development programs and initiatives can also leverage the study's findings. By tailoring interventions based on the identified challenges and opportunities in agricultural funding, these programs can address specific needs, fostering sustainable development in the sector. The study, therefore, plays a vital role in shaping the trajectory of agricultural development efforts in Nigeria.

1.7 Scope of the Study

This study specifically delves into the influence of agricultural funding on food production in Nigeria. It aims to elucidate the impact of various factors such as the agricultural credit guarantee scheme, loans from deposit money banks to the agricultural sector, annual agriculture expenditure by the Federal government, and the role of agricultural machinery in shaping food production outcomes in the country. The temporal scope of the study spans from 1995 to 2022, covering a 28-year period. This timeframe is chosen to encompass periods during which the federal government implemented key

agricultural funding schemes, including the Agricultural Transformation Agenda (ATA), Anchor Borrowers, Commercial Agriculture Credit Scheme (CACS), and Agricultural Credit Guarantee Scheme Fund (ACGSF), among others.

1.8 Definition of Terms

- **Agriculture**: Refers to the science, art, or practice of cultivating soil, growing crops, and raising livestock, encompassing the preparation and marketing of resulting products to varying degrees.
- **Agricultural Funding**: Encompasses the provision of funds to the agricultural sector, including credits from banks and financial institutions, as well as grants and loans from the government, aimed at supporting agricultural production activities.
- **Food Production:** Involves the process of preparing food by transforming raw agricultural products into ready-made food products.
- **Agricultural Machinery**: Pertains to the mechanical structures and devices used in farming and other agricultural practices.

CHAPTER TWO

LITERATURE REVIEW

2.1 Literature Review

This chapter encompasses a comprehensive examination of relevant literature, an exploration of the theoretical framework, and the presentation of empirical findings regarding the relationship between agricultural funding and food production in Nigeria.

2.2 Food Security and Production

Commencing with the concept of food insecurity, it is essential to recognize it as a condition where the availability of food is jeopardized. The World Food Conference (UN, 1975) links food insecurity to the risk of widespread crop failure and natural or other disasters. Maxwell and Smith (1996) expand on this by incorporating factors such as variability in crop production, food supply, employment and wage risks, health and morbidity risks, as well as market and price fluctuations. Conflict plays a significant role in exacerbating these risks, disrupting markets, causing labor withdrawal from productive activities, and potentially displacing entire communities. Dowler (2003) introduces the term 'food poverty' as synonymous with food insecurity, contributing to a broader understanding of food security, which encompasses the ability to access and consume an adequate quantity or quality of food in socially acceptable ways or the uncertainty of being able to do so.

Initially, the application of the food security concept focused on national food supply analysis, but there has been a recent shift towards household-level analysis. Household food security now pertains to a household's resilience against crises that could diminish its level of food consumption. In essence, food security implies the availability of food that individuals are entitled to and can obtain in the expected quantity and at the appropriate time.

The inception of the concept of food security can be traced back to the 1970s, initially spurred by the Universal Declaration of Human Rights acknowledging food as a crucial determinant of well-being in 1948 and the global food crisis of 1972-74. The concept gained prominence in the 1980s, fueled by three key factors: the African famine of 1984-85, a policy shift from food demand to food supply as a poverty proxy during the structural adjustment programme (SAP), and a transition from nutritional planning based on entitlement theory to household food security within the SAP (Anyanwu, 1992).

In its early use during the 1970s, the term primarily referred to national and international food supplies. However, the 1980s witnessed a transformation in its application, expanding to encompass issues of food access at both household and individual levels. The 1990s marked another paradigm shift, introducing terms like flexibility, adaptability, diversification, and resilience into the discourse (Hendriks, 2005; Maxwell & Smith, 1996; UN, 1948).

Maxwell (1996) suggests that the proliferation and evolution of food security definitions indicate an international shift in thinking about the concept. It also highlights the challenges in adequately describing and measuring the diverse factors contributing to hunger and malnutrition. The shift from objective to subjective measurement scales, incorporating cultural adoption of foods and fears of hunger, is evident in these evolving definitions. While food security is a crucial criterion for assessing happiness, it doesn't encompass all aspects of poverty. The extensive range of definitions, exceeding 250 by 1996, often revolves around food availability, adequacy, utilization, safety, and, at times, the cultural acceptability of food for all people at all times. Consequently, food insecurity is defined as a lack of food security that can lead to hunger (Hendriks & Maunder, 2006).

The International Food Policy Research Institute (IFPRI) delineates food security into three pillars: food production, food access, and food utilization. Ensuring food security involves household activities encompassing both caloric production (including processing) and income generation for purchasing food. However, women face the additional challenge of adapting to new opportunities and constraints while securing basic food availability for their families (Mushi, Mduruma, & Mmbaga, 2000).

Recognized as a global issue, food security requires collective efforts from communities and individuals, particularly in the development of technologies to enhance endeavors in this domain (FAO, 2003). Some governmental and non-governmental agencies, such as the Federal Institute of Industrial Research, Oshodi (FIIRO), and the National Centre for

Agricultural Mechanization (NCAM), are actively involved in national-level initiatives to develop technology for women in agriculture. However, evidence suggests that rural women face significant challenges in accessing such assistance. Even when available, the lack of alignment with women's knowledge bases renders these efforts ineffective (Akanji, 2001). This dynamic contributes to the persistence of low returns for smallholder farmers despite their substantial involvement in farming, ultimately leading to a decline in household food security and global food availability in the ongoing fight against hunger.

2.3 Agricultural Financing

Agricultural finance, as defined by Murray (1953), is an economic discipline that revolves around farmers or organizations securing funds from credit agencies, with a primary emphasis on investments in agriculture. Tandon and Dhondyal (1962) describe agricultural financing as a subset of agroeconomics, dealing specifically with the financial resources associated with individual farm units. Consequently, agricultural financing encompasses the borrowing and lending of funds to support agricultural activities throughout the entire value chain, from the planning stage to the marketing stage. This includes various financial instruments such as loans (short-, medium-, and long-term), leases, and livestock insurance. While agricultural financing can take diverse forms, this research paper concentrates on credit-based financing. Credit serves as a pivotal tool for farmers to exert control over working capital, fixed capital, and

consumption goods (Siddiqi, 2009). The timely availability of credit empowers farmers to acquire the necessary inputs and machinery for executing farm operations (Munir, 2009)

2.3.1 Overview of the Nigerian Agricultural Sector

The agricultural sector in Nigeria holds paramount significance as a major contributor to the country's economy and livelihoods of its citizens. Historically, agriculture has played a central role in Nigeria's economic development, providing employment opportunities and serving as a source of income for a significant portion of the population. The sector is diverse, encompassing various sub-sectors such as crop cultivation, livestock farming, fisheries, and forestry. Crop cultivation includes staples like cassava, yams, maize, and rice, among others. Livestock farming involves the rearing of cattle, poultry, sheep, and goats. Fisheries contribute to the economy through the exploitation of the country's abundant aquatic resources, and forestry plays a role in timber production and other related activities.

In the 1960s, Nigeria's agricultural sector was renowned as one of the world's best, boasting top rankings in palm oil, cocoa, and groundnut exports—outpacing even the United States and Argentina. During this period, export crops played a pivotal role, contributing significantly to the country's foreign exchange earnings (Green, 2013). Nigeria held a prominent position as a global agricultural commodity hub. Regrettably, the agricultural sector, once a powerhouse and the country's primary non-oil tradable

sector, underwent a decline, becoming a mere shadow of its former self during and after the oil boom of the 1970s (Oyejide, 1986).

Since then, the oil and gas sector has maintained its dominance in exports and government revenue, while agriculture has faced challenges and struggles. Policymakers have expressed concerns about this trend, leading to numerous empirical studies investigating the causes behind the precipitous decline in agricultural performance since the 1970s. While some researchers attribute this decline solely to Dutch disease, others delve deeper into various factors.

One perspective posits that the civil war between 1967 and 1970 may have exacerbated the negative effects of the oil boom on agriculture. The conflict led to a substantial outflow of resources for national defense and a severe disruption of economic activity in the south-eastern region, heavily dependent on palm oil, rubber, and other agricultural products. Additionally, funds earmarked for agriculture and crucial sectors were diverted to the reconstruction, rehabilitation, and reconciliation efforts in post-civil war areas. On the contrary, Oyejide (1987) argues that government industrialization policies in the 1970s, coupled with resource shifts from agriculture to manufacturing and infrastructure development, weakened the agricultural sector. Furthermore, Teal (1983) highlights that the drought in the northern states between 1972 and 1974 added strain to the agricultural sector.

Moreover, the literature has extensively scrutinized credit financing and its implications for agricultural productivity and output, with Nigeria being a subject of considerable attention. The Food and Agricultural Organization (FAO) identifies credit constraints as a major agricultural issue in Nigeria (2020). Empirical studies, such as those conducted by Awotide, Abdoulaye, Alene, and Manyong (2015) and Osabohien, Mordi, and Ogundipe (2020), lend support to the idea that credit financing exerts a significant impact on agricultural productivity.

Over time, there has been a discernible trend where commercial banks appear to allocate credit more prominently to industry rather than agriculture, with the oil and gas sector taking precedence (refer to Table 1). In the absence of other influencing factors, a marginal increase in bank credit directed towards agriculture is anticipated to correspond with a marginal increase in agricultural productivity and output in the country.

Table 1: Sectoral Distribution of Commercial Banks' Credit (in Naira Billion)

	Agriculture	Manufacturing	Mining and quarring	Oil and Gas
2014	478.91	1,647.45	18.22	2,047.20
2015	449.31	1,736.19	11.71	2,272.81
2016	525.95	2,215.74	21.28	3,587.90
2017	528.24	2,171.37	25.25	3,576.32
2018	610.15	2,230.15	20.69	3,548.97
2019	772.38	2,622.54	11.31	3,416.25

2020	1,049.68	3,191.37	11.88	3,930.14
2021	1,457.82	4,089.29	23.64	4,206.51
2022	1,812.47	5,566.43	30.09	4,706.14

Source: Central Bank of Nigeria (CBN) Statistical Bulletin, 2022

Table 1 illustrates the sectoral preferences for credit facilities among commercial banks, revealing a consistent but relatively small allocation to agriculture compared to manufacturing and the oil and gas sectors. The above breakdown showcases the credit allocation (in Naira Billion) from 2014 to 2022.

Despite a consistent increase in credit to agriculture over this period, it lags behind manufacturing and the oil and gas sector. Notably, the differences in credit allocation can be attributed to varying income and capital loss risks associated with agriculture, manufacturing, and oil and gas.

Recognizing credit financing as a crucial driver of long-term economic growth, its role in enhancing agricultural productivity is evident. Increased access to credit facilitates the procurement of essential inputs like fertilizer, land, improved seedlings, machinery, storage facilities (to reduce postharvest waste), and irrigation infrastructure for dry season farming. Moreover, improved access to credit can serve as a catalyst for new entrants into agriculture, contributing to an overall increase in agricultural output. However, the lack of farmers' access to institutional credit remains a significant constraint on agriculture's performance in Nigeria (FAO, 2020). Moreover, the agricultural sector remains highly

susceptible to commodity price volatility, unexpected disease outbreaks, and the adverse impacts of climate change, encompassing floods and droughts. These factors contribute to the elevated risk associated with agricultural activities, making it less attractive for banks to provide credit facilities. Additionally, a significant challenge arises from the fact that a majority of smallholder farmers and rural residents, who form the backbone of Nigeria's agricultural sector, lack adequate collateral to secure credit from formal financial institutions. This limitation hampers the full potential of agricultural performance.

To address the agricultural financing deficit and enhance food security, the central government took a proactive step in 1977 by establishing the Agricultural Credit Guarantee Scheme Fund (ACGSF). This initiative aimed to incentivize formal financial institutions to increase and sustain lending to the agricultural sector. Acting as a guarantor, the Central Bank of Nigeria (CBN) guarantees 75 percent of bank loans to farmers in the event of default (Ben-Chendo & Henri-Ukoha, 2010). This risk mitigation strategy reduces the exposure for banks and encourages them to expand and maintain agricultural credit.

Since the inception of ACGSF in 1978, the CBN has implemented various reforms, including interest drawback, self-help group linkage banking, and the trust fund model. These measures are designed to perpetuate the momentum of increased bank lending to

the agricultural sector, contributing to sustained support for farmers and rural development (Eyo, Nwaogu & Agenson, 2020).

Nigeria possesses significant potential to fulfill the food and nutritional requirements of its large and rapidly expanding population, generate surpluses for exports, earn foreign exchange for import financing, and contribute to diversifying and expanding the country's revenue base. This potential is rooted in the vast endowment of agricultural resources. However, the actual performance of agriculture in Nigeria is hindered by a combination of economic, political, and social factors, leading to consistently low agricultural output compared to its inherent potential.

Despite the potential, approximately 13 million Nigerians face hunger, with notable disparities between rural and urban areas (Olomola, 2017). Disturbingly, 5 out of 10 children under the age of five suffer from malnutrition in the country (United Nations International Children's Emergency Fund - UNICEF, 2019). The increased reliance on food imports to address local production deficits has resulted in significant foreign exchange leakage in the economy, limiting the funds available for critical input imports essential for strengthening agriculture and sustaining industrialization. According to the National Bureau of Statistics (2020), the value of agricultural imports surged by 59.01 percent in 2020Q2 compared to 2020Q1 and by 68.28 percent compared to 2019Q2. Importantly, when a country imports food crops in which it has a comparative advantage in production, the situation becomes concerning (Oyekale & Ayegbokiki, 2014). This is

evident in some Nigerian food crops, such as tomato paste. Despite being the second-largest producer of tomato paste in Africa in 2016, with an estimated average annual production of 2.3 million tonnes, Nigeria was also the third-largest importer of tomato paste on the continent (PricewaterhouseCoopers - PwC, 2018). In 2016 and 2017, Nigeria imported an estimated USD 360 million worth of tomato paste (PwC, 2018). Furthermore, the rising prices of staple foods pose a heightened risk of hunger, malnutrition, and diminished adult productivity

Despite its underwhelming performance, agriculture remains the primary contributor to Nigeria's non-oil exports. However, its overall contribution to total exports and foreign exchange earnings is subpar, rendering Nigeria's economy heavily dependent on oil and susceptible to fluctuations in global oil prices. The non-oil sectors, on average, contributed 917.81 billion Naira to total exports in 2010-2014 and 1,405.02 billion Naira in 2015-2019, significantly less than the total contribution of oil and gas exports, which stood at 13,204.5 billion Naira and 12,652.31 billion Naira in 2010-2014 and 2015-2019, respectively (CBN, 2020). Agricultural exports witnessed a decline of 38.2 percent in 2020Q2 compared to 2020Q1 but increased by 6.3 percent compared to 2019Q2 (NBS, 2020). The substantial drop in agricultural exports between 2020Q1 and 2020Q2 is partially attributed to the outbreak of the Covid-19 pandemic and the government's lockdown measures to curb its spread.

To tackle the challenge of agricultural productivity growth, successive Nigerian governments have implemented various agricultural financing policies and programs to address farmers' credit needs. The Agricultural Credit Guarantee Scheme Fund is one such initiative. Unfortunately, the scheme has predominantly favored large-scale farming, neglecting smallholders and rural farmers, who constitute the majority of Nigeria's agricultural sector and seldom access credit from formal financial institutions (Awotide et al., 2015). Notably, the increase in the value and number of guaranteed loans has not translated into improved agricultural performance, as food insecurity and low agricultural exports persist as significant issues in the country. According to Eyo et al. (2020), the macroeconomic environment in Nigeria has not been conducive to the value and number of loans, and the performance of guaranteed loans on agricultural output remains unsatisfactory. Urgent and well-informed policy interventions are imperative to address the challenges of low agricultural productivity and output, coupled with Nigeria's large and rapidly growing population, to prevent widespread food inflation, hunger, malnutrition, and reduced productivity.

2.3.2 Agricultural Finance Policies in Nigeria

Since the 1970s, the Nigerian government has been actively working to revitalize the country's agricultural sector, aiming to restore food self-sufficiency. Nigeria's agricultural policy encompasses the government's framework and action plans geared towards achieving comprehensive growth and development in agriculture. These policies seek

self-sustaining growth across all agricultural sub-sectors, instigating structural changes for socio-economic development and enhancing the quality of life for Nigerians. The primary objectives of Nigeria's agricultural financing policies include establishing an effective system of long-term agricultural financing schemes, along with programs and institutions that cater to micro, small, medium, and large-scale producers, processors, and marketers (CBN, 2007).

In response to the declining performance of agriculture in Nigeria, successive government administrations have implemented policies and programs to revive the sector and address credit finance challenges. Given agriculture's pivotal role in nation-building, these policies have evolved over time in response to globalization, technological innovation, and financial crises, shaping Nigeria's financial system's relevance to economic development (Nzotta & Okereke, 2009). Agricultural policies serve as tools for monitoring and evaluating the agricultural development process, fostering self-sustaining growth in all sub-sectors and the necessary structural changes for overall socio-economic development.

The Central Bank's monetary policy mandates that all banks allocate a specified percentage of their loanable funds to the agricultural sector (CBN, 2007). The Nigerian government places special emphasis on agricultural policies, recognizing the benefits of improved performance, foreign earnings, and food provision for the population's sustenance and livelihood. However, some of these policies have faced challenges and

failed, attributed to factors such as conventional banks' reluctance to support small businesses, a lack of effective skill delivery, scarcity of loanable funds, absence of specialized institutions, and the inadequate management capacity of farmers (CBN, 2007). The overarching goal of Nigeria's agricultural policy includes achieving self-sufficiency in basic food commodities where the country has a comparative advantage in local production, increasing agricultural raw material production to meet industrial sector demands, boosting the production and processing of exportable commodities for foreign exchange earnings, and modernizing agricultural production, processing, storage, and distribution.

2.3.2.1 Sectoral Allocation of Credits (1970–1996)

From 1970 to 1996, the Central Bank of Nigeria (CBN) adhered to guidelines aimed at boosting productive sectors and mitigating inflationary pressures through the allocation of credit facilities. Emphasis was placed on supporting the agriculture sector by maintaining low-interest rates to stimulate investment. The government, recognizing the specific needs of each sector, implemented tailored assistance measures to enhance their performance. Despite approximately 75–79% of bank loans being allocated to preferred sectors like agriculture in 1986, 1987, and 1989, there was a notable disparity between policy intentions and actual outcomes. A significant portion of credit ended up with the government, a situation exacerbated by factors such as the absence of collateral,

insufficient bookkeeping by beneficiaries, and government dominance. Consequently, this led to the discontinuation of credit allocation in 1996 (Ikhide, 1996).

2.3.2.2 Nigerian Agricultural Co-operative and Rural Development Bank Ltd

The NACRDB (Nigeria Agricultural Cooperative and Rural Development Bank) stands as a pivotal development finance institution in Nigeria. Operating as a limited liability company, it is wholly owned by the Nigerian government, with 60% of shares held by the Federal Ministry of Finance and the remaining 40% by the Central Bank of Nigeria (CBN). Specializing in agricultural microfinance and agricultural finance markets, the bank focuses on agricultural savings mobilization, credit delivery, instilling banking habits, and contributing to poverty reduction. It plays a crucial role in providing credit to target clients who lack easy access to traditional banking services.

Established in 2000 through the merger of the Nigerian Agricultural and Cooperative Bank (NACB), the Peoples Bank, and the assets of the Family Economic Advancement Programme (FEAP), the NACRDB offers various types of credit, including direct microcredit, on-lending credit, and macrocredit. Given the predominance of small agricultural enterprises in Nigeria, the bank's primary function is to finance agriculture, small, and medium enterprises. The NACRDB engages in both deposit acceptance and providing loans and advances, with interest rates stratified based on the purpose of the loan, as outlined by Anyanwu (2004).

Microfinance services provided by the bank encompass target savings, start-up capital, and smallholder loan schemes. Furthermore, the NACRDB aims to position itself as a gateway for investors entering Nigeria's agricultural sector. The impact of the scheme on Nigeria's agricultural development has been significant, contributing to the country's overall progress in this crucial sector.

2.3.2.3 Rural Banking Programme (1977–1991)

The Rural Banking Programme, in place from 1977 to 1991, mandated commercial banks to open rural branches to stimulate investment. Over 700 rural branches were established, aiming for one in each of Nigeria's 774 local government areas. Despite achieving this goal in 1991, rural areas remained deprived due to a managed economic system promoted by the government during the program's initiation (Uche, 1999).

2.3.2.4 Lending as a Percentage of Savings Mobilized in Rural Areas (1977–1996)

The Agricultural Credit Guarantee Scheme (ACGS), part of the Central Bank of Nigeria's development role, introduced banking to millions in rural areas. Participants saved regularly, serving as collateral for loans. This approach addressed collateral issues, empowered small businesses, encouraged group synergy, and boosted savings mobilization. However, the government halted the program's operations to consolidate it with other existing agricultural financing schemes (Orok-Duke & Edu, 2009).

2.3.2.5 Concessionary Interest Rate (1980–1987)

The Nigerian Central Bank, between 1980 and 1987, addressed rural finance issues by offering low-interest credit to the agriculture sector. A special window was created for banks to provide medium to long-term agricultural loans at favorable rates, promoting economic diversification and expansion. Projects with a five-year repayment period qualified for the concessional interest rate, lower than the stipulated Minimum Rediscounting Rate (MRR). While this initiative boosted agricultural investments, the persistence of endemic poverty remained a challenge, leading to the program's cancellation in 1987.

2.3.2.6 Peoples Bank of Nigeria (1990–2002)

Established to enhance rural financial intermediation and empowerment, the Peoples Bank of Nigeria (PBN) operated from 1990 to 2002. Aimed at alleviating poverty among farmers, rural dwellers, micro-entrepreneurs, and women, it promoted savings and provided credit. However, being supply-driven and heavily reliant on government subsidies, the bank faced challenges in loan recovery and capitalization, with high overheads exceeding earnings (Yunusa, 1998).

2.3.2.7 Community Banks (CBs)/Microfinance Banks (MFBs) (1990 to date)

Community and microfinance banks were introduced to provide financial services, particularly for micro-enterprises and rural economies. In Nigeria, these banks,

originating from existing rotating savings and credit associations (ROSCAs), aim to meet the needs of small-scale entrepreneurs dominating the informal sector. With communal ownership, they bridge the credit gap in the rural economy, focusing on agricultural productivity and poverty reduction. The conversion of many community banks to microfinance banks in 2005 aimed at enhancing wealth creation among the poor and promoting sustainable livelihoods through rural-responsive banking (Anyanwu, 2004).

2.3.2.8 Nigerian Agricultural Insurance Corporation (1996 to date)

Established to address the gap in agricultural insurance, the Nigerian Agricultural Insurance Corporation (NAIC) is backed by the Central Bank of Nigeria. It provides coverage for farmers against natural disasters and other risks in agricultural production. NAIC supports initiatives like the Agricultural Credit Guarantee Scheme, encouraging lending institutions to insure loans made to the agricultural sector. Operating as the only federal government-owned insurance company, NAIC has significantly increased coverage, settlements, and lending to the agricultural sector, earning international recognition through collaborations with organizations like the African Insurance Organization and the United Nations Commission on Trades and Agricultural Development.

2.3.2.9 Family Economic Advancement Programme (1997–2001)

Established to provide credit to cooperative societies and improve the quality of life for rural and urban dwellers engaged in economic activities, the Family Economic

Advancement Programme (FEAP) faced challenges. Despite its goal of raising living standards, it was discontinued in 2001 due to issues of accountability and transparency, with plans to merge it with the Nigerian Agricultural Co-operative and Rural Development Bank Ltd (Osinubi, 2003).

2.3.2.10 Small and Medium Enterprises Equity Investment Scheme (2001–2008)

Administered by the Central Bank of Nigeria, the Small and Medium Enterprises Equity Investment Scheme (SMEEIS) required banks to allocate 10% of their annual gross profit for equity investment in small and medium businesses. Aimed at fostering indigenous entrepreneurship, job creation, and technological development, SMEEIS allowed banks to take equity stakes in viable businesses. In 2008, it was replaced by the Micro Credit Development Fund, where banks contributed 5% of their profit before taxes for microcredit banks (CBN, 2009).

2.3.2.11 Refinancing and Rediscounting Facility (2002 to date)

The Central Bank's Refinancing and Rediscounting Facility (RRF) supports agricultural exports by providing short-term finance at preferential rates through commercial banks. This facility encourages medium and long-term lending to the productive sectors, aiming to diversify and expand the nation's production base and promote growth and development (CBN, 2009).

2.3.2.12 Agricultural Credit Support Scheme (2006 to date)

Collaboration between the Central Bank of Nigeria and the Ministry of Agriculture, the Agricultural Credit Support Scheme (ACSS), provides concessionary funds to participating banks. Designed to accelerate the development of the agricultural sector, the scheme aims to enhance food security, lower food inflation, and reduce credit costs for agricultural production (CBN, 2007).

2.3.2.13 Agricultural Credit Guarantee Scheme (1977 to date):

Established in 1978, the Agricultural Credit Guarantee Scheme (ACGS) aims to encourage banks to lend to those involved in agricultural production. The scheme, with a N3 billion capital base, supports various agricultural activities, including crop cultivation, animal husbandry, and fish farming, by providing credit guarantees to farmers through banks

2.4 Theoretical Review

A theory, as defined by Mugenda and Mugenda (2003), comprises a set of statements or principles designed to elucidate a set of facts or phenomena, often tested and widely accepted, capable of predicting natural occurrences. A theoretical framework, on the other hand, is a compilation of interconnected ideas guiding a research project or a business venture.

2.4.1 Trade-off Theory of Capital Structure

The oldest proposition in this context is the trade-off theory of capital structure, linked to Modigliani and Miller's theory, aiming to establish an optimal capital structure (Chen, 2011). Myers expanded on this theory in 1984, highlighting the importance of finding a balance between tax savings from debt (tax shield) and the potential agency and bankruptcy costs leading to financial distress (Oruc, 2009).

The trade-off theory posits that each capital source has its own cost and return, tied to the firm's earning capacity and the risk of bankruptcy (Awan & Amin, 2014). Farmers, in seeking financing, must consider tenets like bankruptcy costs, emphasizing the significance of the trade-off theory in agricultural financing (Chen, 2011).

The theory underscores the crucial role of cost and return in a farmer's ability to secure credit, suggesting a need for specialized institutions like the Agricultural Financing Corporation (AFC) and agricultural cooperatives to facilitate agricultural financing.

2.4.2 Pecking Order Theory

The pecking order theory explores conflicts between insiders and outsiders within a financial intermediary, focusing on information asymmetry and signaling effects, rather than optimality (Luigi & Sorin, 2009). Myers and Majluf (1984) proposed this theory, assuming a perfect market where debt levels are determined by demand and supply forces, including fund availability (Mostafa & Boregowda, 2014).

A key aspect of the pecking order theory is that firms prefer internal funding first, turning to external financing only when necessary. The theory explains farmers' attitudes toward credit facilities, shedding light on their reliance on them based on fund availability and need.

2.4.3 Financial Intermediary Theory

Financial intermediaries, as per Leland and Pyle (1977), are institutions dealing with information distribution, helping bridge financial gaps by borrowing and lending. Gurley and Shaw (1960) developed this theory in the 1970s, based on information asymmetry, stating discrepancies between lenders and borrowers before (ex ante) and after (ex-post) credit disbursement.

Claus and Grimes (2003) argue that information sharing by financial intermediaries reduces information asymmetry, contributing to the long-term viability of financing institutions. In agriculture, the government often finances the main financial intermediary, such as the Agricultural Finance Corporation (AFC), where the government is the principal and the AFC is the agent. Caution in resource allocation is crucial to ensure fairness, given the public funds involved. The theory emphasizes the need for government policies and regulations to ensure the effectiveness of financial intermediaries in agriculture, supporting activities to boost the country's GDP through monitoring and oversight systems (Parliament) (Diamond & Rayan 2000). The theory

aims to illustrate how agricultural financing impacts productivity, justifying the financing model's existence.

2.5 Empirical Literature

The empirical literature on the impact of agricultural funding on food production in Nigeria has witnessed considerable attention due to the pivotal role agriculture plays in the country's economy, contributing significantly to GDP, employment, and exports. Several studies have explored the relationship between credit accessibility and agricultural performance, particularly in developing nations where agriculture remains a primary source of employment and a key contributor to national output.

For instance, Florence and Nathan (2020) utilized an Autoregressive Distributed Lag Model to assess the influence of commercial bank credit on agricultural growth in Uganda from 2008Q3 to 2018Q4 (ARDL). Their findings indicated a substantial positive impact on agricultural output in the long run, though no immediate effect was observed.

In a similar vein, Islam (2020) employed ARDL to investigate the impact of agricultural credit on agricultural productivity in Bangladesh from 2000 to 2019, revealing significant positive effects in both short and long terms.

Anh, Gan, and Anh (2020) conducted a study on the impact of credit on agricultural performance in Vietnam from 2004Q4 to 2016Q4, utilizing the Indicator Saturation break test, ARDL bounds test, and Toda-Yamamoto Granger causality test. Their findings

demonstrated a significant positive impact of agricultural credit on output in both short and long terms, with a unidirectional causality between credit and agricultural production.

Ogundari, K., & Abdulai, A. (2014) conducted a study on the "Determinants of credit participation and amount of credit among smallholder rice farmers in Nigeria." The findings revealed a positive relationship between credit participation and food production. Farmers with access to credit were able to invest in improved technologies and inputs, leading to increased rice yields.

Adepoju, A., & Salau, S. (2018) explored "Agricultural Credit and Agricultural Productivity in Nigeria: A Cointegration Analysis." The research investigated the long-term relationship between agricultural credit and productivity in Nigeria. The results suggested a significant positive impact of agricultural credit on agricultural productivity. Increased access to credit was associated with higher levels of investment in modern farming techniques, contributing to enhanced food production.

Eboh, E. C., & Okoh, R. N. (2015) delved into "The Impact of Agricultural Credit on Agricultural Productivity in Nigeria: A Cointegration Analysis." This study employed cointegration analysis to examine the relationship between agricultural credit and productivity. The findings indicated a positive impact of credit on agricultural productivity, emphasizing the role of credit in facilitating the adoption of improved agricultural practices, leading to increased food production.

Olayide, O. E., & Heidhues, F. (2004) assessed "Agricultural credit in Nigeria: Does it enhance productivity and efficiency of smallholders?" The study found that access to credit positively influenced the efficiency and productivity of smallholder farmers. Credit was associated with increased investments in technology, inputs, and better farm management practices, resulting in improved food production.

Ojo, S. O., Olagunju, K. O., & Awoyemi, T. T. (2012) conducted a study on the "Impact of Credit on Agricultural Productivity and Rural Poverty in Nigeria." The results indicated a positive correlation between credit access and agricultural productivity, emphasizing the role of credit in poverty alleviation through increased food production.

Ngong, Thaddeus, and Onwumere (2020) explored banking sector development and agricultural productivity in the Central African Economic and Monetary Community (CEMAC) from 1990 to 2018, using the Panel Autoregressive Distributed Lag Model (PARDL) and Vector Error Correction Model (VECM). The study identified a long-term link between banking and agricultural productivity, along with bidirectional causality between the banking sector and agricultural productivity in the CEMAC region.

Several studies have specifically focused on the Nigerian context. Osabohien et al. (2020), using the ARDL model, investigated the impact of access to credit on agricultural performance in Nigeria from 1998 to 2018, finding significant positive short- and long-term effects of the agricultural credit guarantee scheme fund (ACGSF) and commercial bank credit on agricultural performance.

Similarly, Osabohien, Adeleye, and Alwis (2020) evaluated the effect of agro-financing on food production in Nigeria from 1981 to 2018, utilizing Johansen and Canonical cointegration approaches. Their findings highlighted a significant positive impact of agro-financing (via ACGSF) on food production.

Fowowe (2020) utilized a panel dataset from the Generalized Household Survey (GHS) to investigate the effect of financial inclusion on household agricultural productivity in Nigeria. The study found a significant positive impact of financial inclusion on household agricultural productivity.

Using the t test, paired t test, and Granger causality test, Adetiloye (2012) investigated the agricultural credit guarantee scheme fund (ACGSF) for food security in Nigeria from 1978 to 2006. The findings revealed that agricultural credit is significant, but it has not been growing in tandem with the economy.

In a similar vein, Ammani (2012) used the OLS method to investigate the impact of ACGSF on agricultural production in Nigeria from 1981 to 2009. ACGSF has a significant positive impact on crop, livestock, and fishing production, according to the findings. Nigeria is even more food insecure, as food imports are on the rise.

Using a simple linear regression model, Isiorhovoja and Chukwudi (2009) estimated the effect of ACGSF on the output of cash crops in Nigeria from 1981 to 2005. The findings revealed that there is no link between ACGSF and cash crop production.

In summary, empirical studies consistently affirm the positive impact of agricultural funding, particularly credit, on food production in Nigeria, emphasizing the importance of financial support in enhancing agricultural productivity. These findings have implications for policymakers and stakeholders seeking to formulate strategies to boost agricultural performance and food security in the country.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

To assess the impact of agricultural funding on food production in Nigeria, an ex-post facto research design was adopted. This research approach involves the analysis of past events and relies on preexisting data. A well-structured research endeavor is essential to ensure that the chosen overall strategy effectively integrates the different components of the study, addressing the research problem with clarity and precision.

The data for this study were sourced from multiple editions of the Statistical Bulletin of the Central Bank of Nigeria, covering the extensive period from 1990 to 2022 as a result of availability of data. This time frame allows for a comprehensive analysis of the relationship between agricultural funding and food production over several decades, considering various economic and environmental factors that may have influenced the outcomes. The utilization of statistical data from the Central Bank of Nigeria adds a layer of reliability to the research, as it is a reputable source known for its comprehensive and accurate economic information. By focusing on the interplay between agricultural funding and food production, this study aims to provide valuable insights into the dynamics of Nigeria's agricultural sector and its contribution to ensuring food security in the country.

3.2 Theoretical Framework

This study will be grounded in the financial intermediation theory, adapting its principles to explore the impact of agricultural funding on food production in Nigeria. While Gurley and Shaw (1960) originally formulated the financial intermediary theory, its application was extended to the agricultural sector in the context of Nigeria.

Financial intermediation theory, rooted in the concept of information asymmetry, posits that disparities exist between lenders and borrowers both before (ex-ante) and after the credit facility is disbursed (ex-post). In the context of agricultural funding, this theory suggests that there are information gaps between financial institutions providing funding and the agricultural stakeholders utilizing these funds. Drawing on the insights of Leland and Pyle (1977), who define financial intermediaries as institutions dealing with the distribution of information, we consider agricultural funding agencies as intermediaries in the agricultural sector. These agencies play a crucial role in bridging financial gaps by facilitating the flow of funds from investors or lenders to farmers and other stakeholders in the agricultural value chain.

In the Nigerian context, where agriculture is a key economic driver, understanding the impact of agricultural funding on food production is essential for sustainable economic development. Agricultural funding serves as a catalyst for investment in modern farming practices, technology, and infrastructure, ultimately influencing the overall productivity of the agricultural sector

3.3 Model Specification

In this study, regression analysis will be used to examine the relationship between agro financing and food production in Nigeria. The multiple linear regression analysis model which would be used is given as follows;

FP= (ACGS, DMB, FGAA, AM) ……..…….. (1)

This model is further transformed into an econometric model as equation (2)

$\ln FP = \alpha + \beta_1 \ln ACGS + \beta_2 \ln DMB + \beta_3 \ln FGAA + \beta_4 \ln AM + \varepsilon_{it}$

…….…… (2)

Linearizing the econometric model through natural logarithm transformation enhances interpretability, meets statistical assumptions, stabilizes variance, addresses skewness, and reduces heteroscedasticity, improving the reliability and efficiency of the model estimates.

Where:

α= constant represent value of FP when all others explanatory variables are held constant

β_1 - β_4=Coefficient of the explanatory variables ε_{it}= error term of bank i at time t

FP represents Food Production

ACGS represents Agricultural credit Guarantee Scheme

DMB represents Deposit money banks' loan to agricultural sector

FGAA= Federal governments annual agriculture expenditure

AM = Agricultural machinery

3.4 Measurement and Operationalization of Variables

The process of operationalization involves the researcher's definition of how a concept is measured, observed, or manipulated in a specific study. This transformation converts theoretical and conceptual variables into a set of specific research questions.

VARIABLES	VARIABLE TYPE	MEASUREMENT	APRIORI
Food Production	Dependent Variable	Food production is quantified using the food production index (2004–2006 = 100).	-
Agricultural Credit Guarantee Scheme	Independent Variable	The annual aggregate of Agricultural Credit Guarantee Scheme (ACGS) is used as the measure.	+

Deposit Money Banks' Loan to Agricultural Sector	Independent Variable	The annual aggregate of credit provided by deposit money banks to the agricultural sector is the measurement.	+
Federal Government's Annual Agriculture Expenditure	Independent Variable	The annual aggregate of the federal government's expenditure on agriculture serves as the measure.	+
Agricultural Machinery	Independent Variable	The presence of agricultural machinery, including tractors, is considered.	+

In this table, the dependent variable is Food Production, and the independent variables include Agricultural Credit Guarantee Scheme, Deposit Money Banks' Loan to

Agricultural Sector, Federal Government's Annual Agriculture Expenditure, and Agricultural Machinery. The measurement of each variable is explicitly defined, ensuring clarity and consistency in the study's operationalization process. The "APRIORI" column indicates a priori expectations regarding the direction of the relationship between each independent variable and food production. The plus sign (+) denotes a positive expected impact

3.5 Techniques of Data Analysis

The study will adopt the ordinary least square method of data analysis. This techniques will be used in the study to determine the impact of agro financing on food production in Nigeria. After conducting the necessary tests; unit root test, cointegration tests, the data will be analyzed using Eviews 10.0, and the results will be used to test the study's hypotheses.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND DISCUSSION

4.1 Introduction

This chapter presents the research findings in line with the empirical model suggested in chapter four above. It further estimates the overall significance of the model and the significance of the individual variables. The research findings are discussed as follows

4.2 Descriptive Statistics

Descriptive statistics are summarized statistical coefficients that describes or explains a given data set, which can be either a representation of the entire or a sample of a population. Descriptive statistics are broken down into measures of central tendency, measures of variability (spread) and sometimes measures of normality. These measures help to provide some basic and useful information about the variables in question the measures employed here includes, the mean, median, maximum, minimum, standard deviation, skewness, kurtosis, and the Jarque-Bera statistic.

The Mean measures the average of a given set of data observations or series. The median captures the middle value of a series of observation. The maximum is simply the data point that holds the highest value in the series. The standard deviation is a measure of spread or dispersion or variability from the mean. Skewness is a measure of symmetry or asymmetry of a given series. If series is symmetric, it means that is equally distributed

to the left and to the right. However, if a series is asymmetric, it connotes that it has a longer tail to the left (negatively skewed) or it has a longer tail to the left (positively skewed). Kurtosis is a measure of the peakedness or flatness of a given series or data distribution. A kurtosis coefficient of 3 implies that the series has a mesokurtic distribution, while a kurtosis coefficient greater than 3 implies that the series has a Leptokurtic distribution (highly peaked), and a kurtosis coefficient less than 3 implies a platykurtic distribution (flattened).

Table 4.1a: Descriptive Statistics

	ACGS	AM	DMS	FGAA	FP
Mean	4089201	24489.48	0.712727	28.2834	78.26212
Median	4087448	23999	0.72	22.4352	80.06
Maximum	12456251	36200	1.27	79.2	107.45
Minimum	79107.4	13900	0.24	0.2087	39.9
Std. Dev.	3917170	7043.433	0.258992	26.30043	20.58377
Skewness	0.515327	0.140513	0.312485	0.592659	-0.09299
Kurtosis	1.937066	1.722986	2.831369	2.070613	1.889095
Jarque-Bera	3.014105	2.350894	0.576158	3.119516	1.744461
Probability	0.221562	0.308681	0.749702	0.210187	0.418018

Sum	1.35E+08	808153	23.52	933.352	2582.65
Sum Sq. Dev.	4.91E+14	1.59E+09	2.146455	22134.81	13558.13
Observations	33	33	33	33	33

Source: Authors computation using e views 10

The descriptive statistics presented in Table 4.1a offer valuable insights into the variables examined over the 33-period study. Notably, the mean values across this timeframe reveal the average levels of each variable: Agricultural Credit Guarantee Scheme (ACGS) at 4,089,201 thousand naira, Agricultural Machinery (AM) at 24,489.48 thousand naira, Deposit Money Banks' Loan to Agricultural Sector (DMS) at 0.712727, Federal Government's Annual Agriculture Expenditure (FGAA) at 28.2834 billion naira, and Food Production (FP) at 78.26212.

Examining the median values provides further understanding, indicating the middle points of the distributions. These values are observed as follows: ACGS at 4,087,448 thousand naira, AM at 23,999 thousand naira, DMS at 0.72, FGAA at 22.4352 billion naira, and FP at 80.06.

When considering the maximum values recorded during the study period, notable peaks are evident: ACGS at 12,456,251 thousand naira, AM at 36,200 thousand naira, DMS at 1.27, FGAA at 79.2 billion naira, and FP at 107.45.

In contrast, the minimum values observed offer insights into the lower bounds of the variables: ACGS at 79,107.4 thousand naira, AM at 13,900 thousand naira, DMS at 0.24, FGAA at 0.2087 billion naira, and FP at 39.9.

Furthermore, the standard deviation values provide an indication of the dispersion of data points around the mean. These values are as follows: ACGS at 3,917,170 thousand naira, AM at 7,043.433 thousand naira, DMS at 0.258992, FGAA at 26.30043 billion naira, and FP at 20.58377.

Analyzing skewness reveals the asymmetry of the distributions, with ACGS, AM, and FGAA positively skewed, while DMS and FP exhibit negative skewness.

Moreover, the kurtosis coefficients signify the tailedness of the distributions. While ACGS, AM, and FGAA exhibit leptokurtic distributions with heavy tails, DMS and FP display less extreme distributions, suggesting thinner tails.

Lastly, the Jarque-Bera statistic assesses the normality of the distributions. While all variables show significant departures from normality, ACGS, DMS, and FP exhibit relatively more normal distributions compared to AM and FGAA.

4.3 Correlation Analysis

Correlation is a statistical measure or coefficient which indicates the direction and magnitude of the relationship existing between two or more variables of interest. The analysis of Correlation is an important statistical toot that measures magnitude and

direction of the relationship between two or more variables. Correlation analysis is a useful tool for pre-test analysis, however it does not show causality. The correlation among the relevant variables used in this research work is given in the table 4.2 below

Table 4.2: Correlation Matrix

	FP	AM	DMS	FGAA	ACGS
FP	1				
AM	0.976519	1			
DMS	0.189006	0.249567	1		
FGAA	0.835376	0.861156	0.362745	1	
ACGS	0.673652	0.69537	-0.37973	0.486828	1

Source: Author's computation using E views 10

The correlation matrix in Table 4.2 provides insights into the relationships between the variables examined, with food production (FP) being the dependent variable. Here's the interpretation:

There is a strong positive correlation of approximately 0.976 between food production (FP) and agricultural machinery (AM). This indicates a close relationship between the two variables, suggesting that increases in agricultural machinery may lead to higher levels of food production.

The correlation between food production (FP) and deposit money banks' loan to the agricultural sector (DMS) is relatively low, at approximately 0.189. This suggests a weak positive relationship between the two variables, implying that changes in DMS may have limited impact on food production.

There is a strong positive correlation of about 0.835 between food production (FP) and Federal Government's annual agriculture expenditure (FGAA). This indicates a significant relationship, suggesting that higher levels of government expenditure on agriculture are associated with increased food production.

Food production (FP) is moderately positively correlated with Agricultural Credit Guarantee Scheme (ACGS), with a correlation coefficient of around 0.674. This suggests a moderate relationship between the two variables, indicating that ACGS may have some influence on food production.

Overall, the correlation matrix highlights strong positive relationships between food production and agricultural machinery (AM) as well as Federal Government's annual agriculture expenditure (FGAA). These findings suggest that investments in agricultural machinery and government expenditure on agriculture are likely to positively impact food production.

4.3.1 Unit Root Test

In order to carry out the co-integration test, it is necessary to first ascertain the stationarity of the variables. Therefore, this study employs the use of the Augmented Dickey Fuller test to check for the stationarity of the variables employed in the model. In carrying out a unit root test, the order of integration is important as it helps in determining long run relationships among variables. Therefore, the null hypothesis that the variable has a unit root is tested and if the absolute values of the test statistics are greater than the critical values, the null hypothesis is rejected. This implies that the variable is stationary. If the absolute values of the test statistics are however less than the critical value, we fail to reject the null hypothesis. This implies the presence of a unit root and it shows that the variable is non-stationary. The unit root tests as well as the order of integration of the variables at level, are shown in the table below.

Table 4.3.1: Unit Root Test result

	LEVEL		FIRST DIFFERENCE			
VARIABLES	ADF TEST STATISTIC	ADF CRIT. VAL. 5%	ADF TEST STATISTIC	ADF CRIT. VAL. 5%	ORDER OF INTEGRATION	REMARK
lnACGS	-1.433156	-2.957110	-5.114961	-2.960411	I(1)	Stationary

lnAM	-3.500023	-2.957110	-	-	I(0)	Stationary
lnDMS	-1.960108	-2.957110	-7.980660	-2.960411	I(1)	Stationary
lnFGM	-2.084023	-2.957110	-5.924189	-2.998019	I(1)	Stationary
lnFP	-2.266155	-2.957110	-3.126329	-2.971853	I(1)	Stationary

Source: Author's computation using E views 10

All variables except lnAM are found to be integrated of order 1 (I(1)) in their original form, meaning they require differencing to achieve stationarity. After taking the first difference, all variables become stationary and suitable for further analysis.

4.3.2 Co-integration Test

Having performed the unit root tests, the next test to be carried out is the co-integration test which tests if the two or more non-stationary time series are stationary over time and move in the same direction in the long run. It can therefore be seen as the statistical implication of the existence of a long run relationship between economic variables. This test make use of two statistics for the decision rule. These are the Trace statistic and the Max-Eigen Value. For the first, if the Trace statistic is greater than the critical value at the given level of significance it implies that the variables are co-integrated. However, if the Trace statistic is less than the critical value at the given level of significance, we conclude that the variables are not co-integrated. The same decision rule applies when comparing the Max-Eigen value with the critical values.

Table 4.3b Johansen co-integration test (Trace)

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.771265	96.65376	69.81889	0.0001
At most 1 *	0.598143	50.92280	47.85613	0.0250
At most 2	0.335249	22.66139	29.79707	0.2631
At most 3	0.210939	10.00277	15.49471	0.2805
At most 4	0.082184	2.658516	3.841466	0.1030

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Source: Author's computation using eviews 10

The Trace test indicates the presence of 2 co-integrating equations at the 0.05 significance level, as the null hypotheses for "None" and "At most 1" are rejected. This suggests that there are two long-run relationships among the variables being examined, indicating a stable equilibrium relationship over time.

Maximum Eigenvalue

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.771265	45.73096	33.87687	0.0013
At most 1 *	0.598143	28.26142	27.58434	0.0409
At most 2	0.335249	12.65862	21.13162	0.4841
At most 3	0.210939	7.344250	14.26460	0.4493
At most 4	0.082184	2.658516	3.841466	0.1030

Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Source: Author's computation using E views 10

The Max-Eigenvalue test indicates the presence of 2 co-integrating equations at the 0.05 significance level, as the null hypotheses for "None" and "At most 1" are rejected. This further supports the finding from the Trace test, indicating two long-run relationships among the variables being examined.

4.4 Regression Analysis

The Ordinary Least Square regression analysis is conducted to ascertain the relationship (direction and magnitude) between each independent variables and the dependent

variable of the study. The regression output as retrieved from the Eviews version 10 statistical app is presented in Table 4.6 below.

Table 4.4: OLS Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-3.5393	1.319239	-2.68283	0.0121
LNAM	0.78885	0.158934	4.963365	0.0003
LNDMS	-0.03466	0.046219	-0.74996	0.4595
LNFGAA	0.038678	0.014365	2.692543	0.0118
LNACGS	-0.01304	0.023595	-3.55273	0.0048
R-squared	0.926902	Mean dependent var		4.323441
Adjusted R-squared	0.862174	S.D. dependent var		0.281882
S.E. of regression	0.054823	Akaike info criterion		-2.83068
Sum squared resid	0.084156	Schwarz criterion		-2.60394
Log likelihood	51.70627	Hannan-Quinn criter.		-2.75439
F-statistic	204.4931	Durbin-Watson stat		1.986623
Prob(F-statistic)	0.0234			

Source: Author's computation using Eviews 10.

The OLS results in Table 4.4 provide insights into the relationship between food production (FP) and various independent variables, including Agricultural Credit Guarantee Scheme (ACGS), Deposit Money Banks' Loan to Agricultural Sector (DMS), Federal Government's Annual Agriculture Expenditure (FGAA), and Agricultural Machinery (AM).

The constant term represents the intercept of the regression equation. With all independent variables held constant, the estimated coefficient of -3.5393 suggests that food production (FP) would decrease by approximately 3.5393 units. This coefficient is statistically significant at the 1% level ($p = 0.0121$), indicating its importance in the model.

The coefficient of LNAM (0.78885) implies that a one-unit increase in the logarithm of agricultural machinery is associated with an increase of approximately 0.78885 units in food production (FP). This coefficient is statistically significant at the 0.01% level ($p = 0.0003$), supporting the expectation that the presence of agricultural machinery positively influences food production.

The coefficient of LNDMS (-0.03466) suggests that a one-unit increase in the logarithm of deposit money banks' loan to the agricultural sector is associated with a decrease of approximately 0.03466 units in food production (FP). However, this coefficient is statistically insignificant at the conventional levels ($p = 0.4595$), indicating uncertainty in its impact on food production.

The coefficient of LNFGAA (0.038678) implies that a one-unit increase in the logarithm of federal government's annual agriculture expenditure corresponds to an increase of approximately 0.038678 units in food production (FP). This coefficient is statistically significant at the 1% level (p = 0.0118), aligning with the expectation that higher government expenditure on agriculture positively influences food production.

The coefficient of LNACGS (-0.01304) suggests that a one-unit increase in the logarithm of agricultural credit guarantee scheme is associated with a decrease of approximately 0.01304 units in food production (FP). This coefficient is statistically significant at the 0.5% level (p = 0.0048), indicating its impact on food production.

Regarding the model fit, the R-squared value of 0.926902 indicates that approximately 92.69% of the variability in food production (FP) is explained by the variability in the explanatory variables. The adjusted R-squared value of 0.862174 suggests that 86.22% of the variability in food production (FP) is accurately captured by the model, considering the number of independent variables and the sample size. The F-statistic of 204.4931 is statistically significant at the 1% level (p = 0.0234), indicating that the model as a whole is statistically acceptable. The Durbin-Watson statistic of 1.986623 suggests the absence of autocorrelation in the model's residuals, enhancing the reliability of the regression results.

4.5 Diagnostic Tests

Table 4.5 Presentation of diagnostic tests

Variable	Model coefficients
Breusch-Pagan-Godfrey Prob	0.1447
Breusch-Godfrey Serial Correlation LM Test:	0.1052
Jarque-Bera Prob.	0.3129
Ramsey Reset Test	0.4035

Source: Author's computation using Eviews 10.

The diagnostic tests presented in Table 4.5 aim to evaluate various aspects of the regression model, ensuring its reliability and validity.

The Breusch-Pagan-Godfrey Test assesses the presence of heteroscedasticity in the model's residuals. With a probability of 0.1447 associated with the test statistic, there is no significant evidence to reject the null hypothesis of homoscedasticity. Thus, the model's residuals do not exhibit significant heteroscedasticity.

Similarly, the Breusch-Godfrey Serial Correlation LM Test examines the presence of serial correlation (autocorrelation) in the residuals. The associated probability with the test statistic is 0.1052. Since this p-value exceeds 0.05, there is no significant evidence to

reject the null hypothesis of no serial correlation. Hence, the model's residuals do not exhibit significant autocorrelation.

The Jarque-Bera Test evaluates the normality of the residuals' distribution. With a probability of 0.3129 associated with the test statistic, there is no significant evidence to reject the null hypothesis of normality. Therefore, the residuals' distribution is not significantly different from a normal distribution.

Lastly, the Ramsey Reset Test checks for the correct functional form of the model. The probability associated with the test statistic is 0.4035. Since this p-value exceeds 0.05, there is no significant evidence to reject the null hypothesis. Thus, the functional form of the model is appropriate, indicating no specification error.

Overall, based on the results of these diagnostic tests, the regression model appears to be well-specified, with no significant issues such as heteroscedasticity, serial correlation, non-normality, or specification errors in the residuals.

4.6 Test of Hypothesis

I. H01: Agricultural credit guarantee scheme does not have an effect on food production in Nigeria.

To investigate this hypothesis, the relationship between Agricultural Credit Guarantee Scheme (ACGS) and food production in Nigeria was examined. The null hypothesis (Ho) posited that there is no relationship between ACGS and food production, while the

alternative hypothesis (Ha) suggested otherwise. The OLS regression yielded a coefficient of -0.01304 for LNACGS, with a t-statistic of -3.55273 and a probability (Prob.) of 0.0048.

The probability associated with the t-statistic being less than the significance level of 0.05 led to the rejection of the null hypothesis. This indicates that there is evidence to suggest that Agricultural Credit Guarantee Scheme has a significant effect on food production in Nigeria.

II. H02: Deposit money banks' loan does not have an effect on food production in Nigeria.

This test examined the relationship between Deposit Money Banks' Loan (DMS) and food production in Nigeria. The null hypothesis (Ho) stated that there is no relationship between DMS and food production, while the alternative hypothesis (Ha) suggested otherwise. The OLS regression yielded a coefficient of -0.03466 for LNDMS, with a t-statistic of -0.74996 and a probability (Prob.) of 0.4595.

The probability associated with the t-statistic being greater than the significance level of 0.05 led to the failure to reject the null hypothesis. This indicates that there is insufficient evidence to suggest that Deposit Money Banks' Loan has a significant effect on food production in Nigeria.

III. H03: Federal governments' annual agriculture expenditure does not have an effect on food production in Nigeria.

In this test, the relationship between Federal Government's Annual Agriculture Expenditure (FGAA) and food production in Nigeria was explored. The null hypothesis (Ho) suggested that there is no relationship between FGAA and food production, while the alternative hypothesis (Ha) suggested otherwise. The OLS regression yielded a coefficient of 0.038678 for LNFGAA, with a t-statistic of 2.692543 and a probability (Prob.) of 0.0118

The probability associated with the t-statistic being less than the significance level of 0.05 led to the rejection of the null hypothesis. This indicates that there is evidence to suggest that Federal Government's Annual Agriculture Expenditure has a significant effect on food production in Nigeria.

IV. H04: Agricultural machinery does not have an effect on food production in Nigeria.

This test investigated the relationship between Agricultural Machinery (AM) and food production in Nigeria. The null hypothesis (Ho) stated that there is no relationship between AM and food production, while the alternative hypothesis (Ha) suggested otherwise. The OLS regression yielded a coefficient of 0.78885 for LNAM, with a t-statistic of 4.963365 and a probability (Prob.) of 0.0003.

The probability associated with the t-statistic being less than the significance level of 0.05 led to the rejection of the null hypothesis. This indicates that there is evidence to suggest that Agricultural Machinery has a significant effect on food production in Nigeria.

In summary, the tests conducted using the OLS results provide insights into the effects of Agricultural Credit Guarantee Scheme, Deposit Money Banks' Loan, Federal Government's Annual Agriculture Expenditure, and Agricultural Machinery on food production in Nigeria.

4.7 Discussion of Findings

The investigation into the impact of agricultural funding on food production in Nigeria spanning from 1990 to 2022 sheds light on the relationship between various factors and food production outcomes. This analysis centered on key variables such as agricultural machinery (AM), deposit money banks' loan to the agricultural sector (DMS), federal government's annual agriculture expenditure (FGAA), and agricultural credit guarantee scheme (ACGS).

The results of the Ordinary Least Squares (OLS) regression provide insights into the influence of these factors on food production (FP) in Nigeria during the specified period.

Firstly, the coefficient of LNAM (0.78885) indicates that a one-unit increase in the logarithm of agricultural machinery is associated with an increase of approximately 0.78885 units in food production. This finding is statistically significant at the 0.01%

level (p = 0.0003), supporting the expectation that the presence of agricultural machinery positively influences food production. The significance of this coefficient underscores the importance of mechanization in enhancing agricultural productivity and consequently food production in Nigeria.

In contrast, the coefficient of LNDMS (-0.03466) suggests that a one-unit increase in the logarithm of deposit money banks' loan to the agricultural sector is associated with a decrease of approximately 0.03466 units in food production. However, this coefficient is statistically insignificant at conventional levels (p = 0.4595), indicating uncertainty in its impact on food production. This unexpected result highlights the need for further investigation into the relationship between bank loans to the agricultural sector and food production outcomes in Nigeria.

Moreover, the coefficient of LNFGAA (0.038678) implies that a one-unit increase in the logarithm of federal government's annual agriculture expenditure corresponds to an increase of approximately 0.038678 units in food production. This coefficient is statistically significant at the 1% level (p = 0.0118), aligning with the expectation that higher government expenditure on agriculture positively influences food production. The significance of this finding underscores the pivotal role of government investment in agriculture in fostering food security and agricultural development in Nigeria.

Lastly, the coefficient of LNACGS (-0.01304) suggests that a one-unit increase in the logarithm of agricultural credit guarantee scheme is associated with a decrease of

approximately 0.01304 units in food production. This coefficient is statistically significant at the 0.5% level ($p = 0.0048$), indicating its impact on food production. The unexpected negative relationship between agricultural credit guarantee scheme and food production warrants further exploration to understand the mechanisms through which it affects agricultural outcomes in Nigeria.

In summary, the findings from the OLS regression analysis provide valuable insights into the relationship between agricultural funding and food production in Nigeria, highlighting the significance of agricultural machinery, government expenditure, and agricultural credit schemes in shaping food production outcomes. However, the inconclusive findings regarding bank loans to the agricultural sector suggest the need for more nuanced investigation into the dynamics of agricultural finance and its implications for food security in Nigeria.

4.8 Policy Implications

The analysis of the impact of agricultural funding on food production in Nigeria yields critical policy implications that can guide decision-making and interventions aimed at improving agricultural productivity and food security in the country.

Given the significant positive relationship between agricultural machinery and food production, policymakers should prioritize initiatives aimed at promoting mechanization in the agricultural sector. This may involve implementing subsidy programs to make modern agricultural equipment more affordable for smallholder farmers, as well as

providing training and technical support to facilitate the adoption of mechanized farming practices.

The findings underscore the importance of increased government expenditure on agriculture in stimulating food production. Policymakers should allocate adequate resources to support agricultural development programs, including investment in infrastructure, research and development, extension services, and farmer education. Additionally, targeted subsidies and incentives can be provided to farmers to enhance productivity and encourage investment in agriculture.

Despite the unexpected negative relationship observed with agricultural credit guarantee schemes, policymakers should focus on improving access to credit for farmers. This could involve the establishment of more efficient and transparent credit delivery mechanisms, as well as the development of risk-sharing instruments to mitigate lending risks. Strengthening the capacity of financial institutions to lend to the agricultural sector and promoting alternative financing mechanisms, such as agricultural cooperatives and microfinance institutions, can also help address the financing needs of farmers.

To address key challenges facing the agricultural sector, policymakers should prioritize investment in research and innovation. This includes supporting agricultural research institutions and fostering collaboration between researchers, farmers, and industry stakeholders. Research efforts should focus on developing sustainable agricultural

practices, improving crop varieties, and harnessing innovative technologies to enhance productivity, resilience, and sustainability in the agricultural sector.

Policymakers should implement policies that promote the development of agricultural value chains and facilitate market access for farmers. This may involve investing in infrastructure to improve transportation and storage facilities, as well as strengthening market linkages between farmers and buyers. Initiatives to reduce post-harvest losses, such as the provision of storage facilities and market information systems, can also help farmers realize better prices for their produce and incentivize increased production.

CHAPTER FIVE

SUMMARY OF FINDINGS, RECOMMENDATIONS AND CONCLUSION

5.4 Summary of Findings

The analysis of the impact of agricultural funding on food production in Nigeria from 1990 to 2022 revealed significant insights into the relationship between various factors and food production outcomes.

- The presence of agricultural machinery was found to have a substantial positive influence on food production. A one-unit increase in the logarithm of agricultural machinery was associated with a significant increase in food production, as indicated by the statistically significant coefficient ($p = 0.0003$).
- The relationship between bank loans to the agricultural sector and food production was inconclusive. While the coefficient suggested a negative association, indicating a potential decrease in food production with increased bank loans, the result was statistically insignificant ($p = 0.4595$). Further investigation is warranted to understand the dynamics of this relationship.
- Higher government expenditure on agriculture was found to positively influence food production. The coefficient for federal government's annual agriculture expenditure was statistically significant ($p = 0.0118$), indicating that increased government investment in agriculture leads to higher food production levels.

- The presence of an agricultural credit guarantee scheme was found to have a significant but negative impact on food production. A one-unit increase in the logarithm of agricultural credit guarantee scheme corresponded to a decrease in food production, as indicated by the statistically significant coefficient ($p = 0.0048$). Further exploration is necessary to understand the mechanisms underlying this unexpected relationship.

5.5 Policy Recommendations

Based on the discussion of findings regarding the impact of agricultural funding on food production in Nigeria, several policy recommendations can be proposed to enhance agricultural productivity and ensure food security in the country:

- **Investment in Agricultural Machinery:** Given the significant positive relationship between agricultural machinery and food production, policymakers should prioritize investments in modern agricultural equipment and technologies. This includes subsidizing the acquisition of machinery such as tractors, harvesters, and irrigation systems to improve efficiency and productivity in farming practices.
- **Enhanced Government Expenditure:** The findings highlight the positive impact of federal government's annual agriculture expenditure on food production. Therefore, policymakers should allocate adequate resources towards agricultural development initiatives, including infrastructure development,

research and development, extension services, and farmer support programs. Additionally, efforts should be made to ensure efficient and transparent utilization of allocated funds to maximize their impact on food production.

- **Revamping Agricultural Credit Schemes**: While the study indicates a negative relationship between agricultural credit guarantee schemes and food production, policymakers should review and reform existing credit schemes to address the identified challenges. This may involve enhancing accessibility, reducing interest rates, providing financial literacy and capacity building programs for farmers, and ensuring timely disbursement of funds to facilitate agricultural activities.
- **Promotion of Sustainable Agricultural Practices:** Policymakers should encourage the adoption of sustainable agricultural practices that promote environmental conservation, soil health, and resilience to climate change. This includes promoting organic farming, agroforestry, conservation agriculture, and the use of environmentally-friendly inputs to mitigate the adverse effects of agricultural activities on ecosystems and natural resources.
- **Support for Smallholder Farmers:** Given the significant role of smallholder farmers in food production, policymakers should implement targeted policies and programs to support their livelihoods and enhance their productivity. This may include providing access to credit, improving market access through the development of agricultural value chains, investing in rural infrastructure, and facilitating knowledge transfer and capacity building initiatives.

5.6 Conclusion

The analysis of agricultural funding's impact on food production in Nigeria from 1990 to 2022 revealed nuanced relationships between various factors and food production outcomes. Agricultural machinery emerged as a crucial driver of food production, with significant positive relationships observed. Higher government expenditure on agriculture also positively influenced food production levels. However, the impact of agricultural credit guarantee schemes presented unexpected findings, necessitating further investigation. Policy recommendations include prioritizing investments in agricultural machinery, increasing government expenditure on agriculture, and revamping agricultural credit schemes. These measures aim to enhance agricultural productivity and ensure food security. Overall, addressing these challenges and implementing targeted policy interventions can strengthen Nigeria's agricultural sector, improve food production levels, and contribute to sustainable economic development and food security in the country.

References

Adetiloye, K. A. (2012). Agricultural financing in Nigeria: An assessment of the agricultural credit guarantee scheme fund (ACGSF) for food security in Nigeria (1978 – 2006). *Journal of economics, 3*(1), 39 – 48.

Adetiloye, K. A. (2012) *Agricultural Financing in Nigeria: An Assessment of the Agricultural Credit Guarantee Scheme Fund (ACGSF) For Food Security in Nigeria (1978-2006). Journal of Economics,* 39-48.

Africa Development Bank (2015). Empowering African Women: An Agenda for Action. Côte d'Ivoire: African Development Bank Group. Retrieved June 4, 2016 from www.afdb.org/.../afdb/.../African_Gender_Equality_Index_2015-EN.pdf

Agarwal, B. (1985). Women and technological change in agriculture: Asian and African experience. In I. Ahmed (Ed.), *Technological and Rural Women: Conceptual and empirical issues* (pp. 67-114). London: George Allen and Unwin.

Akanji, B. O. (2002). *Globalization, Poverty and Food Security: Some Conceptual Linkages.* Proceedings of an International Conference of Poverty and Food Security ECOWAS Secretariat, Abuja, October, 2002.

Akanji, O.A. (2001). Microfinance as a Strategy for Poverty Reduction. *CBN Economic and Financial Review, 1*(4), 55-78.

Akinriola, O. O. & Okunola, A. M. (2017). Performance analysis of Nigerian agricultural credit guarantee scheme: Bounds test approach to cointegration. Journal of Development and Agricultural Economics, 12(2), 75 – 83.

Akudugu, M. A. (2016). Agricultural productivity, credit and farm nexus in Africa: A case study of Ghana. *Agricultural Finance Review, 76*(2), 288 – 308.

Ammani, A. A. (2012). An Investigation into the Relationship between Agricultural Production and Formal Credit Supply in Nigeria. *International Journal of Agriculture and Forestry 2(*1), 46-52.

Ammani, A. A. (2012). An investigation into the relationship between agricultural production and formal credit supply in Nigeria. *International Journal of Agriculture and Forestry, 2*(1), 46 – 52.

Anh, N. T., Gan, C., & Anh, D. L. T (2020). Does credit boost agricultural performance? Evidence from Vietnam. *International Journal of Social Economics.* Retrieved from 10.1108/IJSE-04-2020-0238.

Anyanwu, C. N. (1992). *Community Development: The Nigerian Perspective.* Ibadan: Gabesther Educational Publishers.

Anyanwu, C.M. (2004). *Microfinance Institutions in Nigeria.* Paper Presented at the Gs4 Workshop on "Constraints to Growth in Sub – Saharan Africa, Pretoria, South Africa, Nov. 29th – 30th.

Author: Murray, W. G. (1953). *Agricultural finance; principles and practice of farm credit.* Ames, Iowa State College Press.

Awan, A. G., & Amin, M. S. (2014). Determinants of capital Structure. *European Journal of Accounting Auditing and Finance Research*, *2*(9), 22-41.

Awotide, B. A., Abdoulaye, T., Alene, A., & Manyong, V. M. (2015, August). *Impact of access to credit on agricultural productivity: Evidence from smallholder cassava farmers in Nigeria.* Paper presented at the International Conference of Agricultural Economists (ICAE), Milan, Italy.

Awotide, B. A., Abdoulaye, T., Alene, A., & Manyong, V. M. (2015, August*). Impact of access to credit on agricultural productivity: Evidence from smallholder cassava farmers in Nigeria.* Paper presented at the International Conference of Agricultural Economists (ICAE), Milan, Italy.

Bahsi, N., & Ceti, E. (2020). Determining agricultural credit impact on agricultural production value in Turkey. *Ciencia Rural*, *50*(11), 1 – 13.

Bob, U. (2004). Rural women and technology in South Africa: Case studies from KwaZulu-Natal Province. *GeoJournal*, *61*(3), 291–300.

Central Bank of Nigeria. (2020). Annual Statistical Bulletin. Abuja, Nigeria. Retrieved from https://www.cbn.gov.ng/documents/statbulletin.asp.

Central Bank of Nigerian (2005; 2006; 2007; 2008). Statistic Bulletin. 16, 17, 18 and 19, December Central Bank of Nigeria. Statistical Bulletin. 2014; 25. Available:http://statistics.cbn.gov.ng/cbn- onlinestats.

Chen, L. J., & Chen, S. Y. (2011). How the Pecking Order Theory Explain Capital Structure. *Journal of International Management Studies*, *6*(3), 92-100.

Claus, I., & Smith, C. (1999). Financial intermediation and the monetary transmission mechanism. *Reserve Bank of New Zealand Bulletin*, *62*(1), 4-6.

Diamond, D.W. (1984) Financial Intermediation and Delegated Monitoring. *Review of Economic Studies, 51*(1), 393-414.

Dowler, E. (2003). Food and Poverty in Britain: Rights and Responsibilities. In E. Dowler & C. J. Finer (Eds.), *The Welfare of Food: rights and responsibilities in a changing world* (pp. 140-159). Oxford: Blackwell Publishing.

Eckbo, B.E. (1986). Valuation effects of corporate debt offerings. *Journal of Financial Economics, 15* (1-2), 119-152.

Eyo, E. O., Nwaogu, M. A., & Agenson, M. E. (2020). Agricultural credit guarantee in Nigeria and the uncertainties of the macroeconomic environment. *International Journal of Economics and Financial Issues, 10*(20), 20 – 29.

Fakoya, E. O., Apantaku, S. O. & Adereti, F. O. (2006). Gender Involvement in Arable Crop Cultivation and its Contributions to Household Food Security in Ogun State, Nigeria. *Journal of Social Sciences 1*(1), 1-4.

Food and Agricultural Organisation. (2020). Nigeria at glance. Retrieved from http://www.fao.org/nigeria/fao-in-nigeria/nigeria-at-a-glance/en/.

Food and Agricultural Organization of the United Nations (2011). The state of food and agriculture 2010–11. Women in agriculture: closing the gender gap for development. Rome (also available at: www.fao.org/publications/sofa2010 - 11/en/. Accessed December 2021.

Fowowe, B. (2020). The effects of financial inclusion on agricultural productivity in Nigeria. *Journal of Economics and Development, 22*(1), 61 – 79.

Green, R. A. (2013). Agriculture is the future of Nigeria. Retrieved from https://www.forbes.com/sites/skollworldforum/2013/08/08/agriculture-is-the-future-ofnigeria/#59bb344c6d96.

Gurley, J.G., & Shaw, E.S. (1960). *Money in Theory of Finance.* Brookings, Washington DC.

Hendriks, S. L., & Maunder, E. M. W. (2006). *Reflecting on the FIVIMS.ZA pilot and food insecurity and vulnerability: Modelling approaches to advise on future directions.* Paper prepared for the World Food Programme. Pietermaritzburg: African Centre for Food Security.

Hendriks, S.L. (2005). The challenges facing empirical estimation of food (in) security in South Africa. *Development Southern Africa, 22*(1), 1-21.

Hillebrand, W., Messner, D., & Meyer-Stamer, J. (1994). *Strengthening technological capability in developing countries: Lessons from German Technical Co-operation.* Working Paper 12, German Development Institute.

Hodges, R. J., Buzby, J. C., & Bennett, B. (2011). Postharvest losses and waste in developed and less developed countries: Opportunities to Improve Resource Use. *Journal of Agricultural Science, 14*(9), 37–45.

Ikhide, S.I. (1996). Bank offices and the mobilisation of private savings. Evidence from selected African countries. *Journal of Development Studies, 33*(1), 117–132.

Imonikebe, B. U. (2010a). Constraints to Rural Women Farmers' Involvement in Food Production in Nigeria. *African Research Review, 4*(3b,) 281-288.

Imonikebe, B. U. (2010b). Constraints to Food Security in Nigeria and Implications. *An International Multi-Disciplinary Journal, Ethiopia, 4* (4), 136-143.

Iqbal, M., Ahmad, M., Abbas, k., & Mustafa, K. (2004). The impact of institutional credit on agricultural production in Pakistan. *The Pakistan Development Review, 42*(4), 469 – 485.

Isiorhovoja, R. A., & Chukwuji, C. O. (2009). Effects of the operations of the agricultural credit guarantee scheme fund on cash crops. *International Journal of Rural Studies, 16*(1), 1 – 7.

Islam, M. M. (2020). Agricultural Credit and Agricultural Productivity in Bangladesh: An Econometric Approach. *International Journal of Food and Agricultural Economics (IJFAEC), 8*(3), 247-255.

Leland, H., & Pyle, H. (1977). Informational Asymmetries, Financial Structure, and Financial Intermediation. *Journal of Finance, 32*(2), 371-387.

Mugenda, A. (2003). *Research methods Quantitative and qualitative approaches by Mugenda. Nairobi, Kenya*.

Ogbuabor, J. E. and Nwosu, C. A. 2017. The Impact of Deposit Money Bank's Agricultural Credit on Agricultural Productivity in Nigeria: Evidence from an Error Correction Model. *International Journal of Economics and Financial Issues, 7* (2), 513–517.

Ojo, C.O, Bila, Y & Iheanacho. (2015). Women's Accessibility to Resources of Agricultural Productivity in Borno State, Nigeria. *Journal of Economics and Sustainable Development, 6*(5), Retrieved July 4, 2016 from http://www.iiste.org/journals/index.php/JEDS/article/viewfile/20705/21627.

Okafor, C. A. (2020). Commercial banks credit and agricultural development in Nigeria. *International Journal of Business & Law Research, 8*(3), 89 – 99.

Osabohien, R., Afolabi, A., & Godwin, A. (2018). An econometric analysis of food security and agricultural credit facilities in Nigeria. *The Open Agriculture Journal, 12*(1), 227 – 239.

Osabohien, R., Mordi, A. & Ogundipe, A. (2020). Access to credit and agricultural sector performance in Nigeria. *African Journal of Science, Technology, Innovation and Development,* 1 – 10.

Osabohien, R., Osuagwu, E., Osabuohien, E., Ekhator-Mobayode, U. E., Matthew, O. & Gershon, O. (2020). Household access to agricultural credit and agricultural production in Nigeria: A propensity score matching model. *South African Journal of Economic and Management Studies, 23*(1), 26-88.

Vaughan, I. O., Afolami, C. A., Oyekale, T. O. & Ayegbokiki, A. O. (2014). An analysis of Nigeria imports and bills. *International Journal of Economics, Commerce, and Management, 2*(9), 1–14.

Weis, T. (2007). *The global food economy: The Battle for the Future of Farming.* Canada, Zed books.

Yusuf, H.O., Ishaiah, P., Yusuf, O., Yusuf, H.A., & Shuaibu, H. (2015). The Role of Informal Credit on Agriculture: An Assessment of Small Scale Maize Farmers Utilization of credit in Jema`a Local Government Area of Kaduna State, Nigeria. *American Journal of Experimental Agriculture, 5*(1), 36-43.

Zakaree, S.S. (2014). Impact of Agricultural Credit Guarantee Scheme Fund (ACGSF) on Domestic Food Supply in Nigeria. *British Journal of Economics, Management and Trade, 48*(8), 1273 – 1284.

Appendix

Research Data

year	FP	ACGS	DMS	FGAA	AM
1990	39.9	98,494.50	0.73	0.26	13,900.00
1991	44.73	79,107.40	0.75	0.21	14,450.00
1992	48.06	91,953.10	0.81	0.46	15,000.00
1993	51.04	80,845.80	0.83	1.80	15,550.00
1994	52.91	104,463.00	0.85	1.18	16,100.00
1995	54.85	164,133.10	0.87	1.51	16650
1996	57.39	225,519.50	0.83	1.59	17200
1997	59.73	242,028.30	0.67	2.06	17750
1998	63.25	219,144.20	0.68	2.89	18300
1999	66.08	241,839.00	0.66	59.32	18850
2000	66.61	361,449.00	0.61	6.34	19400
2001	66.41	728,545.40	0.81	7.06	20006
2002	69.86	1,050,982.30	0.77	9.99	21000
2003	72.87	1,151,015.00	0.63	7.54	22000
2004	77.71	2,083,744.70	0.59	11.26	23000
2005	82.05	9,366,392.90	0.33	16.33	23000

2006	87.33	4,195,099.68	0.27	17.92	23999
2007	81.38	4,087,447.94	0.72	32.48	24800
2008	86.64	6,497,958.93	0.44	65.40	25601
2009	76.27	8,328,565.78	0.55	22.44	26402
2010	86.02	7,840,496.63	0.24	28.22	27203
2011	80.06	10,028,988.81	0.41	41.20	28004
2012	87.85	9,332,484.23	0.44	33.30	28805
2013	85.3	9,256,676.80	0.43	39.43	29606
2014	96.51	12,456,250.87	0.54	36.70	30407
2015	98.85	10,857,380.83	0.65	41.27	31208
2016	104.64	7,858,643.35	0.76	36.58	32009
2017	105.79	5,849,388.73	0.87	50.26	32810
2018	105.2	4,377,626.29	0.98	53.99	33611
2019	106.58	4,068,332.47	1.09	70.27	34412
2020	106.31	4,321,663.85	1.2	76.6	35213
2021	107.02	4,532,654.23	1.24	78.3	35707
2022	107.45	4,764,323	1.27	79.2	36200

Source: CBN Statistical Bulletin 2022, WDI 2022, NBS2022

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	2.805033	Prob. F(4,28)	0.1447

Obs*R-squared	9.440670	Prob. Chi-Square(4)	0.1210
Scaled explained SS	7.579067	Prob. Chi-Square(4)	0.1083

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 04/25/24 Time: 15:32
Sample: 1990 2022
Included observations: 33

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.014326	0.084064	0.170413	0.8659
LNAM	-0.003079	0.010128	-0.303993	0.7634
LNDMS	-0.002866	0.002945	-0.973085	0.3388
LNFGAA	-0.000789	0.000915	-0.861522	0.3963
LNACGS	0.001403	0.001503	0.932933	0.3588

R-squared	0.286081	Mean dependent var	0.002550
Adjusted R-squared	0.184092	S.D. dependent var	0.003868
S.E. of regression	0.003493	Akaike info criterion	-8.337143
Sum squared resid	0.000342	Schwarz criterion	-8.110399
Log likelihood	142.5629	Hannan-Quinn criter.	-8.260850
F-statistic	2.805033	Durbin-Watson stat	2.625909
Prob(F-statistic)	0.044720		

Breusch-Godfrey Serial Correlation LM Test:

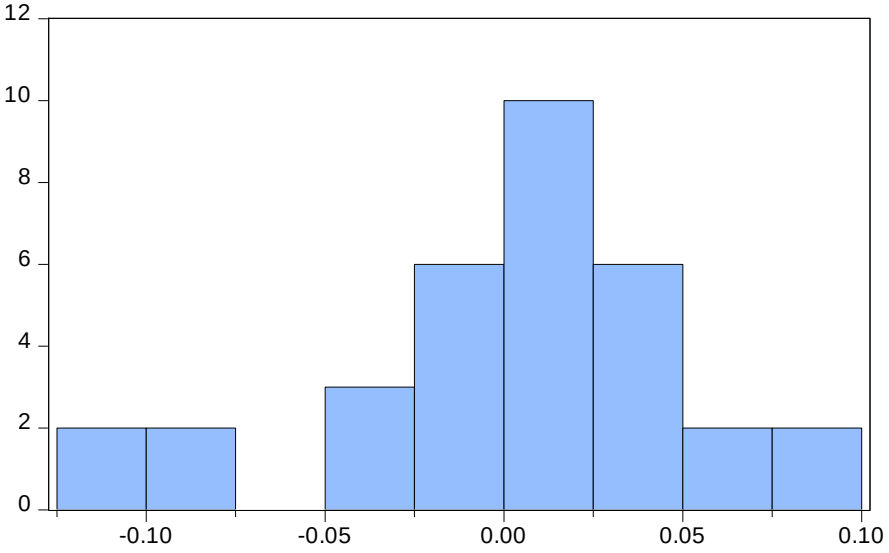
F-statistic	6.496025	Prob. F(2,26)	0.1052
Obs*R-squared	10.99551	Prob. Chi-Square(2)	0.0941

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 04/25/24 Time: 15:33
Sample: 1990 2022
Included observations: 33
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.512160	1.221009	-1.238451	0.2266
LNAM	0.166910	0.145959	1.143539	0.2632

LNDMS	-0.037285	0.041818	-0.891595	0.3808
LNFGAA	-0.022225	0.013674	-1.625382	0.1161
LNACGS	-0.009063	0.020716	-0.437464	0.6654
RESID(-1)	0.435780	0.196277	2.220231	0.0353
RESID(-2)	0.340024	0.184029	1.847669	0.0761

R-squared	0.333197	Mean dependent var	4.23E-15
Adjusted R-squared	0.179320	S.D. dependent var	0.051282
S.E. of regression	0.046457	Akaike info criterion	-3.114732
Sum squared resid	0.056115	Schwarz criterion	-2.797291
Log likelihood	58.39308	Hannan-Quinn criter.	-3.007923
F-statistic	2.165342	Durbin-Watson stat	1.365703
Prob(F-statistic)	0.079516		



Series: Residuals
Sample 1990 2022
Observations 33

Mean	4.23e-15
Median	0.008894
Maximum	0.094708
Minimum	-0.120313
Std. Dev.	0.051282
Skewness	-0.639749
Kurtosis	3.230256
Jarque-Bera	2.323932
Probability	0.312870

Ramsey RESET Test
Equation: UNTITLED
Specification: LNFP C LNAM LNDMS LNFGAA LNACGS
Omitted Variables: Squares of fitted values

Value	df	Probability

t-statistic	3.198916	27	0.4035
F-statistic	10.23306	(1, 27)	0.3335
Likelihood ratio	10.60489	1	0.2011

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	0.023129	1	0.023129
Restricted SSR	0.084156	28	0.003006
Unrestricted SSR	0.061027	27	0.002260

LR test summary:

	Value
Restricted LogL	51.70627
Unrestricted LogL	57.00872

Unrestricted Test Equation:
Dependent Variable: LNFP
Method: Least Squares
Date: 04/25/24 Time: 15:34
Sample: 1990 2022
Included observations: 33

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-38.95099	11.12886	-3.499997	0.0016
LNAM	5.644053	1.524010	3.703422	0.0010
LNDMS	-0.225233	0.071801	-3.136884	0.0041
LNFGAA	0.224901	0.059532	3.777796	0.0008
LNACGS	-0.109763	0.036508	-3.006524	0.0057
FITTED^2	-0.671972	0.210063	-3.198916	0.0035

R-squared	0.975999	Mean dependent var	4.323441
Adjusted R-squared	0.971554	S.D. dependent var	0.281882
S.E. of regression	0.047542	Akaike info criterion	-3.091437
Sum squared resid	0.061027	Schwarz criterion	-2.819345
Log likelihood	57.00872	Hannan-Quinn criter.	-2.999887
F-statistic	219.5867	Durbin-Watson stat	1.283818
Prob(F-statistic)	0.000000		