Essays on Agricultural Finance, Financial Development, and Economic Growth in Nigeria

By

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Doctoral thesis submitted in fulfilment of the requirements for the award of Doctor of Philosophy

The Graduate School of Business Administration

University of the Witwatersrand

Supervisor: Dr George Tweneboah

LIST OF PUBLICATIONS AND RESEARCH OUTPUTS

Prior to submission, portions of the thesis and other related areas have been published in peer reviewed journals and working papers while others are under review.

Peer reviewed journal publications

(i) **Ayodele E. Ademola,** Babatunde Afolabi, and George Tweneboah (2023) Financial Development and Economic Growth: Nigeria and Ghana Experience, *FUOYE Journal of Contemporary Humanities and Social Sciences: Vol. 1, Issue 2. Quarterly Publications of Tertiary Education Trust fund (Tetfund).*

(ii) Tweneboah, G., **Ayodele E. Ademola**, Afolabi, B., Babatunde, D.A., Akinsanmi, F.J.S., & Emmanuel, A.O. (2021). Impact of Financial Intermediaries on Economic Growth. *Academy of Accounting and Financial Studies Journal, 25*(S4), Pp.1-10.

Papers under review

(i) Ayodele, A.E., and Tweneboah, G., Agricultural Finance-Economic Growth Nexus in Nigeria: A Dynamic Relationship

(ii) Ayodele, A.E., and Tweneboah, G., The Links Between Financial Development Indexes on Agricultural Output and Economic Growth in Nigeria

(iii) Ayodele, A.E., and Tweneboah, G., Agricultural Finance, Financial Development, and Inclusive Growth: Role of Threshold and Interaction Effect

Conference Presentations

1. **Ayodele E. Ademola,** Babatunde Afolabi, and George Tweneboah (2023) Financial Development and Economic Growth: Nigeria and Ghana Experience, ***6th International Conference on Advanced Research in Business, Management and Economics.*** At Anglo-American University, Letenska 120/5, 118 00 Prague 1, Czech Republic.

Abstract

This study examines essays on agricultural finance, financial development and growth in Nigeria. It focuses on investigating the individual and joint effects of agriculture finance and financial development indicators on growth. Also, the research computed the threshold of agricultural finance at which financial development indicators optimizes inclusive growth in Nigeria. To achieve these research objectives, we adopted both the Endogenous growth and Solow-Swan theoretical foundation; and employed the Autoregressive Distributed Lag (ARDL) and Quantile Autoregressive Distributed Lag (QARDL) techniques. The study utilized time series data from the Central Bank of Nigeria (CBN) Statistical Bulletin and World Bank World Development Indicators (WDI) covering 1980 to 2022. The results reveals that agriculture finance exerted significant negative impact on economic growth in the short-run; however, the long-run impact of agriculture finance on economic growth is positive. Also, it was observed from that financial development indicators (bank deposit, credit to private sector and market capitalization) have positive impact on economic growth. Although, bank deposits exerted negative impact on agricultural output growth, credit to private sector and market capitalization impacted positively on agricultural output growth. Furthermore, it was observed from the QARDL results that positive links exist between agriculture finance, financial development indicators and inclusive growth in the short-run. Also, the interactive effects of agriculture finance and financial development indicators on inclusive growth were positive in the short and long-run periods. Lastly, the threshold effects of agricultural finance suggest an optimal level that maximizes inclusive growth, indicating policymakers should consider an 11% to 14% allocation of GDP per employed person to the agricultural sector. Therefore, the study recommends as key access to agricultural credit, as well as ensuring proper monitoring to boost growth in Nigeria. Importantly, credit to the agricultural sector should be kept within the established threshold level, since agricultural finance might exert some adverse effects on inclusive growth when it exceeds the established threshold levels.

Keywords: Agricultural Finance, Financial Development, Economic Growth, Autoregressive Distributed Lag (ARDL), Quantile Autoregressive Distributed Lag (QARDL), Nigeria

JEL Classification: Q14, G10, O4, C22.

DECLARATION

I, **Ademola Emmanuel Ayodele** with student number 2290643, hereby declare that this research report is my own work except as shown in the references and acknowledgements. It is submitted in fulfilment of the requirements for the award of Doctor of Philosophy in Finance at the University of the Witwatersrand, Johannesburg, South Africa. It has not been submitted before for any degree or examination in this or any other university.

Ademola Emmanuel Ayodele

Signed at…**WBS**……On the ……**12th**…….. day of ……**January**…… 2024

DEDICATION

Late Ass. Prof. Adebola Dorcas Babatunde

ACKNOWLEDGEMENTS

As they say, the beginning of a journey is not usually smooth, but that does not impede the intended destination. I am very grateful to the Almighty God for guiding and seeing me through my PhD journey; to God alone be all the glory (**Acts. 12 vs. 23**)! Indeed, *"It takes a village to raise a child" is a well-known proverb, but "It takes the world to raise a scholar", and I strongly believe that completing my PhD is a monumental achievement. I find it hard to believe that I have reached this milestone; seriously, this can only be by the mercy of God. I raise a toast to everyone who has been a part of this incredible journey with me.*

First and foremost, I thank my supervisor, Dr George Tweneboah. Your exceptional academic expertise, coupled with your commitment to supporting early career researchers like me, truly makes you a role model in the often-competitive realm of academia. Your moral, financial, and academic support with undiluted understanding makes me know that following your mentorship offers joy and immense benefits to me going forward. I owe it a duty to sincerely appreciate my adopted Mummy, the late Dr. Mrs. Adebola Dorcas Babatunde, and my Daddy, Daniel Babatunde, for your immeasurable support since the beginning of this program, and I will forever be grateful to you, Daddy and Mummy.

Hmm! I have never seen anyone who believes so much in me and my future as Mummy Okeke's family, and I forever acknowledge the undiluted fatherly support of Late Pastor Okeke – your family is a blessing to me till Jesus comes. *"*Mummy Ori e akanke**" (**I LOVE YOU). I am indebted to Prof. I. Fasanya (Wits, CLM) for his review, correction, support, and, more importantly, his time and dedication toward the success of this thesis. Prof., your name cannot be forgotten in the history of this research because of your immeasurable contribution.

I extend my sincere gratitude to my parent Daddy and Mummy, Oluwadare Lawrence and Sherifat Atinuke Ayodele, and Mr. Adebowale Adewale, whose support in my life has been phenomenal. Prof. and Mrs. A.A. Awe also played important roles in my educational ladder – you inspire me. I cannot repay you, but may the Almighty bless you all. On this score, I thank all my siblings, Mrs. Iyabo Adebowale, Mrs. Bunmi Adejumo, Pastor Mrs. Olubukola Ayeni, Mr. Yinka Akinola, Mr. Abiodun Ayodele, Adedotun Adesina, Adedoyin Adesina, Abisola Alake Adesina, and Okiki Ayodele, and all my niece and nephews, I sincerely appreciate you all for the belief you have in me that I can do it by the grace and mercy of God upon me. God bless you all!

My appreciation also goes to Prof. Kayode Soremekun, the former Vice-Chancellor (FUOYE), from whom I got this program funding privileged under his administration, and Prof. Cecilia Akintayo of the former Director of Academic Planning (DAP, FUOYE). I have also received diverse support from some special people whom I acknowledge: Prof. P.O Oladele, Prof. Yakibi Ayodele, Prof. and Mrs. Afolabi Babatunde, and Ass. Prof. Adedokun – thanks so much for your constant encouragement – the late Dr. Olufemi Adeyeye, the late Prof. Adams Alawiye Adewale, Mrs. Kehinde Daramola, Dr. Jide Fadaka, Mr. Muyiwa (FUOYE, TETFUND desk officer), Prof. Amazoma, and all academic and non-academic staff in the Department of Finance, and senior colleagues, not excluding my peers within the Faculty of Management Sciences – I am deeply grateful for the support you have given me since I started this PhD journey.

I especially appreciate my lecturers, senior colleagues, and colleagues at the Department of Finance, Afe Babalola University, Ado-Ekiti, and Ekiti State University, Ekiti State. Engaging in stimulating academic exchanges with all of you while maintaining a personal connection has been truly enriching. Thank you so much!

I am grateful to my lecturers at the Wits Business School (WBS), Prof. Paul Imhotep Alagidede (my academic grandpa, WBS), and Prof. Odei Mensah (WBS). Similarly, I extend my sincere gratitude to Dr. Totowa (WBS). Many thanks also go to Mrs. Mmabatho Leeuw (PhD Program Coordinator, WBS), Mrs. Jennifer S. Mgolodela (Senior Faculty Officer, WBS), and Veli Mongwe (WBS), and Keabetswe Rihlamvu (WBS, ICT) for their administrative support. I also thank the following people for their various roles and peer-to-peer support: Senyo Cudjo (PhD Candidate, WBS), George Iroha (PhD Candidate, WBS), Dr. Silvester Senyo (Postdoctoral fellow, WBS), Samuel Temaugee (PhD Candidate, Dept. of Physics, Wits), Dr. Ntsoaki Mokala (Lecturer, Wits School of Education), Dr. Mrs. Yemi Oniya's family (Postdoctoral fellow, UJ), Atinuke Alao, and the numerous friends and family members have also been helpful. You are all wonderful to me!

To my friends scattered around the world, thank you for your thoughts, well-wishes/prayers, phone calls, e-mails, texts, visits, editing advice, and being there whenever I needed a friend: Kolawole Asanre (UK), Sola Akomolafe (UK), Wale Aluko (UK), Tobi (UK), Bolade Awosusi (UK), Pastor Banjo Adedeji's family (UK), Akindele Olawale (USA), Dayo Alhassan and family (USA), Pastor Oluwaseun Olurominiyi (Dominica Republic), Pastor and Mrs. Oseni's family (SA), Pastor and Decn. Ilori's family (Nigeria), Dr. Uhmmu Bakare (Canada), Bode Olowofela (Canada), Pastor Olarewaju's family (Canada), Adebowale Debo (Nigeria), Pelumi

(Belgium), and my friend for life, Francia Philemond, your support is immeasurable. Thanks, dear!

Yes! It was tough, but I eventually had to sacrifice part of my marital life to focus on my studies. Given this, I want to especially thank my children who paid a supreme price during this battle period both in marriage and career, Oluwademilade Hadassah and Adedamola Mishael Ayodele you mean more than the world to me. I love you with everything in me, and I will forever appreciate the price you paid. Ngiyabonga nkosazane yami!

Finally, I appreciate all the funding privileges that I enjoyed. First and foremost, the Tertiary Education Trust Fund (TETFUND, Nigeria) through the Federal Government of Nigeria under the leadership of Former President Muhammud Buhari, and the ES, Mr. Gbenga, and Ajia Sadaatu (all TETFUND). Indeed, our nation has made me who I am today; God bless the Federal Republic of Nigeria. Also, I acknowledge funding benefits through my supervisor, such as the Postgraduate Merit Award (Wits), Bradlow (WBS), and CAPSI (WBS), toward the successful completion of this research. To all those I have inadvertently left out who are worth mentioning, I say mpag-ya (thank you). The usual caveats apply.

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CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

In emerging nations, agriculture is the cornerstone of economic expansion, progress, and the fight against poverty. Economic prosperity has also been attributed to agriculture as the catalyst and solution. As Gunner Myrdal (1984) once said, the agriculture sector will make or break the fight for sustained economic growth. Economists and development experts disagree on how this route results in economic progress, nevertheless. Agriculture has been the backbone of the Nigerian economy for the past few decades. The industry is said to have been the backbone of the economy in the early 1960s. It is said to be the main force for development and growth. To emphasize the industry's critical position in the Nigerian economy, the agricultural sector is included in the Millennium Development Goals program, which aims to reduce poverty in Nigeria. The agricultural sector continues to be the major employer in the majority of developing nations (low- and middle-income countries), providing food, employment opportunities, inputs, raw materials for other industries, foreign earnings from exporting surpluses, and—most importantly—the significant benefit of value added in the various production processes (Izuchukwu, 2011).

Following the discovery of oil in the 1970s, the agriculture sector's productivity and contribution to real GDP declined. Between 1970 and 1980, the agricultural sector's GDP share rose from 29.2% to 33.3%, according to empirical data. Aigbokhan (2001) found that before the oil boom in the 1950s and 1960s, the agricultural sector contributed over 63% and 54% of RGDP, respectively as cited by Kamil et al., (2017).

Besides, some researchers (Gardner, 2005; Chebbi, 2010) have raised a lot of questions regarding the impact of agricultural sector on economic growth. Ahungwa et al., (2014). In recent decades, the potential contribution of agriculture as one of the drivers of economic growth has been a subject of much controversy among development economists. While some contend that agricultural development is a pre-condition for industrialization, others strongly disagree and argue for a different path. However, the role of agricultural sector in bringing about economic growth and sustainable development of a nation cannot be underestimated. Okolo (2004) described agricultural sector as the most important sector of the Nigeria's

economy which holds a lot of potentials for the future economic development of the nation as it had done in the past.

Economic growth is a fundamental precondition for achieving sustainable development through a steady-appreciable increase in the output of goods and services over time. It can be spurred by strengthening the economy's essential sectors, mainly the agricultural and industrial sectors, as highlighted in the Lewis two-sector growth model (Lewis, 1954; Angaha & Atong, 2020). Nigeria, like other developing economies, is predominantly primary sector driven, with over 36 percent of the labor force in the agricultural sector. Agriculture is, therefore, an important primary sector of the country's economy and the core of its rural economy, where around 90 percent of the rural workforce is directly and indirectly engaged in subsistence agricultural activities. Despite this, the agriculture sector's contribution to gross domestic product (GDP) is dwindling steadily, with a share of this sector to GDP at about 14 percent (Oyaniran, 2020; Central Bank of Nigeria, 2021).

According to Zakaria et al., (2019), economic theories have identified several factors that affect output expansion (specifically agricultural and industrial growth and productivity), namely, skilled human capital, technology and innovation, environment, terms of trade, widespread subsistence farming, risks, and uncertainties. Another important factor is finance, which can be separated into agricultural financing and financial development. Also, the Sustainable Development Goals 2 and 8 United Nations Development Program (UNDP, 2015) highlighted ensuring food security and growth through agricultural production as one of the important goals.

Generally, financial development is the ability of the financial system to provide easy access and affordable credits to the private sector (Oyetayo et al., 2021). It alleviates the financing constraints by raising national savings, bank credits, and investment activities in the economy's productive sectors (Ahadu, 2019). Thus, financial development strengthens the availability of agricultural credits by providing support to the government's numerous agricultural programs, which allows farmers to invest and adopt new inventions and acquire inputs (seeds, fertilizers, and agrochemicals) and training that enhances farming households' livelihoods through improved agricultural productivity, and, in turn, spur GDP (Shahbaz et al., 2013). More significantly, agricultural finance is essential on a short-, medium-, and long-term basis to fulfill the financial needs of farmers based on their preferred farming activities. However, the availability of credit to the private sector is not only weak, but the government agricultural

programs targeted to support Nigerian farmers have yielded little because of the huge fiscal deficits since the series of global recessions and the outbreak of the COVID-19 pandemic.

Besides the challenges posed by finance, the issues arising from risks and uncertainties in the agricultural production process cannot be overemphasized. They prevail in acquiring seedlings and young livestock for cultivation and brooding, respectively. Other factors that introduce risk and uncertainties are government's weak monetary and fiscal policies, which result in unstable macroeconomic variables and turbulent monetary instruments. Furthermore, Sertoglul et al., (2017) argued that the agriculture sector is particularly dependent upon the conditions of the natural environment. Hence, it is exposed to a wide spectrum of risks, especially those with climatic or natural background. This issue of production risk is so massive that it has been considered by the World Bank, which focused on drawing up strategies for countries, namely preliminary risk assessment, source identification, and appropriate measures (Sulaimon, 2021). Though these factors directly affect the agricultural sector, their ripple effects on economic growth are indirect.

The relationship between finance and growth, as well as other fundamental and conditioning variables, are explicitly and implicitly explained by extant economic theories (Eschenbach, 2004). The supply-leading hypothesis view of financial development states that efficient financial markets enhance the supply of financial services in advance of the demand for them in the real sector of the economy. Therefore, functional financial systems can stimulate overall economic efficiency, develop and expand liquidity, mobilize savings, enhance capital accumulation, and transfer resources from traditional to growth-inducing sectors, including agriculture (Acquah-Sam & Salami, 2014). In addition, the Endogenous Growth theory models the importance of finance in mobilizing entrepreneurship and innovation for economic growth through research and development. The proponents of the Endogenous theory, namely Romer (1986) and Lucas (1988) in Oguwuike (2018), argued that the required finance drawn from both the private and public sectors is directed mainly to agriculture and manufacturing.

Because it encourages entrepreneurship, self-sufficiency, and wealth creation among Nigeria's throngs of young people, agriculture has been viewed as the cornerstone of the country's economic prosperity (Angaha & Atong, 2020). The two industries in consideration are the commercial modern industrial sector and the subsistence agricultural sector, which has zero marginal labour productivity. The five stages of economic growth were defined by Rostow in

1960 and included traditional society, start-up requirements, maturation, and the high mass consumption era.

Every nation's growth and development are largely dependent on its agricultural sector. It is essential to the production of goods and services for both domestic and foreign markets, employing a sizable percentage of the labour force and assisting the nation in raising its output level. In particular, as of 2017, agriculture contributed roughly 32% of the GDP of each country and 14% of the agricultural GDP in Africa. It provides a living for over two-thirds of Nigeria's expanding population and employs 62% of its labour force, forming the foundation of the nation's agribusiness (Central Bank Nigeria, 2022).

Agricultural financing channels can be separated into government funding, funds from financial institutions, and development partners' funding. For instance, the Nigerian government has inaugurated agricultural programs over time to increase the flow of finance to this sector. Some of these programs include regional agricultural programs (1960-1966), The Green Revolution Program (1979-1983), and more recently, the Anchor Borrowers' Program (2015-2022), the Commercial Agricultural Credit Scheme (CACS), and the Nigerian Incentive-Based Risk Sharing Scheme for Agricultural Lending (NIRSAL) (Zuberu et al., 2019). However, the need to synergize financial development with agriculture finance cross these programs were lacking therefore creating disconnect and inefficiency in the flow of funds from the government and private sector to through agriculture sector. Also, neglected is the need to calculate the threshold level at which the funds channeled towards agriculture would be effective (Ogbuagu et al., 2022).

Thus, the agriculture sector faces many challenges, so developing it is not easy. This is because farmers face various risks, creating uncertainties in their income (Orji et al., 2021). For instance, there are production, environmental, and technological risks, risks from government policies, and, more importantly, financial risks. The availability of finance for agriculture and its value chains remain meager as a ratio of GDP, culminating in lesser contributions to Nigeria's GDP. This situation continues to worsen despite being the country's highest employer of labor. More so, the sector remains underdeveloped, with farmers using crude tools and remaining in the subsistence form, unlike advanced countries where agriculture is mechanized, engages fewer workforce, and contributes more to GDP.

In addition, empirical literature shows conflicting evidence. While Levine et al., (2000) and Mtar and Belazreg (2021) support a positive relationship between financial development and

growth, Alabi (2014) found a negative relationship between financial development and growth. Similarly, Obansa and Madueke (2013) and Sebastian et al., (2018) reveal a positive relationship between agricultural finance and growth, while Uzomba et al., (2020) find a negative relationship between agricultural finance and growth. This study is novel because it determined the individual and joint effects of agricultural finance and financial development on economic growth, computed the threshold of agricultural finance, which financial development is required to optimize economic growth, and modeled the asymmetric effect of agricultural finance on economic growth in Nigeria.

1.2 Motivation

The main motivation for this study rests on the argument that there is a dearth of related literature, especially in dissecting the interrelationship between agricultural finance, financial development, and economic growth (Schumpeter, 1934; Levine, 2021). This claim is obvious in African literature and more conspicuous when narrowed down to pieces of evidence from Nigeria. This tacit observation in the stock of literature was an important influencer toward embarking on the current study.

Statistics show that from 1981 to 2021, the agricultural sector witnessed an injection of 229.59 billion naira from government programs, as highlighted by the Central Bank of Nigeria (CBN, 2021). However, the country still witnesses huge human and animal feed shortages, termed "food insecurity". This trend resulted in massive importation of foodstuffs (namely rice, wheat, fish, and meat, especially chicken and turkeys), which gulped 308.58 billion naira, approximately 0.18 percent of GDP, in 2021 (CBN, 2021). Thus, another important motivation for this study was to examine whether fund flows from private credits can complement the available public credits channeled to agriculture. Also, the key is the urgency to compute the agricultural finance threshold at which private sector credits drive economic growth to the optimal point since this might provide policy guidelines to curb gaps in domestic food supply and sectoral contributions to economic growth in Nigeria.

Another compelling reason for conducting this research was to examine the specific contributions of agricultural finance and financial development to economic and inclusive growth in Nigeria. The interplay between agricultural financing and financial development on economic growth was examined in detail. For instance, if the joint effects are positive or

negative, agricultural finance and financial development will be complementary or substitutes, respectively.

Lastly, the agricultural sector employs the highest amount of labor factor at over 60%, thus making it the greatest employer of labor and the second major contributor to Nigeria's GDP (Olaoye et al., 2022). It cannot be argued that the agricultural sector is very viable with great potential. In addition, past authors have focused on the finance-growth nexus like, (Obansa & Maduekwu, 2013) and agricultural finance-growth relations. Within the Nigerian literature, there is a gap in analyzing the tripartite relationships between agricultural finance, financial development, and economic growth.

1.3 Statement of the Problem

The demand for sustainable financial resources, products and services in the agriculture sector falls short of the supply, and it has trapped most farmers within the small-scale category characterized with weak productivity. Hitherto, the Nigerian government has inaugurated pockets of programs including; Agricultural Credit Guarantee Scheme Fund (ACGSF), Small and Medium Enterprises Equity Investment Scheme (SMEEIS), Bank of Agriculture and Microfinance Banks especially for unbanked (Odili, 2022). Besides the above, there are series of social intervention or safety net programs aimed at enhancing farmers' access to funds. They are chronologically listed as: Operation Feed the Nation (OFN), Green Revolution (GR), Directorate for Food, Roads, and Rural Infrastructure (DFRRI), Directorate of Employment, Better life Programme for Rural Women, National Economic Empowerment and Development Strategy (NEEDS), National Poverty Eradication Programme (NAPEP) to mention but a few Afolabi et al., (2022). Despite these lofty programs, the contributions of agriculture to GDP and output growth in Nigeria has continued to decline steadily.

Agricultural credits are critical for the purchase of farm inputs, machineries and to cover other farm operating costs. However, small scale farmers rarely have access to loans and other financial facilities from financial institutions (Mbelu & Ifionu, 2022). This is because financial institutions and governments find it too risky to provide these credits through conventional processes, as most of the farmers lack adequate collateral and other requirements for credits and loan advancements. Therefore, due to the arguments provided above, credit and savings gap especially for small scale farmers continue to widen. Despite the amount of capital that exist, as well as numerous efforts by both private and public sectors, it has proven abortive to

meet the required huge demand for agricultural investment capital (Ijaiya et al., 2017). Hence, providing sustainable and stable financial services for agriculture in Nigeria has been extremely difficult (Third International Conference on Financing for Development 2015). It can therefore be argued that higher proportion of the farmers are separated from formal financial services.

Currently, the Nigerian economic performance has been lackluster. The GDP fell to 3.3% in 2022 from 3.6% in 2021 due to lower oil production, causing a 5% industrial contraction, balanced by 7% growth in services and 2% in agriculture. Reduced public consumption (2.5%) and net exports (80%) also contributed towards the GDP decline. Similarly, per capita income growth dropped to 0.8% from 1.2% in 2021. The fiscal deficit improved, narrowing to 4.9% in 2022 (from 5.2% in 2021), funded by borrowing, raising debt to $103.1B (22% of GDP). Inflation hit an 18.8% two-decade high, driven by energy and food prices. Improved oil exports helped achieve a small current account surplus of 0.1% in 2022. International reserves decreased by 7.5% to $37.1B (5.7 months of imports). Nonperforming loans were 4.2%, below the 5% requirement. Capital adequacy exceeded the benchmark at 13.8%. High rates of multidimensional poverty (63%) and unemployment (33.3%) persisted (Africa Development Bank, 2023). The combinations of these statistics contributed towards the weakening and deterioration of inclusive growth in Nigeria.

Like other African nations, Nigeria faces rising macroeconomic policy shocks which triggers inflationary pressure in agricultural inputs, weakens access to credits, reduces agricultural productivity and increases inequality across economic groups. Despite notable economic growth, other factors which causes decline in agricultural productivity include; changing demographics, slow adoption of technological advancements, banditry and kidnappings in rural communities as well as changing environmental factors (Onuorah, 2022). Despite her economic growth, the expected reduction in poverty, unemployment, and overall living standards has not improved. Most citizens still endure extreme poverty. World Bank reports labeled Nigeria as the global poverty hub since 2018, while the National Bureau of Statistics noted a rise in unemployment from 27% in 2019 to around 30% in 2021 (NBS, 2021). Despite being Africa's largest economy, she exhibits a relatively low GDP per capita of $2184 in 2022, trailing behind Kenya ($2245B), Egypt ($5485B), and South Africa ($6681B) (World Bank, 2022). This discrepancy may be linked to Nigeria's non-inclusivity in growth.

The relationship between financial development and growth though topical, has witnessed no consensus in the nexus within the stock of existing literature. Tracing this trend from

McKinnon (1973) and Shaw (1973) seminal papers, economists (Orji et al., 2020; Mtar & Belazreg, 2021) found positive relationship; Ayinde & Yinusa (2016) and Olomola & Yaro (2015) found negative; while neither positive nor negative were discovered by Orji et al. (2014). Meta-analysis has been conducted in finance-growth nexus, in order, to extend researches in this area as well as extend evidences. Despite these evidences, the concept of growth has remained controversial among development economists, and as such, views on financial development becomes less holistic.

1.4 Research Questions

(i) What is the effect of agricultural finance on economic growth in Nigeria?
(ii) What is the impact of financial development on economic growth in Nigeria?
(iii) What is the interactive effect of agriculture finance and financial development on inclusive growth?
(iv) Can the threshold of agricultural finance at which financial development optimizes inclusive growth in Nigeria be computed?

1.5 Objectives of the Study

The major goal of the study is to examine the links between agricultural finance, financial development, and output growth in Nigeria. The specific objectives are as follows:

(i) To examine the impact of agricultural finance on economic growth in Nigeria.
(ii) To investigate the impact of financial development on economic growth in Nigeria.
(iii) Determine the interactive effect of agriculture finance and financial development on inclusive growth.
(iv) Compute threshold of agricultural finance at which financial development optimizes inclusive growth in Nigeria

1.6 Scope of the Study

This research covers the years 1980 through 2021. The year 1980 was justified because it covers major periods of agricultural reforms in Nigeria, as mentioned earlier. Also, it provides time series data long enough to produce robust results. The end year, 2021, is justified by the most recent year for which annual time series data could be collected. This, however, was dependent on the availability of data from trustworthy sources. Besides the period, another

important scope considered in the study was the study's geographical coverage, which focused on Nigeria. The first major reason for concentrating on Nigeria is based on the argument that over 60 percent of Nigeria's labor force derives their source of livelihood from farming. Also, over 70 percent of the populace is directly, indirectly, or partly engaged in agriculture, whether in production lines or along the extended value chains. Therefore, agriculture plays a major role as a contributor to Nigeria's GDP; as such, paying attention to agricultural credits, which enhances growth, cannot be overemphasized. Importantly, the research considers various variables, namely agricultural finance, financial development, GDP growth, and other indicators of private and agricultural credits, which are important determinants of growth output.

1.7 Significance of the Study

This study is unique because unlike previous researches, it dissected the tripartite relationships and trajectory between agricultural finance, financial development, and inclusive growth, providing an entirely new perspective to studying the finance-growth nexus within the stock of existing literature (Mtar & Belazreg, 2021). This is because agricultural finance-growth relations are better understood through some mediating factors, namely institutional quality, environmental factors, climatic change and variability, macroeconomic conditions, and financial development, to mention a few (Chandio et al., 2020). In an attempt to further improve the relevance of the current study, financial development was selected as a trajectory through which the agricultural finance-output growth relations were dissected. Unfortunately, existing literature ignores the need to examine these tripartite relationships across the variables (Angaha & Atong, 2020). Therefore, this study not only determined the individual effects of agricultural finance and financial development on output growth, but it operationalized the joint effects of agricultural finance and financial development on output growth by modeling the interactive effects of the independent variables on the explained variable (Onuorah, 2022). Thus, the interactive model provided a basis to conclude whether financial development complements or substitutes the impact of agricultural finance on output growth in Nigeria (Orji et al., 2020).

Also, this study computed the agricultural finance threshold, optimizing inclusive growth through the financial development pathway. The agricultural finance threshold benchmarks the value of agricultural finance at which inclusive growth attains its optimal value by differentiating the interactive model in terms of financial development and subjecting the resultant differential equal to zero (Ayinde & Yinusa, 2016). This was important to establish

whether the computed threshold of agricultural finance was below or above the calculated average within the study period. Similarly, the agricultural finance threshold confirms the point at which financial development accelerates inclusive growth to its optimal level. This study, therefore, contributes to methodological literature by employing Quantile Autoregressive Distributed Lag (QARDL) and threshold regression techniques. In time series analysis, the QARDL technique has become increasingly popular and convenient for unraveling autocorrelation, separating short-run and long-run relationships, as well as modeling asymmetric relationships.

Therefore, this study on agricultural finance, financial development, and output growth in Nigeria is significant and contemporary because it shows the pathway through which financial development strengthens the effects of agricultural finance on inclusive growth in Nigeria (Olomola & Yaro, 2015). Importantly, it provides an econometric basis for investigating the dynamic relationship among these variables. Thus, the study employed the Autoregressive Distributed Lag (ARDL) technique, providing an opportunity to examine dynamic short-run and long-run relationships.

Also, the research provides relevant guides or policy formulations for stakeholders and policymakers, including the Central Bank of Nigeria (CBN) and Federal Ministry of Agriculture and Rural Development, in making decisions and policies that curb challenges in agricultural credit provision and distribution, advance agricultural productivity, and ameliorate adverse effects on output growth, in general, arising from agricultural financing and financial development (Yazidu & Ashenafi, 2021). Importantly, the research output would be valuable to students, professionals, academics, and all other stakeholders, providing broad-based empirical findings and insights from the literature review.

1.8 Structure of the Thesis

The study is organized into five chapters. Chapter one, the introductory chapter, covers the study background, the problem being investigated, the motivation, and the research objectives. This chapter, therefore, provides a general introduction to the study and the main issues investigated. Chapter Two focuses on the symmetric relations between agricultural finance and economic growth in Nigeria. Chapter Three covers the symmetric effects of financial development on economic growth in Nigeria, while Chapter Four investigates the interaction effect of agricultural finance and financial development on inclusive growth, as well as computes the threshold of agricultural finance required to accelerate inclusive growth to the optimal point. Also, these chapters are illustrative of issues raised in the introductory chapter. Lastly, Chapter Five, based on the empirical findings, provides conclusions, recommendations, and suggestions for further studies.

CHAPTER TWO

2.0 AGRICULTURE FINANCE-ECONOMIC GROWTH NEXUS IN NIGERIA: A DYNAMIC RELATIONSHIP

2.1 Introduction

Economic growth involves the process of increasing the per capita income, national income, gross national product (GNP) and gross domestic product (GDP) (Poliduts & Kapkaev, 2015). Growth is a long-run and complex phenomenon, influenced by factors namely; population, human and physical capital, capital utilization, governmental intervention, as well as institutional and cultural factors (Lucas, 1988). Stable and sustainable growth are pathways towards resolving negative macroeconomic phenomena including unemployment, inflation, deficits in investments and trade.

Romer (1986) stressed that endogenous growth models provided analytical frameworks for examining finance-growth trajectory. According to Levine (2021), relationship between Finance and growth began as a separate discipline in economics commenced within the last three decades. Interestingly, finance is encompassed of credits to government and private sector. In term of private sector credits, it could be separated across sector namely; industrial, service, construction, mining and agriculture.

Agricultural financing is a key aspect of private credits (Mbutor et al., 2013). The various components of agriculture, services and its key agribusinesses play essential role towards achieving the 17 Sustainable Development Goals (SDGs), particularly ending hunger, eradicating poverty and bridging inequality by 2030. Agricultural credits are critical for the purchase of farm inputs, machineries and cover costs of farm operations. However, small scale farmers rarely have access to loans and other financial facilities drawn from financial institutions (Mbelu & Ifionu, 2022). This is because financial institutions and governments prefer to issue credits to other less risky and more profitable sectors or businesses.

In Nigeria, farmers are predominantly small-scaled, who rely on wide range of products for their livelihood because of lack of financial credits for expansion and large scale production. Also, the demand for sustainable financial resources, products and services in the agriculture sector falls short of the supply, and it has trapped most farmers within the small-scale category. Hitherto, the Nigerian government has inaugurated pockets of programs to facilitate access to credits; however, little progress have been witnessed. This is because agricultural sector has contributed below expectations towards the gross domestic products (GDP). More worrisome

is the fact that its exports earnings and contributions to overall wealth creation remains unimpressive (Odili, 2022; Afolabi et al., 2022). Despite the above scenario, this sector has the potential to accelerate economic growth which could evolve into development in the long run period if well-financed and nutured (Egwu, 2016).

The positive relationship between agriculture finance and growth are well-captured in the Neo-classical and Endogenous theoretical point of views (Romer, 1986 and Ogbuagu et al., 2022). The neoclassical theory argues that economic growth is usually driven by the accumulation of factor inputs and technical progress, with the potential role of finance restricted to assistance in the accumulation of capital. Similarly, the endogenous growth theory approaches finance-growth relations through the role of entrepreneurship and innovation, which multiplies the effect of finance to directly drive research and innovation in the production process, which in-turn enhances growth.

This study is significant as it clarifies existing conflicts in empirical results on the impact of agriculture finance on output growth in Nigeria. For instance, Mbutor et al., (2013) and Afolabi et al., (2022) found positive impact of agriculture finance on economic growth; while Onoh (2020) and Ali et al., (2016) found that agriculture finance exerts negative impact on output growth. Also, it aligns with the Sustainable Development Goals (SDGs) focused on food security, employment generation, wealth creation and economic growth through the non-oil sectors. Besides the above, it investigates dynamic relationships between agriculture finance and economic growth by employing Autoregressive Distributed Lag (ARDL) technique, which provides robust outcomes.

2.2 Stylized Facts

2.2.1 Overview

Policies on agriculture financing are developed to inspire both private and government financial institutions to support farmers and other individuals along the value-chain, not only to access funds, but also at lower interest rate Mafimesebi et al., (2009). Despite the how strategic, the sector in the nation's socio-economic situation, agriculture is still underplayed and severely underfunded. Recently, Olatunji et al. (2018) stressed that this situation could be due to budgetary constraints. Another important factor is the failure of farmers to repay loans, and as such, banks seek to ameliorate risk exposure by tightening lending windows. Other factors according to Fakun & Evbuomwam (2017), are poor commitment from lending institutions, weak follow-up and non-performing loans are determinants of agriculture sector performance; and worst still, ratio of agriculture productivity to bank financing were found to fall short of capacity. However, agriculture credits were found to greatly increase sectoral output productivity, employment and economic growth (Egwu, 2016).

Although, the contribution of agricultural sector to GDP rose from 28 percent to 32 percent between 2014 and 2016, before declining to 31 percent in 2017 according to Bright (2022); then experienced an increment of 6 percent in 2018 (CBN, 2022). However, its contributions remained stable at 37% in 2019, and declined drastically to 27% and 22% in 2020 and 2021 respectively, as mentioned by Varrella (2021). It was observed that the contributions of agriculture to GDP declined steadily from 0.37 in 2019 to 0.22 in 2021 (CBN, 2022).

Furthermore, the National Bureau of Statistics (NBS, 2022) stressed that agricultural sector credits as a ratio of private sector credits was 3.26% and 3.36% in 2016 and 2017 respectively. Comparatively, banking sector credit to other industries relative to agriculture received the least in terms of credit allocation from banks despite the sector's greater contribution to GDP. Importantly, the ratio of budget allocation to agriculture fell short of the 10 percent benchmark as a ratio of annual budget, prescribed by the Maputo Declaration on food security as agreed by the African Union (AU). For instance, budgetary allocation for agriculture in 2017 and 2018 were N0.10 trillion and N0.20 trillion, and accounts for 1.3% and 2.2% respectively of the total budget. Though agriculture's contributions to GDP, as well as its share of budgetary are relatively small, however, the values indicate that this sector cannot be neglected.

Therefore, agricultural financing involves an overlapping and complex mix of intermediaries across households, farmers, agribusinesses, and other agriculture value-chains. Some of the

farmers' need for financial services and products are diverse including credits to fund working capital requirements, fixed assets, risk mitigations, insurance policies and asset-building which could be either short, medium or long-term period. This section provides an opportunity to discuss the relationships between agriculture finance and economic growth using data covering 1981 and 2022 in Nigeria. Here, the stylized facts were searchlight using both the descriptive and trend analysis as presented in Table 2.1 and Figures 2.1 respectively.

2.2.2 GDP Growth Rate and Agricultural Finance

The trend of gross domestic product (GDP) growth rate and agricultural financing as a ratio of GDP is presented in Figure 1, as compiled from the CBN (2022) statistical bulletin. The figure reveals that the trend of GDP growth rate and agricultural financing followed a similar pattern, except for the fact that the former experienced negative growth rate in 1981, 1982, 1983, 1993, 1994, 1995, 2016 and 2020. Between 1981 and 1984, agricultural financing declined from 25.58 to 14.87; while GDP growth rate rose from -13.13 to 5.91 between 1981 and 1985. The history and structure of Nigerian economy have revealed that the Nigerian economy experienced economic slump which resulted in economic recession; as such, resulting in declining government expenditure including credits to agriculture. To revamp the economy as well as drive economic growth, the government increased expenditure according to the Keynesian theory. This is an important determinant of the rise in GDP growth between 1981 and 1985 as discovered in Figure 1 below.

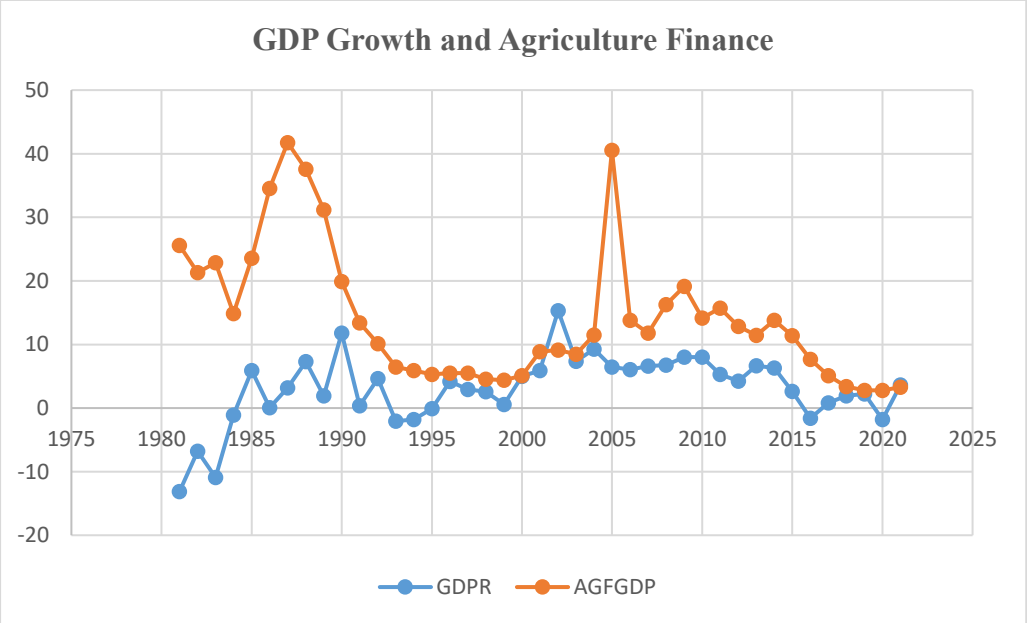

Figure 2.1: Trend of GDP growth rate and Agriculture Finance **Source: Author's compilation, 2023**[3]

As observed in the trend, agricultural financing increased from 14.85 to 41.74 between 1984 and 1987. Within the same period, economic growth responded positively by increasing from 5.91 to 7.33 between 1985 and 1988. Conversely, agricultural financing fell from 37.58 to 6.43 between 1988 and 1993, GDP growth rate after an initial increase from 7.33 to 11.78 between 1988 and 1990, fell to -2.04 in 1993. A further decline of agricultural financing to 4.41 in 1999, also led GDP growth rate to decline to 0.58 in 1999. As agricultural financing peaked at 40.51 in 2005, economic growth also rose to 9.25 percent in 2004. Afterwards, agricultural financing continued to decline down to 13.82 in 2014, while economic growth to 6.30 percent. Between 20014 and 2016, agricultural financing continued to decline down to 7.66, while economic growth became negative at negative at -1.62 in 2016. In 2019, agricultural financing and economic growth were at approximately 2.7 percent. While economic growth was negative in 2020 due to the Covid-19 pandemic, agricultural financing upshot to 3.29 and 3.64 percent in 2021. Thus, it can be argued that the rise in economic growth after the Covid-19 pandemic could be attributed to slight improvement in agricultural financing in between 2020 and 2021.

2.3 Literature Review

Despite the fact that there are many researches on economic growth, there are much lesser studies on the relationship between agricultural finance and economic growth especially in unindustrialized countries like Nigeria. This section of the study examines some of these studies and pinpoints some areas where the study will add something new to the literature and the body of knowledge in general. The discussion in this section is based on the study's objectives.

2.3.1 Conceptual Review

Economic growth is increase in the production of goods and services over a given period of time. It is often measured as the percentage of change in gross domestic product, gross national product or national income per capita over a time frame, and is usually adopted in the analysis of quantitative terms, processes and functional relations between endogenous variables (Barro & Sala-i-Martins, 2004). Economic growth involves national wealth creation which includes production capacity expressed in both absolute and relative sizes, per capita and structural modifications within the economy. Therefore, it is process of increasing the levels of national

economies' macroeconomic indicators, which transmits positive effects on the socio-economic sectors of the society.

Agriculture finance varies across the micro-and-macro concepts. In the micro-concept, it involves financing and providing liquidity services through the provision of credits to farmers for the purpose of agribusiness expansion or creation of new ones (Toaha, 2023). The macro-concept on the other hand targets the processes of streamlining the agricultural sector's role in stimulating growth within the economy as a whole. For instance, modeling the effects of farmer' behavioural patterns as a basis towards understanding determinants of macroeconomic outcomes in the agricultural sector. Another important aspect of agriculture finance involves understanding the dynamics in economic and financial policies of Nigeria, as it may affect the agriculture sector in isolation or in relation to other sectors of the economy (Ndem, Mboto, Okey, James & Lebo, 2024).

Financial development refers to improvements in the functionality of the financial sector, including unaverred access to greater financial diversification and intermediation, increased financial opportunities targeted at improving information quality, better incentives and monitoring as well as improved risk management practices (Ogunlokun & Adeleke, 2023). It increases seamless access of financial instruments and credit to the private sector, which encompasses the agriculture sector and other sectors of the economy.

2.3.2. Empirical Review

For public agricultural spending and output growth, Toaha (2023) investigated the impact of agriculture credit on economic growth in Bangladesh using time series data obtained from the World development indicators. Employing Johansen cointegration and Vector Error Correction model (VECM), the author found that besides the existence of long-run relationship between agriculture credit and economic growth, the former exerted positive on economic growth in Bangladesh. Based on the findings, the study recommended that policy-makers should fashion out policies to accelerate delivery of credits to farmers, in order to boost productivity and GDP growth in Bangladesh.

In the case of Ogunlokun and Adeleke (2023), they examined the relationship between agriculture and financial sector growth in Nigeria. Obtaining data from the CBN statistical bulletin, the study employed the ARDL technique and regressed credits granted to agriculture, agricultural credit guarantee Scheme on financial sector growth. The results revealed that the

productivity of the agriculture sector have significant positive impacts on the growth of the financial sector in Nigeria. Based on the research finding, the study concluded that agriculture sector should be prioritized in term of availability of credits, as this culminates into the promotion of the financial sector.

Ndem et al., (2024) investigated the effect of agriculture credits on economic performance of Obudu Local Government Area, Cross Rivers State. The study utilized survey data collected using questionnaire from this geographical area, and then employed descriptive statistics and the analysis of variance (ANOVA) to analysis the available data. The study found that credit programmes enhanced agriculture sector, which in turn stimulate economic growth. Therefore, the authors recommended that government should release funds at lower interest rates and regularly to farmers in order to accelerate performance.

Mile et al., (2021) examined the impact of agriculture credits on output growth from 1981 to 2019. The study employed vector error correction (VEC) technique, VAR granger causality, and Johansen co-integration test to analyze the data. It was observed that government expenditures on agriculture have a positive impact on agricultural output. Furthermore, existence of bidirectional relationship between government agricultural spending and agricultural output was confirmed.

Osabohien et al., (2022) employed Autoregressive Distribution Lag (ARDL) technique to investigate the relationship between agricultural finance and Nigeria's economic growth. The results revealed that agriculture credit exerted positive impacts on economic growth across the periods. The outcomes uncovered that agricultural commodities essentially influence Nigeria's economic growth. Covering study periods from 1986 to 2020, Okore and Nwadiubu (2022) dissected the impact of agricultural financing on agricultural output. The study adopted the Ordinary Least Square (OLS) Method using time series data obtained from the CBN Statistical Bulletin. Evidence from the regression results shows that commercial bank loans channeled to agriculture and Agricultural Credit Guarantee Scheme Fund exerted significant positive effects on agricultural output. Thus, the authors recommend government policies aimed at enhancing agricultural production through flows of agricultural credits.

For the period 1981-2017, Afolabi et al., (2021) examined the impact of agricultural lending on Nigeria's economic growth. Breaking out the influence of the Agricultural Credit Guarantee Scheme Reserve (ACGSF) and the Deposit Money Bank Credit to the Agriculture Sector (DMBCA) on Nigeria's Economic Growth is one of the specific goals. Applying the ARDL

technique, the result revealed that DMBCA is critical for economic growth. However, ACGSF influenced economic growth negatively. Another of such study is that of Angaha and Atong (2020), who evaluated the effect of agricultural credits on output growth in Nigeria covering 29 years. Using threshold autoregressive (TAR) model, the results reveal that agricultural finance fell below the expected optimal threshold as adjudged in most regimes of GDP, hence, agricultural financing cannot propel GDP growth rate to its steady-state. The paper recommends urgency in improving government budget allocation to agriculture significantly. More so, special funds should be channeled towards agriculture, in order to spur productivity, cover import gaps as well as ensure food security.

Olaleye and Ozegbe (2020), employed the ARDL technique to assess the link between agricultural financing and GDP growth in Nigeria using annual data covering 38 years. The empirics from the result indicate that agricultural financing exerts insignificant negative effect on agricultural output and economic growth in the short-run. Conversely, agricultural financing exerts significant positive effect on agricultural output and GDP growth in Nigeria. Using time series analysis, Asukwo et al., (2020) investigated the impact of commercial banks loans on agricultural sector in Nigeria from 1979 to 2016. The results revealed that there was significant positive impacts of interest rate, liquidity, loans and advances on agricultural productivity. Drawing from the above findings, the research recommends that private financial institutions should channel more credits to the agricultural sector. Also, lending rates should not exceed single digit.

Islam (2020), applied the ARDL technique to searchlight the short and long run relationships between agricultural credit and agricultural output growth utilizing annual time-series data obtained from Bangladesh Bureau of Statistics (BBS) and Bangladesh Bank (BB) between 1999 and 2020. The study discovered that positive short and long run relationships exist between agriculture finance and agricultural output. More so, other factors that influence agricultural output include inflation, interest rate, and government expenditure. This paper recommends boost in agricultural credit in order to enhance agricultural productivity, which in turn fosters economic growth in Bangladesh.

Babarinde et al., (2019) used the VEC and VAR granger causality to explore the relationship between agricultural loans and GDP growth in Nigeria from 1992 to 2018. The correlational analysis revealed a strong, positive, and crucial link between agricultural finance and economic growth. Furthermore, cointegration tests verify the variables' long-term relationship, while the

VEC results revealed that agricultural finance has a negative and insignificant impact on output growth in the short run. In any event, agricultural finance and long-term economic growth are diametrically opposed. Also, the VAR granger causality confirmed no connection between agricultural finance and economic growth. As a result, agricultural finance has little effect on economic growth in the interim, but the converse is true in the extended period.

Egwu (2016) utilized least square and co-integration regression methods to examine the relationship between agricultural financing and economic growth in Nigeria covering the periods from 1980 to 2010. The results revealed that Commercial Bank Credit to Agricultural sector (CBCA) and Agricultural Credit Guarantee Scheme Fund Loan to Nigeria's Agricultural sector (ACGSF) were positive drivers of GDP growth. Also, Ogbonna and Nnamerenwa (2022) dissect the effect of agricultural financing through banks credits on agricultural productivity covering 1981 to 2019. Using multiple regression analysis, the result reveals that bank credits and loans allocated to agriculture under ACGSF negatively and positively influenced agricultural performance respectively. Therefore, the study recommends that it is imperative to ensure adequate financing of agricultural sector in Nigeria.

Ibrahim and Alagidede (2018) investigated the relationship between agriculture finance and economic growth across 29 sub-Saharan African nations covering 1980-2014 period. The study utilized the sys-GMM technique, and the results reveal that agriculture finance indicators exert significant positive impacts on economic growth. Anifowose (2017) took on Ordinary Least Square estimation technique to look at the effect of agricultural sector output on GDP growth of Nigeria. The variables utilized include: Gross Domestic Product (GDP), result of agricultural sector, portion of horticulture in the GDP, record of agricultural creation, and ratio of agricultural result to GDP. The outcomes showed that the Nigeria agricultural sector adds gigantically to GDP growth of Nigeria however the over-reliance on the oil sector has over shadowed the possibilities of the sector.

Elikwu et al., (2018) researched the effect of agricultural gear financing on expanded usefulness in the Agricultural sector in Nigeria. The review utilizes the authentic and narrative exploration design which includes auxiliary information assortment. 16 years information on total yearly financial consumption on agricultural gear and information for agricultural result and commodity profit from 2000 to 2015 (16 years) structure the number of inhabitants in the review. Information on total yearly consumption on agricultural hardware financing (AEF), a total of innovative headway in motorized cultivating (TMF) and agricultural efficiency (AP),

were utilized. The discoveries uncover that agricultural hardware financing essentially affects innovative headway of motorized cultivating and that there is a critical connection between mechanical progression of automated cultivating and creation yield.

Ajayi et al., (2017) endeavored to investigate the degree to which agricultural financing strategy and deposit money bank loans to agricultural sector affected on agricultural efficiency in Nigeria inside the time of 1981 and 2015. By applying completely changed least squares regression techniques, it was shown that deposit money bank loans and agricultural financing strategy intermediary by Agricultural Credit Guarantee Scheme Fund have significant and direct impact on agricultural usefulness in Nigeria while lending rate has a significant and circuitous impact on agricultural efficiency.

Sajo and Li (2017) inspected the links between financial development, trade and economic growth in Nigeria from 1994 to 2013. Johansen co-integration strategy is utilized to examine the long run relationship among the variables. The bearing of causality between variables is tried by Granger causality test and Ordinary least square (OLS). The analysis revealed that the development of products and transportation has a positive large impact on economic growth. While financial development, global exchange structure and energy sector negatively affects economic growth.

Following the empirical review, there exist gaps in methodology especially in the area of empirical testing of research hypothesis where most existing literature adopted mainly descriptive methods, ordinary least square techniques, co-integration and step-wise techniques (Egwu, 2016; Ayodele, 2019). Therefore, it has been observed that most studies employed OLS method despite their perceived weakness. This research will adopt both the ARDL technique for sensitivity test as well as provide an opportunity to dissect the short and long-run symmetric impacts of agricultural finance on output growth. Besides this methodological gap, there is also gap in the available database on variables for Nigeria, especially covering the periods between 1981 and 2021.

2.4 Theoretical Framework

The theoretical framework for this study is built on the financial intermediation as explained in the New Growth Theory (Romer, 1986). The Endogenous growth theory is classified as one of the new growth theories which specializes in explaining long-run growth trajectories of an economy, through the application of endogenous factors Olaleye and Ozegbe, (2020). Some of

these endogenous are human capital, technology, private savings and investment, innovation and financial credits. The model specification is developed by superimposing the endogenous growth model into the typical Cobb-Douglas production function which relates productivity to factor inputs (labour and capital). The capital inputs in the agriculture sector will be decomposed into agriculture financing, while the labour component is proxied with the level of unemployment rates. Although the Cobb-Douglas production function has limitations arising from its two inputs constraint, as well as assumption of constant returns to scale; however, more variables would be theoretically factored into the model to make it more robust (Echevarria, 1988 and Zakaria et al., 2020).

We specify the Cobb-Douglas production function as:

$$Y_t = AK_t^{\alpha} L_t^{\beta} e_t^{\mu} \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \quad (1)$$

Where Y is economic growth, K and L represents capital and labour inputs. The parameters α and β are marginal impacts of capital and labour on economic growth, and these parameters fall between 0 and 1, i.e $0 < \alpha < 1$ and $0 < \beta < 1$, t is the time period, while μ is stochastic error term. The study examines the impact of agriculture finance on output growth by considering finance as an important determinant of output growth, then we incorporate finance as conditioning variables following the arguments of Romer (1986) in-line with the endogenous growth theory financial intermediation (Ali et al., 2016). Other macroeconomic determinants of growth will be introduced into the model as control variables. Thus, equation 1 is transformed into equation 2 as below:

$$Y_t = AK_t^{\alpha} L_t^{\beta} F_t^{\gamma} Z_t^{\lambda} e_t^{\mu} \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots . \quad (2)$$

The parameters **γ** and **λ** falls between 0 and 1, which shows marginal impacts of finance and other control variables on growth. Taking natural logarithms of equation 2, we derive equation 3 as:

$$Y_t = A_0 + \alpha K_t + \beta L_t + \gamma F_t + \lambda Z_t + \mu_t \qquad \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots .. (3)$$

In the augmented form of equation 2 which generates equation 3, Zt contains the conditional variables especially the finance (agriculture finance, financial development and money supply) components. This according to the Neoclassical and endogenous models are key components of the model because they drive accumulation of factor inputs, technical progress, entrepreneurship and innovation. These factors in turn accelerate economic growth. Similarly,

since the neoclassical model encourages capital flows, it justifies the net flows of trade in to the model.

Drawing from the above, equation 3 can be transformed into a new model labelled as equation 4 below.

$$Y_t = A_0 + \alpha K_t + \beta L_t + \gamma AGF_t + \sigma MS_t + \theta FID_t + \gamma TOPN_t + \mu_t \quad \ldots\ldots\ldots\ldots\ldots (4)$$

The above equation is now in its augmented form, and re-specified to achieve the stated research objectives.

2.5 Data and Methodology

2.5.1 Data

The research examines the effect of agriculture finance on growth in Nigeria. The empirical analysis employs time series data covering 198 to 2022, which covers 42-year period in order to achieve its research objectives. The important variables utilized in the descriptive analysis, trend analysis and regression analysis include: Agricultural financing, financial development, economic growth, money supply, trade openness, gross capital formation and human capital. The major sources for the data are the CBN Statistical Bulletin and WDI as published in the year 2023. For instance, the data on agricultural financing or credit, money supply, financial development (credit to private) are sourced from the CBN Statistical Bulletin; while data on economic growth, trade openness, gross capital formation and human capital were obtained WDI. Mathematically, economic growth is computed as growth rate of GDP, while trade openness is calculated by dividing export plus import by gross domestic product before multiplying by 100. Also, money supply and financial development are proxied by broad money and credit to private sector respectively. Although, the study is aware of the challenges of using proxies, however, studies have supported that the use of the above proxies are reliable as well as produces valid research outcomes. The study would have employed data covering 1970 to 2022, however, the unavailability of data namely: gross capital formation, agricultural financing or credits, and credit to private constrained the research to cover between 1980 and 2022 which is 42 years. Importantly, sample covering 42 years not only exceeds the required 30 samples for a normal distribution, it produces robust and valid results for forecast and policy formulation.

2.5.2 Methodology

This study will investigate short and long-run relationships among the variables by first conducting preliminary tests (unit roots, cointegration tests and optimal lag-test), before the core regression analysis. Thus, modern time series econometric techniques will be employed specifically the linear ARDL (Pesaran et al., 2001 and Shin et al., 2014). This will avail the research an opportunity to investigate relationships between the variables of interests as explained in the Cobb-Douglas production function (Zakari et al., 2021). Notice that the linear ARDL method can be applicable in this study if the variables are integrated of order zero and one (I (0)) and one (I (1)); and all the variables are stationary at first difference or order one (I (1)). Also, the variables will show tendencies of cointegration in the long-run (Islam, 2020).

2.5.2.1 Examine the impact of agriculture finance on economic growth

To achieve research objective one, which focuses on examining the impact of agriculture finance on economic growth, the ARDL approach will be employed in the study (Pesaran et al., 2001). According to Nsor-Ambala and Amewu (2022), the ARDL technique is justified because of its ability in dealing with small sample data. More so, the bounds test approach does not limit us to variables with same order of integration; rather it requires a series of variables with combination of integration at levels one (I (1)) and zero (I (0)). More importantly, besides the capacity of ARDL methodology or model to estimate short and long-run symmetric impacts, it eliminates problems of serial correlation and endogeneity within the variables (Rahman & Kashem, 2017 and Muhammad & Abdullahi, 2020).

Thus, the generalizing form of the research model is:

$$GDP_t = f(LAB_t, CAP_t, AGF_t, FID_t, MS_t, TOPN_t) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (4)$$

In order to specify the linear ARDL model correctly, the lags of both the explained and explanatory variables are included as presented in equation 5 below.

$$\begin{aligned} \Delta lnGDP_t = \beta_0 &+ \sum_{i=1}^{p} \beta_1 \, \Delta lnGDP_{t-i} + \sum_{i=0}^{p} \beta_2 \, \Delta lnLAB_{t-i} + \sum_{i=0}^{p} \beta_3 \, \Delta lnCAP_{t-i} \\ &+ \sum_{i=0}^{p} \beta_4 \, \Delta lnAGF_{t-i} + \sum_{i=0}^{p} \beta_5 \, \Delta lnMS_{t-i} + \sum_{i=0}^{p} \beta_6 \, TOPN_{t-i} \\ &+ £_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (5) \end{aligned}$$

From equation 5, i = 1, 2, …. N which denote the maximum number of lags for the explanatory variables (LAB, CAP, AGF, FID, MS, TOPN) respectively. Interestingly, the E-Views 12 was used to automatically select the optimal lag for each variable. The ARDL bounds test form which comprises both short and long-run coefficients is specified in equation 6 as:

$$\Delta lnGDP_t = \beta_0 + \sum_{i=1}^{p} \beta_1 \Delta lnGDP_{t-i} + \sum_{i=0}^{p} \beta_2 \Delta lnLAB_{t-i} + \sum_{i=0}^{p} \beta_3 \Delta lnCAP_{t-i} + \sum_{i=0}^{p} \beta_4 \Delta lnAGF_{t-i} + \sum_{i=0}^{p} \beta_5 \Delta lnMS_{t-i} + \sum_{i=0}^{p} \beta_6 TOPN_{t-i} + \alpha_1 lnGDP_{t-1} + \alpha_2 lnLAB_{t-1} + \alpha_3 lnCAP_{t-1} + \alpha_4 lnAGF_{t-1} + \alpha_5 lnMS_{t-1} + \alpha_6 lnTOPN_{t-1} + £_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (6)$$

Where GDP = Growth rate of gross domestic product (Economic growth), LAB = Human capital, CAP = Physical capital, AGF = Agriculture finance, MS = Money supply, TOPN = Trade openness.

Notice that Δ is the difference operator, ln is the natural log of the variables, β_i represents the coefficient of short-run dynamics, α_i represents coefficient of long run dynamics, and t is the time period. Deductions from the above show that β_4 and α_4 represent the short and long-run symmetric impact of financial development on economic growth.

2.6 Empirical Results and Discussions

2.6.1 Summary of Five-Year Average of Economic Growth and Agriculture Finance in Nigeria

In Table 1, the summary statistics of the five-Year average of economic growth and agriculture finance. In the first period covering 1981-2021, it can be observed that the five-year average of economic growth and agriculture finance were -5.2 percent and 34,522.5 million naira respectively. It can be observed that this period witnessed the worst economic growth and lowest agricultural credits to farmers and individuals along the agricultural value-chains. In 1986-1990 which accounts for the second 5-year average period, it can be observed that economic growth progressed to 4.858 percent, while agriculture finance increased by 68,872.64 million naira. This observation reveals that substantial increment in agriculture finance, drove economic growth from -5.213 to 4.858 percent within this period (CBN, 2022).

Table 2.1: Five-Year Average of Economic Growth and Agriculture Finance

Period	Five-Year Average for Economic Growth (percent)	Five-Year Average for Agriculture Finance (Million Naira)
1981-1985	-5.213	34,522.5
1986-1990	4.858	103,395.14
1991-1995	0.213	15,821.48
1996-2000	3.063	257,996.00
2001-2005	8.86	2,876,136.10
2006-2010	7.092	6,189,913.80
2011-2015	5.03	10,386,356.31
2016-2021	0.862	5,377,064.10

Source: Author's computation, 2024

The 1991-1995 period witnessed decline in agriculture finance from 103,395.14 to 15,821.48, and as such economic growth within this period plummeted to 0.213 percent as presented in Table 1. This observation validated the argument for the preceding period. In the 1996-2000 period, agriculture finance increased to 257,996 million naira and this drove economic growth to 3.063. These increment in agriculture finance is substantial, which is equally reflected in the rate of economic growth compared to the previous period.

A further improvement in agriculture finance to 2,876,136.10 million naira within the 2000-2005 period, revealed a rise in economic growth to 8.86 percent. Across these time intervals, the 2000-2005 period witnessed the highest growth rate in GDP. However, with an increment in agriculture finance from 6,189,913.80 to 10,386,356.31, economic growth fell from 7.092 to 5.03 percent. This trend could be explained as arising from structural rigidities and distortions, as well as external disturbances. In the last period (2016-2021), it was observed that with a drastic fall from 10,386,356.31 to 5,377,064.10 million naira in agriculture finance, economic growth responded by declining from 5.03 to a meagre 0.862 percent.

2.6.2 Unit Roots Testing of the Variables

In this subsection, we focus on the stationarity or unit roots properties of our selected variables. This is an essential pre-diagnostic test which determines the most appropriate technique to be employed based on whether or not the variables are integrated of order zero (I (0)), one (I (1)) or both. To confirm the presence and level of integration of unit roots, the study adopted the Phillip-Perron and Augmented-Dickey Fuller methods for testing level of stationarity, as presented in Table 2.2.

From Table 2.2, it can be observed from the Phillip-Perron test that most variables (GDP growth, agricultural finance, financial development, capital formation and trade openness) are not stationary at order zero (I (0)); but become stationary at first differencing (I (1)). Conversely, the remaining variable (money supply) was stationary at levels (I (0)). However, in the Augmented Dickey-Fuller test, only GDP growth rate and money supply were stationary at level, while the rest variables were stationary at first difference. The outcomes from the unit roots test as presented in Table 2.2 suggest mixture of order zero and one for variables within the model. Given these outcomes from the unit roots tests in Tables 2.2, the Autoregressive Distributed Lag (ARDL) best fits the technique of analysis.

Table 2.2: Phillip-Perron and Augmented-Dickey Fuller Unit Roots Tests

Variables	**Phillip-Perron Test**		**Augmented Dickey-Fuller Test**	
	At Level (I(0))	**First Diff (I(1))**	**At Level (I(0))**	**First Diff (I(1))**
GDP Growth	-1.136 (0.7005)	-4.385 (0.0003)*	-3.142 (0.032)**	-10.357 (0.000)*
Agric Finance	-1.035 (0.740)	-5.639 (0.0000)*	-1.488 (0.529)	-7.157 (0.000)*
Financial Development	-1.834 (0.3639)	-4.785 (0.0001)*	-2.212 (0.205)	-5.908 (0.000)*
Capital Formation	-1.431 (0.5673)	-3.459 (0.0091)*	-1.271 (0.634)	-2.96 (0.04)**
Money Supply	-3.535 (0.0071)*	-7.170 (0.0000)*	-3.583 (0.000)*	-6.780 (0.000)*
Trade Openness	-2.223	-8.111	-2.378	-7.760

	(0.1979)	(0.0000)*	(0.154)	(0.000)*

Source: Author's compilation, 2023 *. ** and *** indicate statistical significance at 1%, 5% and 10% respectively. P-values are in parenthesis.

In the next sections, we present the various econometrics results and discussions in line with the laid down research objectives as presented in the previous chapters.

2.6.3 Correlation Analysis

Next, we consider the correlation coefficients among the variables. As can be observed, most of the variables exhibit the expected relationships. The correlation coefficient between the agricultural finance variable and GDP growth is 0.71, which indicates positive relationship between these variables. It suggests that GDP growth variable would respond positively to adjustments in agricultural financing and vice-versa. This correlation result is in tandem with the findings of Babarinde et al. (2019). Thus, as more resources are devoted to the agricultural sector, GDP growth increases spontaneously. The same can be said for the correlation relationship between GDP growth and financial development which is 0.66. This degree of correlation coefficients between GDP growth and financial development indicates positive relationship between the variables. As noted above, adjustments in financial development would drive positive spontaneous reaction in GDP growth and vice-versa. Another variable that is positively correlated with GDP growth is gross fixed capital formation at 0.93. Deductions from the value of the correlation coefficient between GDP growth and capital formation (0.93) connotes positive response between these variables as presented in Table 3 below.

Table 2.3: Correlation Statistics among Variables

Variables	Agric Finance	Fin Dev	GDP growth	Money Supply	Capital formation	Trade Openness
Agric Finance	1.000					
Fin Dev	0.800	1.000				
GDP growth	0.710	0.660	1.000			
Money Supply	-0.060	0.030	-0.300	1.000		
Capital formation	0.510	0.500	0.930	-0.350	1.000	

Trade Openness	0.380	0.190	-0.100	0.330	-0.270	1.000

Source: Author's compilation, 2023

Contrary to the above, GDP growth and money supply as well as GDP growth and trade openness have weak negative correlation of -0.30 and -0.10 respectively. This implies that money supply and trade openness have weak negative relationship with GDP growth, as adjustments in these independent variables triggers weak negative responses from GDP growth and vice-versa. This runs counter-intuitive to the prediction of macroeconomic theory; as the money supply and trade openness are expected to drive GDP growth upwards at least in the interim. The relationships shows that increase in money supply in Nigeria may be inflationary; unlike in the convectional macroeconomic theory which postulates that money supply should drive interest rate downwards and stimulate GDP growth through the investment trajectory. More so, the negative links between trade openness and GDP growth may indicate that globalization has militating effects on Nigeria's growth prospects. This analysis is however bivariate and may not represent the true reflection of the relationships among these variables. Hence, the remaining part of this section is devoted to addressing this issue.

The results of the correlation test shows generally that the variables are weakly correlated whether negatively or positively. As such, their introduction into the empirical models for the regression do not arise to multicollinearity which is a prominent econometric problem.

2.6.4 Autoregressive Distributed Lag (ARDL) Estimation Technique

2.6.4.1 Effect of Agricultural Finance on Economic Growth

We now turn to address the unit root property of the model. In Table 5, we present the symmetric ARDL results showing the link between agricultural finance and output growth in Nigeria. Starting with the expanded model, the Bound test statistic confirms long-run association among the variables. This is evident in the statistical significance of the Pesaran & Shin (1999) Bound Test results, since the upper bounds is above the critical values. As expected, the coefficient of the lagged value of the dependent has statistically significant negative impact on GDP growth rate. This suggests one unit rise in first lag of GDP growth reduces GDP growth by 0.386-unit *ceteris paribus.*

In the short-run, it can be observed that the coefficient of agricultural finance is statistically significant negative at 5% level. This result is in tandem with Adebayo et al., (2019) and Asukwo et al., (2020). Drawing from the above, it can be deduce that one unit increase in

agricultural finance reduces GDP growth by 0.049 unit. Following this result, it can be deduced that agricultural finance or credits require some time lag to promote and drive agricultural finance, which in turn influences economic growth. Also, in the short run, trade openness and human capital have positive and significant impact on GDP growth. These results are in tandem with Afolabi et al., (2022). This implies that human capital and trade openness transmits spontaneous positive effect on GDP growth. This is because trade openness not only earns foreign exchange, especially if trade results in positive net export.

More so, trade openness results in the flows of capital and technology, which transmits positive spillover, as well as drives GDP growth in Nigeria (Onuorah, 2022). The above findings support the a-priori expectations of positive relationship between trade openness and output growth. The coefficient of the money supply turns out negative and significant. What this suggests is that an increased money supply reduces the GDP growth rate of the Nigerian economy in the short run. This appears counter-intuitive, as macroeconomic theory suggests that increased money supply spurs economic activity in the short run. This might arise from the fact increased money supply in Nigeria are inflationary in the short run, which discourages savings, declines capital accumulation and investment (Orji et al., 2022). A downturn in investment no doubt would relegate economic growth downwards. The coefficient of gross capital formation on the other hand appears not to be statistically significant.

The long-run coefficient of agricultural finance becomes positive and statistically significant, and larger in magnitude than its short-run value as proposed in the new growth theory (Romer, 1986). In the new growth theory, the net effect suggests that agricultural finance increases economic growth rate in Nigeria. This finding upholds the results of Islam (2020) and Ibidunni et al., (2019). The strong positive and significant impact of agricultural finance on economic growth could be explained by the argument that funds channeled into agriculture requires time to be utilized for purchase machineries, training of agricultural extension workers and farmers on new methods of farming (Olaleye & Ozegbe, 2020).

More importantly, agricultural exports are majorly from cash crops which requires minimum of five (5) years to mature. Building on the arguments above, it requires time for agriculture funds and credits to manifest into increased productivity in the sector, which in turn promote growth in the economy as a whole. The result no doubt supports the a-priori expectations as explained in macroeconomic theory (see Table 5 below).

Table 2.4: ARDL Symmetric Effects Agricultural Finance on Economic Growth

Dependent Variable: dlog (GDP)

Variables	Coefficient	t-stat	Coefficient	t-stat
LogGDP (-1)	-0.386*	-4.130	-0.1760*	-5.420
D (Agric Finance)	-0.049*	3.310	0.018	1.250
Agric Finance	0.3150**	2.290	0.0309*	6.570
D(Capital Formation)	0.060	1.690	0.540*	2.990
Capital Formation	0.4440*	5.130	0.173**	2.810
D(Money Supply)	-0.001**	-1.890		
Money Supply	0.002**	2.860		
D(Trade Openness)	.002**	2.370		
Trade Openness	-0.002**	-1.380		
Human Capital	0.015*	4.780		
D(Human Capital)	-0.004	-1.580		
Adjusted R-Squared	0.820		0.610	
Bound Test (F-Stat)	12.460*		15.110	
Durbin Watson Test	2.520		1.940	
Breusch–Godfrey test	6.310		0.354	
LM Test	3.440		0.010	

Source: Author's compilation, 2023 Note: * p < 0.05, ** p < 0.01, *** p < 0.001

Other covariates of the model with positive and significant coefficients are gross capital formation, money supply and human capital. Interestingly, the short and long-run coefficients of the money supply are incidentally the same. This suggests that the negative effect of money supply on economic growth rate is cancelled out in the long run. The adjusted R-squared of 0.82 indicates that over 80% of the variation in the explained variable is generated by changes in the dependent variables. Furthermore, the statistical significance of the F-statistic implies all the variables are jointly significant in the model.

The post-estimation tests indicate that most of the time series issues that were present in the OLS estimation have been resolved. For instance, the Durbin-Watson statistic of 2.52 indicates that the residuals from the estimation are not correlated. Also, the Breusch-Godfrey test statistic (6.31) and the LM test (3.44) depict absence of higher order serial-correlation, as well as free from multicollinearity problem. The result of the reduced model as presented in model II of Table 5 depicts that the first lag of GDP growth exerts lesser positive and significant impact on GDP growth.

Unlike in the expanded model, the short run impact of agricultural finance on GDP growth is positive. Similarly, the long run coefficient of agriculture finance exerted greater significant positive impact on output growth relative to the short term period. These results are in line with the a-priori expectations. Compared to the expanded model, the reduced model has a weaker Adjusted R-squared of 0.61, which indicates that only 61 percent variations in the explained variable were captured from within the model.

Although the Durbin-Watson statistic of 1.94 suggests the residual is not correlated with its successive terms (absence of first order serial-correlation), however, the Breusch-Godfrey statistic (0.354) and LM test (0.010) suggest presence of second order serial-correlation, as well as multicollinearity. Therefore, it can be concluded that the results from the expanded model is more robust and best suited for forecast and policy formulation.

2.7 Policy Implications and Recommendations

The policy formulations and recommendation were culminated from key empirical evidences and stock of existing literature on the nexus between agricultural finance and economic growth in Nigeria.

Firstly, it has been confirmed from both literature and empirical analysis that the agricultural sector possess potentials to accelerate economic growth, which in turn can spur economic development in the long run. Therefore, funds for intervention should be channel to finance agriculture sector targeted at regaining its dominance in exports, employment, contributions to GDP and highest raw material supplier to the industrial sector (Okunlola & Oke 2018). This can be guarantee if the federal government through the CBN could motivate private financial institutions to give top priority to Agricultural sector by issuing lower bank lending rates to agribusiness in Nigeria. With the deliberate decline in bank lending rates, credits could easily reach farmers and other players across the value-chain through robust monetary policies by the CBN. Also, focused should be targeted at bridging gaps between rural and urban participants to access and make effective utilization of these agricultural credits.

More significantly, proactive campaign on provision of credit facilities to farmers at single-digit interest rate should be on the front-runner. This is because besides availability of credits to agriculture, another factor which setbacks farmers access to agriculture loans is availability of where, how and when to get these facilities. Thus, access to information on available credits to agriculture sector and farmers could be enhance through comprehensive campaigns such as:

social media, town hall meetings, door-to-door vibes and market square awareness, radio programs and other forms of engagements through agricultural extension services and information dissemination through agricultural cooperative societies.

Importantly, policy makers bring to bear awareness on available bottlenecks that militate against efficient functioning of agricultural value chains in accelerating competitiveness and enhancing agricultural output growth. These strategies can support initiatives that promote transparency and strengthen business synergies across value chain actors. As such, famers and other players in this sector can be capture within the safety nets, hence, increasing the number of farmers with access to finance. This could be the required pathway to attract, engage and build the requisite technical and human capacity, as well as managerial capacity required to drive competitiveness in the sector. It is therefore essential to address problems of technical and human capacity across farmers in Nigeria, in order to increase the possibility of meeting consumers' food demands and producers' raw material requirements locally. This could be achieved if financial service providers understand specific needs of their clients.

In addition, invest in better data cannot be overemphasized because agricultural market is fragmented and complex. This said, understanding some of those important evolving trends and dynamics in market demand structures is key towards creating suitable financial instruments. Investing in data and analytics for information metrics namely pricing and weather conditions; and its analysis are necessary for advancing agriculture and curbing its attendant risks. Also, data are key to analyzing and comprehending risks factors as well as opportunities for designing robust instruments and financing structure in agricultural clusters. The above notwithstanding, the role of governance and suitable legal framework to ensure transparency financial market interventions cannot be overemphasized, as agricultural credits are critical public good, both in terms of practice and policy directives.

Lastly, economic stakeholders including monetary and fiscal regulatory authorities across private and public sector of the economy should collaborate, and formulate policies to improving the functions of financial intermediaries especially at providing adequate credit to farmers in order to attain solid productive-based economy and sustainable GDP growth. In this regard, policy formulation should be conducted with all sense of meticulousness, effective implementation, monitoring and adequate checks installed in the form of strict sanctions on defaulters of agriculture credit allocation. This will encourage more farmers to engage in

commercialized farming, promote agriculture export, and increase revenue earnings, which would transmit to growth and improved contributions to GDP in Nigeria.

2.8 Conclusion

This study investigates the symmetric and dynamic effects of agricultural financing on economic growth in Nigeria covering from 1981 to 2021. The core of this research is developed from the argument that agricultural credits stimulate growth and economic development. The result suggests that agricultural financing has negative significant symmetric impact on output growth in the short-run; whereas in the long-run, it exerted significant positive symmetric impact on GDP growth in Nigeria. This method is unique because it is robust, compute short-run and long-run impacts, as well as suitable for policy analysis and forecasting.

CHAPTER THREE

IMPACT OF FINANCIAL DEVELOPMENT ON OUTPUT GROWTH IN NIGERIA

3.1 Introduction

The financial industry's evolution significantly advances national productivity by serving as an intermediary, providing payment services, and implementing monetary policies (Olushola & Uzoma, 2018). Recognized for its crucial role in output growth, it supplies lending opportunities, creating a symbiotic relationship between financial intermediation and economic agents with surplus or deficit spending. This sector crucially channels savings from surplus to deficit entities, thus enhancing economic output in Nigeria (Azubuike, 2019).

Yadirichukwu & Chigbu (2014) highlighted that sustainable output growth hinges on efficient financial mobilization and distribution, enabling firms to optimize resources. Critical to this advancement is capital accessibility from financial markets, which supports sectoral growth through extended repayment periods. This method funds state and local governments without immediate obligations, providing ample time for loan repayment (Askira et al., 2014). Thus, financial market progress crucially sustains long-term economic development.

Nigeria's financial landscape has significantly expanded from 2000 to 2019, as evidenced by the Nigerian Stock Exchange's robust performance. For instance, the All Share Index surged from 8,111.00 in December 2000 to 26,842.07 by December 2019. Concurrently, the equities market capitalization soared from N0.47 trillion to N13.0 trillion during this period (Akintola et al., 2020). This growth highlights the sector's substantial development and economic impact. Furthermore, the Nigerian money market has significantly expanded, evidenced by the growth in operators, branches, capacity, and asset volume. The introduction of Open Market Operations (OMO) in 1993 notably boosted market activity, increasing the value of treasury notes sold from N47,265.0 million in 1993 to N323.8 billion in 2000, and reaching N2,421.1 billion by 2002 (Imobighe & FIIA, 2015). This illustrates the market's substantial development and enhanced financial capacity.

The Nigerian banking sector's cumulative assets increased by N11.8 billion, reaching N65.48 trillion by June 2022, a 22% rise over the year. Gross credit has consistently grown since 2019, with an N5.02 trillion increase from June 2021 to June 2022, particularly in the manufacturing, commerce, and oil & gas sectors (CBN, 2022). Despite this, Nigeria's GDP fell to 3.3% in 2022 from 3.6% in 2021 due to reduced oil production, causing a 5% industrial contraction, offset

by growth in services (7%) and agriculture (2%). Public consumption and net exports fell, dropping per capita income growth to 0.8%. The fiscal deficit narrowed to 4.9%, raising debt to $103.1 billion (22% of GDP). Inflation reached 18.8% due to energy and food prices. A small current account surplus (0.1%) was achieved, but international reserves decreased by 7.5% to $37.1 billion. Nonperforming loans were 4.2%, and capital adequacy was 13.8%. Multidimensional poverty (63%) and unemployment (33.3%) remained high (Africa Development Bank, 2023).

Notwithstanding, the development of the financial system is pivotal for output growth, as it efficiently allocates financial assets. Schumpeter (1912) posited that financial sector expansion drives economic production, a view contested by Robinson (1952), who emphasized the necessity of financial support for investment and business efficiency. Accessible financial resources enhance the production of goods and services, positively impacting the broader economy (Egbo & Nwankwo, 2018). The efficiency of financial institutions in channeling resources to the real economy is crucial for industrial and business funding. A well-developed financial sector effectively mobilizes surplus funds at low costs (Bist, 2018).

Nigeria's financial sector has undergone numerous reforms to enhance its role in economic growth and support real industry and business development (Okpara et al., 2018). The 1986 Structural Adjustment Programme introduced deregulation to correct financial system imbalances, promoting economic liberalization and sector performance (Madichie et al., 2014). However, persistent underperformance and insufficient support for output growth have been noted, with recent instability and bank failures further eroding confidence (Gabriel et al., 2016).

The complex relationship between financial development and output growth has been widely studied, particularly focusing on causality and dynamics (Obamuyi & Faloye, 2018). In Nigeria, with its evolving financial sector and diverse economy, understanding this connection is crucial. While literature often examines the unidirectional impact of financial development on output growth, the concept of symmetry—whether output growth also drives financial sector evolution—remains underexplored (Iheanacho, 2016; Egbo & Nwankwo, 2018). This study investigates if financial development symmetrically affects output growth in Nigeria, where the financial sector has seen significant reforms due to policy changes, technological advancements, and global economic shifts. Given Nigeria's varied growth phases, this research aims to elucidate the mutual interactions between financial sector development and economic performance across different periods.

This study quantifies the short-term and long-term symmetric effects of financial development on economic growth in Nigeria, examining causality, directionality, and feedback effects. Given Nigeria's status as one of Africa's largest economies, understanding this relationship is crucial for effective policy formulation. The research offers significant insights into the reciprocal impact of financial development and economic growth, contributing to both theoretical frameworks and empirical evidence. It aims to enhance understanding of economic development processes, aiding in sustainable policy-making and expanding existing literature on the financial-growth nexus.

3.2 Review of Extant Literature

3.2.1 Brief Conceptual Overview

The intricate interplay between financial development and output growth has long been scrutinized in economic theory. This relationship is vital for developing nations like Nigeria, striving for equitable and sustainable development. The importance of financial development in shaping output growth has escalated, given its role in capital accumulation, resource allocation, and technological innovation (Obamuyi & Faloye, 2018).

According to Seethana et al., (2019), a modern financial system fosters investment by identifying and financing profitable opportunities, while also managing savings, monitoring management efficiency, and facilitating risk management and diversification. These functions enhance resource allocation, accelerate capital formation, and drive technological advancement, thereby stimulating output growth (Garba & Mamman, 2014). The financial sector, comprising banks, stock exchanges, insurers, and other entities, is assessed for stability, lending capacity, and deposit-taking ability (Osuji, 2015). Key metrics like the monetization ratio and intermediation ratio gauge sector size and performance.

In Nigeria, there is a clear distinction between the formal and informal financial sectors. The informal sector comprises local cooperatives and savings societies, while the formal sector includes entities operating in money and capital markets, governed by various regulatory bodies. Nigeria's financial landscape encompasses banking, insurance, capital markets, and investment management. Unlike the short-term money market, the capital market facilitates long-term funding for projects like infrastructure, overseen by the Securities and Exchange Commission (SEC) with the Nigeria Stock Exchange (NSE) as a key player (Akintola et al., 2020).

The money market, operating with short-term funds, experienced significant growth since the establishment of the CBN in 1959, marked by increased operators, branches, and assets. Initially focused on government securities, Open Market Operations (OMO) in 1993 revitalized the market, evidenced by increased Treasury notes sales (Imobighe & FIIA, 2015). Moreover, Nigeria's foreign exchange market underwent liberalization post-deregulation, transitioning to a market-driven system like the Second-tier Foreign Exchange Market (SFEM) (CBN, 2017). However, weak macroeconomics post-liberalization resulted in the swift devaluation of the naira (Ahmed et al., 2017).

Industrialization stands as a cornerstone of national advancement, crucial for breaking the cycle of poverty and underdevelopment. A robust financial system plays a vital role in enabling effective industrialization, underscoring the importance of financial development. In economies like Nigeria, a thriving financial sector significantly facilitates enterprise financing (Okoye et al., 2013). Recognized as complex yet pivotal for sustainable industrial success, financial development profoundly impacts output growth. The efficiency of connecting surplus and deficit units defines the developmental role of the financial system, emphasizing the importance of its advancement (Adediran et al., 2017). Global financial progress relies on reforms aimed at cultivating a more stable and efficient system, ultimately enhancing economic performance.

The Nigerian financial system faces challenges in fulfilling its developmental role, limiting its potential as a growth catalyst. Restricted private sector credit access within the formal financial system is attributed to factors like government deficits, driving banks towards safer investments (Albert et al., 2021). This exacerbates the system's shallowness. Banks' use of public funds to support government borrowing creates a paradox, reducing resources available for private-sector financing. Despite financial deregulation and expansion, Nigeria's output growth remains sluggish, with rising unemployment and per capita income below $4,000 (Albert et al., 2021). Inefficient rural financial markets further impede sustainable rural development. These challenges cast doubt on Nigeria's financial market's developmental efficacy and its ability to facilitate essential investments.

Since the 1980s, Nigeria's pivotal production sectors have experienced substantial decline. The nation grapples with widespread and severe poverty, impacting nearly 70% of the population, with concerns of intergenerational persistence. Income inequality further compounds the problem, positioning Nigeria among the world's most unequal nations. Approximately half of

the population receives only 8% of the national revenue, contradicting efforts to foster sustainable industrial sector growth for both long and short-term financial development (CBN, 2017).

3.2.2 Stylized Facts

The intricate dynamics of the finance-growth nexus in Nigeria unveil compelling trends, reflecting a nuanced interplay shaped by a confluence of policy, institutional, and external factors (Akintola et al., 2020). Analyzing these stylized facts provides invaluable insights into Nigeria's distinctive trajectory toward prosperity and offers essential guidance for evidence-based policymaking. Notably, the established patterns within this interplay exhibit a noteworthy evolution. From 1981 to 1986, there was a discernible uptrend in financial development, surging from 5.80% to 7.57%, coinciding with a transformation in GDP growth rates from -13.13% to 0.06%. However, a dip in financial development to 5.24% in 1990 led to a contraction in GDP growth to 0.36% in 1991. This volatility underscores the sensitivity of output growth to financial sector fluctuations. Nevertheless, a subsequent rebound in both financial development (to 8.23%) and GDP growth (to 4.63%) highlights the potential positive impact of financial development on output growth (CBN, 2023; World Bank, 2023). These empirical observations bolster the forthcoming correlation test results, demonstrating a noteworthy correspondence between fluctuations in financial development and GDP growth rates, as evidenced in Figure 3.1.

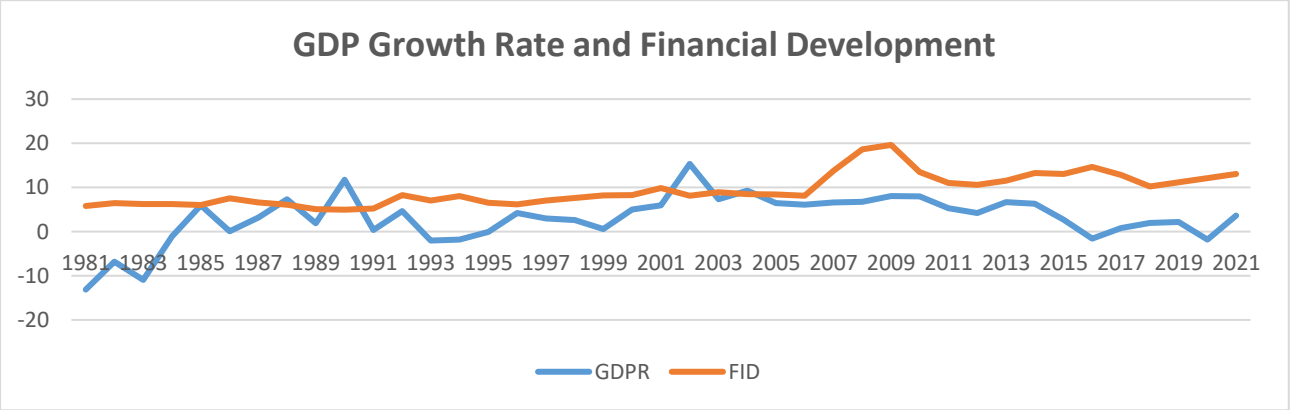

Figure 3.1: Trend of Output Growth Rate and Financial Development in Nigeria
Source: *Author's Computation, 2023 from CBN and World Bank Databases.*

The deceleration in GDP growth rate is not solely attributable to a decline in financial development but is compounded by significant external factors, notably the aftermath of post-election unrest following the non-declaration of M.K.O. Abiola as the winner of the presidential

election held on June 12th, 1993 (Obamuyi & Faloye, 2018). Despite the downturn in financial progress to 6.17% in 1996, a deviation from previous trends, a corresponding surge in GDP growth rate to 4.19% was observed. Subsequently, both financial development and GDP growth rates witnessed notable expansions, reaching 9.88% and 5.92%, respectively, by 2001. Pinnacle points were notably reached in 2009 with financial development peaking at 19.62%, and in 2002 with output growth hitting 15.33%. However, 2012 marked a contraction in both financial development (10.60%) and output growth (4.23%). While a recovery in financial development to 14.61% was observed in 2016, simultaneous output growth dwindled to -1.6%. The onset of the COVID-19 pandemic in 2020 precipitated a recession (-1.79%), but 2021 demonstrated signs of recovery, with financial development and output growth rates improving to 13.06% and 3.64%, respectively (CBN, 2023; NBS, 2023).

Table 3.1: Five (5) Yearly Average Growth Rate of GDP and Financial Development

Year Range	Average GDP Growth Rate	Average FID Growth Rate
1981-1985	-3.009	6.553
1986-1990	3.439	6.459
1991-1995	1.816	6.485
1996-2000	3.737	7.315
2001-2005	7.868	9.939
2006-2010	6.095	13.309
2011-2015	3.460	12.917
2016-2020	0.109	12.485

Source: *Author's Computation, 2023.*

Table 3.1 presents the 5-yearly growth rates of Nigeria's Gross Domestic Product (GDP) and Financial Development (FID) spanning from 1981 to 2021, offering insights into the country's economic evolution. These stylized facts distilled from the data unveil critical trends shaping Nigeria's economic landscape. The GDP growth rate exhibited notable volatility, with a significant downturn in the early 1980s averaging approximately -3.01% and subsequent oscillations, peaking at 7.87% in the 2000s before dwindling to 0.11% during 2016-2020. Conversely, Nigeria's financial development showcased more consistent growth, with FID growth rates maintaining an average range of 6.46% to 13.31% throughout the examined periods. Particularly noteworthy was the substantial acceleration of FID growth during the mid-2000s, reaching an average of nearly 13.31% from 2006 to 2010 (CBN, 2023; World Bank, 2023). The data suggests an asymmetrical relationship between GDP and FID growth, with

FID, displaying more stability amidst GDP fluctuations, indicating its resilience to short-term economic shocks. The decline in both GDP and FID growth rates post-2015 underscores the impact of diverse factors, including domestic and global economic challenges, policy shifts, and external shocks (Azubuike, 2019). Nonetheless, a discernible positive correlation between FID and GDP growth persists, underscoring the symbiotic relationship between financial development and output expansion in Nigeria, particularly evident during the mid-2000s.

3.2.3 Theoretical Underpinning

Schumpeter (1911) argues that a tight nexus exists between financial development and economic output growth. Subsequent studies have bolstered this assertion significantly. Researchers like Levine (2021) emphasize that the degree of financial advancement serves as a robust predictor for forthcoming growth, capital accumulation, and technological shifts. Primarily, the significance of financial development is theoretically acknowledged owing to its pivotal role in economic growth mechanisms. This segment delineates the two primary macroeconomic growth paradigms, delves into the theory of financial development, and elucidates the plausible theoretical linkage between finance and growth dynamics.

3.2.3.1 Neoclassical Growth Theory

The emergence of neoclassical growth theory traces back to the twentieth century. Banam (2010) underscores its roots in Harrod-Domar's 1946 model, positing that economic growth hinges on two pivotal factors: the accumulation of savings and the efficiency of capital utilization, denoted as capital per output ratio. This model emphasizes the paramount importance of savings in production, asserting that their efficient allocation amplifies productivity, thereby fueling output expansion. Solow's seminal work in 1956 further refined this framework by incorporating labor and exogenously driven technological progress (Nor, 2015). The neoclassical growth theory, thus, entails a long-term linear production function integrating capital, labor, and exogenous technological advancements.

$$Y = TF(K, L) \tag{3.1}$$

Y = output

T = Exogenous technology

K = capital, L = labor

This theory underscores capital accumulation as pivotal in driving economic growth, as depicted in its production function. It posits that augmenting capital aligns with labor force expansion, while the capital-to-labor ratio delineates growth trajectories. A higher ratio, coupled with exogenous technological advancements, amplifies productivity, fostering economic expansion. Notably, technological progress in this context pertains to qualitative shifts in production, such as enhanced workforce education and scalable production methods, rather than mechanization (Nor, 2015). While savings spur temporary output boosts, sustained growth hinges on technological advancements, facilitating movement to elevated growth paths. This theory, akin to the Harrod-Domar model, underscores the interchangeability of capital and labor via technology.

The neoclassical growth theory, akin to other theoretical constructs, rests on several assumptions. Firstly, it posits that net savings fuel investment, augmenting physical capital stock, and thus propelling growth (Kularatne, 2001). Savings, determined chiefly by income, dictate investment levels and capital accumulation. Secondly, the theory overlooks the role of finance, disregarding alternative capital sources like debt and financial markets (Froyen, 2009). Thirdly, it contends that economic policy exerts minimal influence on sustained development. Lastly, barring capital, the model assumes constancy among factors and zero capital depreciation. These assumptions underpin the neoclassical growth theory, shaping its framework and implications for economic dynamics.

3.2.3.2 Endogenous Growth Theory

The endogenous growth theory predates its neoclassical counterpart, offering fundamental insights into sustained economic expansion, also known as the new growth theory. Kar et al. (2008) elucidate its essence: "The endogenous growth theory delves into the origins of exogenous technical progress, thus underpinning a nation's growth trajectory." Central to this theory is the pivotal role of technological advancements in driving economic prosperity, spurred by profit-driven agents' innovations. Rooted in the venerable Pagano AK Model, it surpasses by illuminating the significance of financial intermediation. Most endogenous growth models, extensions of the AK Model, elucidate the intricate dynamics of financial development and economic growth. Rebelo (1991) further expounds on Pagano's AK model:

$$Y_t = AK_t \quad (3.2)$$

Y_t = National income or output at time t

A = constant

K = capital stock

Equation (3.2) delineates a linear production function, showcasing fixed returns to capital, leading to escalating national income with increasing capital stock represented by A. This highlights the model's superiority over neoclassical growth theory. Additionally, the model acknowledges capital stock variability, equating it to net investment, the disparity between gross investment and capital depreciation, as illustrated in equation (3.3).

$$I_t = K_{t+1} - (1 - \delta)K_t \quad (3.3)$$

Equation (3.3) introduces financial intermediation, illustrating the financial spread, which Pagano (1993) via De Haas (2001) defines as national savings denoted by (1-δ), retained within the intermediation process. Financial agents earn income from this spread during intermediation. The economic growth rate is then formulated as follows:

$$g_t = A\varphi_s - \delta \quad (3.4)$$

Equation (3.4) delineates the economy's growth rate, a function of net savings (φ), adjusted for depreciation.

Pagano's AK model suggests three theoretical pathways through which financial intermediation drives economic advancement. Firstly, finance bolsters growth by elevating the savings rate (Bencivenga & Smith, 1991), channeling savings into investment, thereby stimulating financial development and fostering growth. Secondly, investing in the financial system enhances capital productivity (De Haas, 2001), as liquidity breeds more liquidity, amplifying capital stock to spur economic growth. Lastly, financial intermediation boosts savings, channeled back into the financial system to fuel economic expansion. These pathways hinge on the assumption of no loss during intermediation. The endogenous growth theory underscores the substantial influence of economic policies on sustained growth (Kar et al., 2008), emphasizing technology's pivotal role as an endogenous driver of long-term growth.

3.2.3.3 Financial Development Theory

McKinnon (1973) and Shaw (1973) laid the groundwork for financial development theory (Sbia & Alrousan, 2016). Money holds central importance in McKinnon's framework, where it complements investment. McKinnon posits that available money determines investment levels, with deposit rates shaping real returns and financing investment to drive growth. Shaw (1973) extends this by introducing debt intermediation, asserting that borrowing and lending foster investment, bolstering output growth. Money deposited serves as investment finance, attracting more deposits via interest income. Borrowing augments investment, enhancing growth dynamics. Both theories emphasize the vital role of financial mechanisms in stimulating economic development.

The McKinnon-Shaw (1973) financial development theory amalgamates McKinnon's and Shaw's perspectives. Central to contemporary finance-growth studies, it posits money and capital as complements, highlighting the significance of debt finance in fostering investment and economic prosperity. Ghosh & Karmakar (2017) assert that high real interest rates, per the McKinnon-Shaw model, spur savings, investment, and growth. In contrast to the neoclassical stance favoring declining interest rates to boost borrowing and investment, the McKinnon-Shaw theory underscores the efficacy of high-interest policies in stimulating savings for investment, cementing its status as a cornerstone theory in financial development.

3.2.3.4 Theoretical Linkage between Financial Development and Output Growth

The theoretical discourse on the finance-growth nexus finds its roots in Schumpeter's seminal work (1911). Terming the 'early view', Schumpeter posits that innovation within financial intermediaries drives financial progress, subsequently fueling real GDP growth. Galbis (1977) and Fry (1978, 1980) expand on Schumpeter's theory, highlighting the adverse effects of government intervention in the financial system, such as credit ceilings and high reserve requirements, on financial sector advancement and economic prosperity. Greenwood & Smith (1997), echoed by Levine (1997) via Eita (2007), emphasize that credit creation, unhindered by deposit constraints, fosters investment, productivity, and ultimately economic growth. While Calderon & Liu (2003) and Apergis et al., (2007) reinforce this perspective, debates persist on the relationship's significance for policy development.

Ongoing theoretical discourse on the finance-growth nexus has fostered contemporary arguments rooted in the endogenous growth theory, pioneered by Patrick (1966). Building upon

Schumpeter's early view, it delves into the intricate dynamics between financial progress and tangible output, elucidating four theoretical paradigms: supply-leading, demand-following, bidirectional, and independent causality hypotheses. These patterns explore the nature and directionality of the relationship between financial advancement and economic growth, enriching our understanding of the complex interplay between financial factors and real economic outcomes.

The supply-leading causality hypothesis, supported by Levine & Zervos (1998), and Calderon & Liu (2003), asserts that financial progress drives real GDP growth. This hypothesis posits a one-way causality from the financial to the real sector. It suggests that when financial sector growth precedes demand, output increases, fostering economic expansion, aligning with Schumpeter's (1911) perspective on the pivotal role of the financial system in economic growth. This notion underscores the significance of financial development in shaping overall economic performance.

In direct opposition to the supply-leading causality hypothesis, the demand-following causality hypothesis posits that economic growth drives financial expansion (Ikhide, 2015). Here, financial development reacts passively to real output growth, with any constraints in the financial sector attributed to insufficient demand for financial services. This hypothesis, advocated by Quixina & Almeida (2014), establishes a unidirectional causality from economic growth to financial development, echoing Robinson's notion that finance follows enterprise, underscoring the interdependence between economic activity and financial sector growth.

The bidirectional causality hypothesis integrates the supply-leading and demand-following causality hypotheses, termed the 'hybrid' view. Ikhide (2015), elucidate proponents' stance that financial expansion drives GDP growth, while economic growth reciprocally enhances financial progress. Patrick (1966) developed this hypothesis to explore evolving dynamics in economic and financial development over time. It suggests a shift from supply-leading to demand-following causality as financial markets mature, reflecting changing priorities in economic development. Ultimately, bidirectional causality theory underscores the evolving nature of the finance-growth nexus over developmental stages.

Finally, the independent causality hypothesis posits that financial development and economic growth operate independently (Habibullah & Eng, 2006). It asserts that financial progress neither drives economic advancement nor is influenced by it. While theoretically plausible, empirical evidence suggests otherwise. This hypothesis challenges the notion of a causal

relationship between financial and economic dynamics, suggesting that factors beyond financial development and real output drive economic growth. Yet, it remains a subject of theoretical inquiry due to its divergence from conventional views on the interconnectedness of financial and economic systems.

3.2.4 Empirical Review of Literature

3.2.4.1 Evidence from Advanced Countries

The literature on the finance-growth nexus extensively examines the multifaceted relationships between financial development and output growth across various economies. Several studies underscore the pivotal role of financial institutions and markets in facilitating economic activities, enhancing resource allocation, and fostering innovation, which collectively spur output growth. Notably, research by Öncel et al., (2024) analyze the impact of four financial development indicators and export performance on economic growth in nine Commonwealth of Independent States (CIS) from 1995 to 2020. Using PVAR and VECM for long-term relationships and FMOLS and DOLS for coefficient estimates, they find a cointegration between economic growth, export, broad money, domestic credit, and monetary sector credit. While financial development and exports positively influence economic growth, monetary sector credit negatively affects it, and gross capital formation's impact is inconclusive. Combined results suggest that financial development has a stronger long-term positive effect on economic growth than exports.

Mulugeta (2024) investigates the impact of remittances on output growth volatility, contingent on financial development levels, across 17 Eastern and Southern African markets from 1981 to 2019. Using an endogeneity-robust system generalized method of moments estimator for dynamic panel models, the study finds that remittances reduce output growth volatility, supporting the counter-cyclicality hypothesis. The stabilizing effect of remittances is more significant in countries with well-developed financial systems. The results, robust across different measures of output volatility, suggest that the volatility-reducing influence of remittances strengthens with higher levels of financial development.

Chiwira (2023) explores the relationship between financial development and economic growth in the Southern African Development Community (SADC) from 1980 to 2020. This study uniquely divides the SADC into middle-income and low-income countries to discern income effects on the relationship. Utilizing panel data, it employs the Autoregressive Distributed Lag

(ARDL) Bounds and Toda-Yamamoto and Dolado-Lütkepohl (TYDL) models to analyze causality. Findings reveal that in the short run, financial development, particularly through domestic credit to the private sector, stimulates economic growth. The long-term focus should prioritize promoting bank deposits. Causality tests present mixed results. Strengthening financial sector legislation and supervision is recommended for enhanced efficiency and realizing the benefits of financial innovation.

Mammadov & Ahmadov (2021) address the pivotal link between financial development and economic growth, particularly crucial during financial crises. Focusing on the Azerbaijani economy, the study employs VECM model estimation and Granger causality analysis on monthly data spanning 2005 to 2019. Findings uncover a bidirectional relationship between financial development and economic growth in Azerbaijan. This highlights the intricate interplay between financial dynamics and economic prosperity, emphasizing the need for comprehensive policies that foster symbiotic growth in both domains, especially in the face of economic turbulence or crises.

Manu et al., (2020) scrutinized the intricate relationship between financial development (FD) and economic growth (EG) from 1980 to 2017, utilizing panel vector autoregressive and panel quantile regression methods. Results underscored significant cointegration between FD and EG across countries. Granger causality tests revealed foreign direct investment (FDI) and trade as causal factors for per capita gross domestic product. This research aims to offer policymakers comprehensive insights into the FD-EG nexus. It includes analyses of various African regions to ensure robustness, advocating for financial system restructuring and economic structural changes crucial for sustainable growth in Africa.

Chen et al., (2020) scrutinized the asymmetric influence of financial development on economic growth, incorporating inflation and government expenditure asymmetries into the model. The nonlinear auto-regressive distributive lag (NARDL) technique was applied. Results reveal that positive financial development shocks in the short term boost growth, while negative shocks decrease it in the long term. Inflation shocks reduce growth, while government expenditure impacts growth variably. Stable inflation, regulated spending, and robust financial system development are pivotal for fostering economic growth. Policies promoting low inflation, controlled spending, enhanced financial institutions, and resource mobilization are recommended for sustainable growth.

Škare et al., (2019) scrutinize Poland's finance-economic growth relationship via time series analysis. They unveil a significant nexus between finance and economic growth in Poland, highlighting the oversight of lending structure in most studies. Results reveal the significance of considering the share of household and corporate credits, indicating a larger impact on economic growth. Notably, studies using total private credit or total credit value tend to underestimate financial development's influence. The study advocates for policymakers and researchers to account for bank lending structure. Moreover, it suggests potential long-memory properties in financial series, urging the use of fractional integration methods for deeper insights.

Ono (2017) investigates the finance-growth nexus in Russia using the vector autoregresssion model, incorporating oil prices and foreign exchange rates. Spanning 1999-2008 (Sub period 1) and 2009-2014 (Sub period 2), findings from Sub period 1 reveal causality from economic growth to money supply and bank lending, indicating demand-following responses. In Sub-period 2, economic growth Granger causes bank lending, while no causality is observed from money supply to economic growth, possibly due to reduced intervention in foreign exchange markets. These results underscore the dynamic interplay between economic growth, financial variables, and external market influences, providing insights into Russia's financial landscape.

3.2.4.2 Evidence from Sub-Sahara African

Taddese & Abebaw (2023) delve into the contentious issue of financial sector development's impact on economic growth in 25 sub-Saharan African countries from 2010 to 2017. Utilizing dynamic panel data models, the study evaluates the effects of financial sector depth, access, and efficiency on economic growth through two-step system GMM estimation. Financial sector depth, access, and efficiency are represented by credit to the private sector per GDP, commercial bank branches per 100,000 adult population, and Return on Assets, respectively. Results indicate a positive and statistically significant impact of these dimensions on economic growth, advocating for policies to enhance financial sector depth, accessibility, and efficiency.

Hyacinth et al., (2023) empirically explore the relationship between financial development and economic growth in sub-Saharan Africa from 1995 to 2022. Employing preliminary tests, they utilize two-stage estimated generalized least squares and robust least squares methods. Financial development is measured through indices focusing on the banking sector and market-based indicators (Ustarz & Fanta, 2021). Results reveal a significant positive impact of the

banking sector index on GDP per capita, while the market sector index has a negative impact. Government expenditure positively influences GDP per capita. Policy implications include advocating for inclusive financial strategies, sustainable banking sector development, and promoting capital market growth with favorable listing rules and global integration to reduce impediments.

Bakar et al., (2022) aimed to examine the impact of financial development (FD) on economic growth across different periods in sub-Saharan Africa (SSA) and explore the growth-enhancing transmission channels. Employing the system generalized method of moments (SGMM) on data from 45 SSA countries spanning 1990 to 2017, findings revealed mixed long-run effects pre-millennium Development Goals (MDGs) and during MDGs, but positive outcomes in the main period. Key transmission channels included institutional quality, human capital, and foreign direct investment. Despite data limitations, the study underscores the importance of enhancing human capital, governance quality, and FDI attractiveness to foster economic growth in SSA.

Okuyan (2022) delves into the nuanced relationship between financial development and economic growth in developing countries, aiming to elucidate divergent views in the literature. Analyzing data from 19 nations, the study employs Pesaran et al.'s (2001) bounds test to ascertain cointegration and Toda Yamamoto's causality test (1995) to determine causality. Findings reveal bidirectional causality in four countries, unidirectional causality from financial development to economic growth in four countries, and no causality in 11 countries. This underscores the complexity, suggesting no universal approach applies. The research underscores the necessity for tailored approaches to understand the financial-economic dynamics in each country.

An et al., (2021) examine the intricate relationship between financial development and economic growth in sub-Saharan Africa (SSA), categorized into low, middle, and upper-income segments to discern income-based variations in finance's impact on growth. Employing dynamic and static panel data models, 30 SSA nations are analyzed across the 1985–2015 period. Results reveal that while financial depth and intermediation bolster growth in upper-income and overall SSA, they hinder growth in low and middle-income countries. Credit supply benefits low-income nations but detrimentally affects middle-income and overall SSA growth. Financial liberalization spurs growth in upper-income and overall SSA but curtails it

in low and middle-income countries, highlighting nuanced income-dependent effects of financial development and liberalization on economic growth.

Ibrahim & Alagidede (2018) investigate the economic growth implications of disproportionate growth between finance and the real sector across 29 sub-Saharan African countries from 1980 to 2014 using panel data. Employing system generalized methods of moments (GMM), findings underscore finance's role in fostering economic growth, contingent upon balanced real and financial sector growth. Balanced sectoral growth yields higher growth elasticity. Unchecked credit expansion detrimentally affects economic growth by funding risky investments and excessive consumption, leading to inflation. Nonetheless, the study highlights a stronger excess finance-economic growth link through the investment channel.

3.2.4.3 Evidence from Developing African Countries

El Yamani (2024) investigates the impact of financial development on Morocco's economic growth, emphasizing the banking sector's role in financial intermediation. Utilizing a vector error correction model (VECM) and secondary data from 2007Q1 to 2020Q4, the study examines real GDP per capita and financial development indicators such as the ratio of private sector credit (CPS) alongside control variables like government consumption share (GC), real interest rate (IR), trade openness (TO), and inflation rate (INF). Results indicate that financial sector development positively influences both short- and long-term economic growth in Morocco.

Fakudze et al., (2022) investigated the interplay between financial development and economic growth in Eswatini using quarterly time series data from 1996 to 2018. Employing the Auto Regressive Distributed Lag bounds test and Granger causality test, findings revealed positive long-run and short-run relationships between the private sector credit-to-GDP ratio, trade openness, and economic growth. However, money supply exhibited a negative association with output in both time frames. Government size relative to GDP negatively impacted long-run growth but temporarily boosted short-run growth. The study suggests policy interventions to enhance private sector credit, optimize government spending, manage liquidity, boost trade, and strengthen regulatory frameworks for non-bank financial sectors.

Mohieldin et al., (2019) elucidate the trajectory of Egypt's banking sector and financial development trends from 1980 to 2016. Utilizing IMF-provided financial development indexes, the study employs econometric time series modeling to probe the nexus between

financial sector evolution and economic growth. Key findings highlight a robust correlation between real per capita growth and financial development, especially concerning money supply to GDP. Notably, banking service accessibility and efficiency exhibit no direct link with income levels. However, the Financial Markets Access Index, capturing market capitalization and corporate debt issuers, notably correlates with real per capita GDP. The study underscores the imperative for Egypt to bolster its financial services sector, particularly through enhanced bank financing for private enterprises, and further develop its capital market to sustain inclusive economic growth.

Ofori-Abebrese et al., (2017) examine the finance-growth relationship in Ghana from 1970-2013 using the ARDL approach and Granger causality test. They find a significant positive association between domestic credit to the private sector and economic growth, while domestic deposits show no such connection. Moreover, the study reveals the Ghanaian economy's reliance on changes in domestic credit to the private sector, with unidirectional causality from economic growth to domestic deposits. The findings underscore the importance of enhancing financial system efficiency to direct deposits towards growth-centric investments, facilitating long-term economic growth, and suggesting strategic reforms for policymakers.

3.2.4.4 Evidence from Nigeria

Lucky & Mbanefo (2024) analyzed the impact of financial development on Nigeria's economic performance from 2009 to 2020 using data from the Central Bank of Nigeria's Statistical Bulletin. The study measured economic performance by Real Gross Domestic Product (RGDP) and financial development through point of sales, payment mobility, automated teller machines (ATMs), and internet transfers. Employing unit root tests for variable stationarity and Johansen cointegration tests for long-term relationships, the results revealed a positive and significant relationship between financial development and economic performance. This aligns with Goldsmith's (1969) findings on financial development and growth. Recommendations include expanding ATMs in semi-urban/rural areas, increasing POS outlets, and enhancing public awareness of e-payment channels.

Saranu et al., (2024) examined the effect of financial inclusion on Nigeria's economic growth using an ex-post facto design. The study analyzed variables including credit to the private sector, ATM transactions, and gross domestic product from 2001 to 2021, sourced from the Central Bank of Nigeria's Statistical Bulletin. Utilizing the ordinary least squares (OLS)

method, findings revealed a positive and statistically significant relationship between CPS and GDP, while ATM transactions showed a positive but statistically insignificant relationship. The study recommends that monetary authorities enhance private-sector credit availability, potentially by lowering interest rates to stimulate economic growth.

Oluranti et al., (2024) investigate the impact of banking sector reforms in Nigeria, specifically targeting financial accessibility for the real sector, which remains underfinanced despite reforms. High nominal interest rates deter firms from borrowing from deposit money banks, which hold about 90% of financial sector assets. The study examines the long-term relationship between financial development indicators and real sector growth from 1970 to 2022 using Johansen and Juselius' cointegration and Vector Error Correction Modelling (VECM). Findings show that in the short run, liquid liabilities, trade openness, and private sector credit significantly influence the real sector. In the long run, these factors, along with interest rate spread and government expenditure, are influential. The study supports McKinnon and Shaw's (1973) financial liberalization theory and recommends focusing on low-cost credit and interest rate liberalization to boost real sector growth.

Anthony-Orji et al., (2023) examine the impact of financial development and inclusion on Nigeria's economic growth from 1981 to 2019. Utilizing a classical linear regression model, the study finds that both financial development and inclusion significantly and positively influence economic growth. The authors recommend policies to enhance the efficiency of financial intermediaries in mobilizing funds, making them more accessible and affordable for individuals, businesses, and productive sectors. This approach aims to ensure that financial development and inclusion continue to drive growth in Nigeria.

Afolabi (2022) investigates the combined impact of financial liberalization and trade openness on Nigeria's economic growth from 1981 to 2018. Employing annual time-series data, stationarity is confirmed through the Augmented Dickey-Fuller (ADF) unit root test, while the Johansen cointegration test affirms long-run relationships among variables. Dynamic Ordinary Least Squares (DOLS) estimation and Granger causality tests are employed. Findings highlight significant effects of financial development, exchange rate, and interest rate spread on real GDP. However, trade openness and its interaction with financial development show no significant impact. The study aligns with demand-following and trade-led growth hypotheses, suggesting policy frameworks enhancing financial sector intermediation and trade diversification to boost Nigeria's competitiveness and national output.

Omankhanlen et al., (2022) elucidate that financial sector growth facilitates the allocation of resources, driving domestic development. Nigeria's manufacturing sector, contributing 4% to GDP, operates below capacity, hampering productivity. The financial sector decline exacerbates this. Analyzing 1990-2019 data, the study explores market capitalization, money supply, and private sector credit's impact on economic growth. Utilizing Autoregressive Distributed Lag, findings indicate market capitalization and money supply/GDP ratio positively influence Nigeria's economic growth. However, the credit to private sector/GDP ratio lacks significance. Urgent measures are recommended to enhance macroeconomic stability, curb non-performing credits, ensure effective private sector credit allocation, bolster financial governance, and fortify risk management.

Weli et al., (2022) explore how financial system advancements impact economic growth in Sub-Saharan Africa's largest economies. Utilizing gross domestic product growth as the dependent variable, financial development is assessed via institutions and markets. Variables include money supply, bank branches, interest rate spread, and more. World Bank data is utilized, with separate models for each country. Employing Augmented Dickey-Fuller and autoregressive distributive lag tests, results show only the money supply negatively influences Nigeria's growth significantly. South Africa exhibits no long-term relationship between financial development dimensions and output. The study concludes that both countries' financial development isn't sufficiently advanced to spur desired economic growth, recommending expanded financial institutions and markets, including rural banking.

Umar et al., (2021) delve into the intricate dynamics of financial development and economic growth, considering financial globalization uncertainty and inflation within Nigeria's economic framework from 1980–2019. Employing threshold Autoregressive cointegration and nonlinear autoregressive distributed lag methods, the study explores asymmetric relationships. Results unveil a long-run association amidst asymmetries. Positive financial development shocks curtail economic growth, while negative shocks enhance productivity. Inflation displays a positive relationship, contrasting the insignificant impact of financial globalization uncertainty. The findings prompt discussions on policy implications for Nigeria's productivity enhancement strategies, emphasizing the nuanced interplay between financial development, economic growth, and external factors.

Albert et al., (2021) conducted a comprehensive analysis on financial development's impact on Nigeria's economic growth from 1980 to 2019. Utilizing time series data, including GDP

growth rate, real interest rate, gross domestic savings, and domestic credit to the private sector, the study employed these variables to assess their relationships. Results revealed an inverse relationship between real interest rate and gross domestic savings with GDP growth, while domestic credit to the private sector exhibited a positive correlation. The model exhibited a strong fit, explaining approximately 93% of GDP variation. The study underscores the necessity for enhancing Nigeria's financial system through innovative practices, robust regulation, efficient fund mobilization, and improved services to foster economic growth.

Farouq et al., (2020) investigate the intricate relationship between economic growth, foreign direct investment (FDI), and Nigeria's financial sector from 1970 to 2018. Employing Gregory and Hansen's co-integration, nonlinear ARDL elasticity estimation, and Diks and Panchenko's causality techniques, the study reveals a long-term connection among the variables. Notably, asymmetry in economic growth's impact on financial development is evident. Unidirectional non-linear causality from economic growth to financial development is observed, along with FDI's one-way causality towards financial development. Overall, economic growth and FDI exert a positive and substantial influence on financial development. The study recommends enhancing the real sector and attracting more external investors to foster positive spillover effects on financial sector development.

Akintola et al., (2020) delved into the influence of financial sector development on Nigeria's economic growth, focusing on the distinct impacts of money, capital, and foreign exchange markets. Analyzing quarterly data from 2000Q1 to 2019Q4, findings revealed positive and significant long-term effects of financial deepening, banking system liquidity, and the all-share index on real output growth. Conversely, the exchange rate spread correlated with declining real output growth. The study advocates prioritizing the growth of money and capital markets in Nigeria. Specifically, adjusting policy rates and monetary instruments to enhance banking system liquidity can amplify private-sector lending, thereby fostering economic growth.

Imoagwu & Ezeanyeji (2019) scrutinized the financial development-economic growth nexus in Nigeria from 1986 to 2017. Employing recent econometric methodologies like ADF, PP, and cointegration tests, they assessed the impact of financial deepening, interest rates, stock market capitalization, and credit to the private sector on economic growth. Results indicate a significant positive short-term relationship between financial development and economic growth, with a negative impact in the long term. Causality runs from financial development to economic growth. Policy implications suggest that fostering an efficient financial system,

minimizing bureaucratic hurdles, and prioritizing financial development could spur sustained economic growth in Nigeria.

Kamalu et al., (2019) aimed to scrutinize the causal relationships among financial development, financial inclusion, trade openness, foreign direct investment, and economic growth in Nigeria from 1970 to 2018. Employing Ng Perron, Zivot Andrew unit root tests, and Gregory and Hansen cointegration tests, the study found stationary and cointegrated variables in the long run. Results showed a one-way causal link from financial inclusion to economic growth and a two-way link between financial development and economic growth. However, no causal relationship was found between trade openness and economic growth. The study concludes that financial development and inclusion significantly impact economic growth, particularly when formal financial services are accessible to a broader population, emphasizing the importance of policies promoting credit to the private sector for enhanced growth in Nigeria.

Okpara et al., (2018) investigated the nexus between financial development and economic growth in Nigeria, scrutinizing the impact of financial development on economic expansion. They examined the presence of supply-leading and demand-following hypotheses. Utilizing cointegration and vector error correction models, the study assessed the long-run effects of financial development on economic growth, validated by diagnostic tests. Granger causality tests explored hypotheses. Findings revealed a long-run relationship between financial development and economic growth, with banking system financing being notably inadequate. Bidirectional causality existed between capital market liquidity or economic volatility and economic growth. Recommendations include robust financial inclusion measures to bolster banking sector financing for substantial economic growth.

Osisanwo (2017) investigates Nigeria's financial development's influence on economic growth using annual time series data from 1980 to 2014. Employing unit root and co-integration tests, followed by ordinary least square estimation, the study evaluates long-run impacts and policy implications. Financial indicators include financial deepening, bank deposit liabilities, stock market capitalization, and interest rates, with GDP measuring economic growth. Findings reveal positive impacts of financial development on economic growth, notably from banking and stock market development. However, the adverse effect of private-sector credit suggests high-interest loans hinder output. The study recommends low-interest loans for local industries to foster finance-led growth in Nigeria.

3.2.5 Research Gap

A critical gap in the current literature on the relationship between financial development and output growth in Nigeria pertains to the limited exploration of the transmission mechanisms through which financial development affects different sectors of the economy. While existing studies have established a positive correlation between financial development and economic growth, there remains a lack of detailed analysis on how specific channels of financial intermediation, such as credit allocation, investment patterns, and risk management practices, impact the performance of key sectors such as manufacturing, agriculture, and services. Failing to dissect these transmission channels obscures our understanding of the sectoral dynamics of financial development and hinders the formulation of targeted policies to optimize its contribution to output growth across diverse sectors of the Nigerian economy.

The omission of sectoral transmission mechanisms from the analysis has several implications for research and policy formulation. Firstly, different sectors of the economy exhibit varying levels of dependence on financial services and may respond differently to changes in financial development indicators. For example, while the manufacturing sector may rely heavily on bank credit for investment and expansion, the agricultural sector may require specialized financial products tailored to its unique risk profile and seasonal cash flow patterns. Neglecting these sectoral nuances obscures the differential impacts of financial development on output growth and may lead to suboptimal policy interventions that fail to address the specific needs of each sector.

Secondly, overlooking sectoral transmission mechanisms overlooks potential spillover effects and feedback loops within the economy. Financial developments in one sector may have ripple effects on others through supply chain linkages, input-output relationships, and demand-side dynamics. For instance, increased access to credit for smallholder farmers may boost agricultural productivity and create demand for agro-processing industries, thereby stimulating growth in the manufacturing sector. By failing to account for these inter-sectoral linkages, researchers and policymakers may underestimate the full economic impact of financial development initiatives and miss opportunities to leverage synergies between sectors for enhanced output growth.

Addressing this gap in the literature requires a nuanced analysis of the sectoral transmission mechanisms through which financial development influences output growth in Nigeria. By identifying the key channels through which financial development affects different sectors of

the economy, this study provides policymakers with actionable insights for designing sector-specific policies that harness the potential of financial development to drive inclusive and sustainable output growth in Nigeria.

3.3 Theoretical Framework Linking Financial Development and Economic Growth

3.3.1 Solow-Swan Growth Model

The Solow-Swan growth model is a pivotal framework in economics that seeks to explain the determinants of long-term economic growth within a country. In contrast to the earlier exogenous growth models, which emphasized the role of population growth (Labour input), savings and investment, especially when the economy is at full-employment (Solow, 1956). Central to the Solow-Swan growth model is the concept of "constant returns to scale," wherein the expansion of inputs leads to equal proportional increases in output. This implies that as an economy grows, it can generate positive feedback loops that further accelerate growth. Mathematically, the Solow-Swan model is developed from the Cobb-Douglas production function, with some adjustments by Solow (1956) and Swan (1956). Mathematically, it is expressed as follows:

$$Y = AK(HL)^{1-\alpha} \quad (1)$$

Y = output, A = technological progress, K = physical capital, H = human capital, L = labor, α = output elasticity of capital.

The model suggests that as economies invest more in R&D, their productivity increases, fueling long-term growth. This notion of endogenous technological progress underscores the critical role of human capital and research-driven innovation in fostering sustainable economic development. To showcase the nexus between financial development indicators (credit to private, bank deposit and market capitalization) and economic growth within the endogenous growth framework, researchers (Levine, 1997) have extended the model to incorporate financial factors. The relationship between financial development indicators and output growth is intricate. Financial systems facilitate the allocation of savings to productive investments, fostering output growth. Incorporating financial development indicators into the endogenous growth model requires the integration of a financial sector and its impact on macroeconomic variables. Financial development can be captured through variables such as credit availability, bank deposits and stock market development. Researchers (McKinnon, 2010) have extended

the AK model to include a financial sector, emphasizing the ways in which financial factors interact with technological progress and human capital accumulation to drive growth.

Following McKinnon (2010), the augmented model can be represented as follows:

$$Y = AK(HL)^{1-\alpha}F^{\beta} \quad (2)$$

Where: F = control variables, β = measures the elasticity of output with respect to financial development.

This formulation explicitly demonstrates how financial development interacts with technological progress and human capital to influence economic growth. An increase in financial development (F) can lead to higher investment in productive activities, improved resource allocation, and greater efficiency in capital allocation. This, in turn, enhances the productivity of physical capital (K) and human capital (H), amplifying the overall growth rate. Empirical studies have supported the interconnectedness between financial development and economic growth. Levine (1997) conducted a comprehensive analysis that showcased how financial intermediaries and well-functioning stock markets can facilitate economic growth by channeling savings into productive investments. Similarly, Rajan & Zingales (1998) highlighted the role of financial systems in fostering technological innovation, which is a central tenet of endogenous growth models. Consequently, by modifying equation 2 for the purpose of the study in such a way that Y = gross domestic product growth rate (GDP), K = gross capital formation (GCF), H*L = human capital (HCAP), and F = financial development (FID). Furthermore, F = control variables which include financial development (bank deposit, market capitalization and credit to private sector), trade openness (TOP), and broad money supply (MOS). Given the above modification, the new modified functional model is given as:

$$GDP_t = F(LAB, CAP, MS, FID, TOP)_t \quad (3)$$

Equation (3) presents the functional model, while equation (4) presents the mathematical form of the model given as:

$$GDP_t = \beta_0 + \beta_1 LAB_t + \beta_2 CAP_t + \beta_3 MS_t + \beta_4 FID_t + \beta_5 TOP_t \quad (4)$$

Furthermore, the econometric form of the model is given as:

$$GDP_t = \beta_0 + \beta_1 LAB_t + \beta_2 CAP_t + \beta_3 MS_t + \beta_4 FID_t + \beta_5 TOP_t + \varepsilon_t \quad (5)$$

Notice that $FID = f(BDEP, MCAP, CRED)$ *in all the models*.

3.4 Data and Methodology

3.4.1 Data

This section provides information on the data used for analysis and in achieving the research objectives. The research examines the asymmetric impacts of agriculture finance on economic growth in Nigeria. The empirical analysis utilized annual time series data from 1981 to 2022, which covers 43-year period. The data for this study which include variables such as GDP growth rate (economic growth), human capital (labour), physical capital (gross capital formation), agricultural finance (credits to agriculture), financial development (credit to private sector), money supply (broad money), and trade openness (trade as a ratio of GDP) were be obtained from Central Bank of Nigeria (CBN) Statistical Bulletin 2022, National Bureau of Statistics (NBS) 2022 and the World Bank World Development Indicators (WDI) 2022 databases.

For instance, the data on agricultural financing or credit, money supply, financial development (credit to private) are sourced from the Central Bank of Nigeria (CBN) Statistical Bulletin 2022; while data on economic growth, trade openness, gross capital formation and human capital are sourced from the World Bank World Development Indicator (WDI), 2022. Mathematically, economic growth is computed as growth rate of GDP, while trade openness is calculate by dividing export plus import by gross domestic product before multiplying by 100. Also, money supply and financial development are proxied by broad money and credit to private sector respectively. Although, the study is aware of the challenges of using proxies, however, studies have supported that the use of the above proxies are reliable as well as produces valid research outcomes. The study would have employed data covering 1970 to 2022, however, the unavailability of data namely: gross capital formation, agricultural financing or credits, and credit to private constrained the research to cover between 1980 and 2022 which is 43 years. Importantly, sample covering 41 years not only exceeds the required 30 samples for a normal distribution, it produces robust and valid results for forecast and policy formulation.

3.4.2 Methodology

In order to achieve the research objectives, the study first conducts preliminary tests before the core regression analysis targeted at investigating short and long-run symmetric relationships across the variables of interest. And to achieve the research objectives, robust and modern time series econometric techniques were employed specifically linear ARDL (Pesaran et al., 2001 & Shin et al., 2014) with financial development indicators decomposed. This avails the study an opportunity to investigate the relationships between financial development indicators, agricultural output and economic growth as explained in the Cobb-Douglas production function (Zakari et al., 2021). Notice that the linear ARDL method are applicable in this study because the variables are integrated of order zero (I (0)) and one (I (1)). Also, the variables were cointegrated in the long-run.

To investigate the symmetric impact of financial development on output growth, the model specifies both short and long-run coefficients. Building on the above, the autoregressive distributed lag (ARDL) technique is the most appropriate. As such, the ARDL approach is adopted to examine the symmetric effect of financial development on economic growth. Specifying model 6 below enables the study to examine the individual effect of financial development indicators on output growth.

$$\begin{aligned}\Delta lnGDP_t = \beta_0 &+ \sum_{i=1}^{p} \beta_1 \, \Delta lnGDP_{t-i} + \sum_{i=0}^{p} \beta_2 \, \Delta lnLAB_{t-i} + \sum_{i=0}^{p} \beta_3 \, \Delta lnCAP_{t-i} \\ &+ \sum_{i=0}^{p} \beta_4 \, \Delta lnFID_{t-i} + \sum_{i=0}^{p} \beta_5 \, \Delta lnMS_{t-i} + \sum_{i=0}^{p} \beta_6 \, TOPN_{t-i} + \alpha_1 lnGDP_{t-1} \\ &+ \alpha_2 lnLAB_{t-1} + \alpha_3 lnCAP_{t-1} + \alpha_4 lnFID_{t-0} + \alpha_5 lnMS_{t-0} + \alpha_6 lnTOPN_{t-0} \\ &+ £_t \quad \ldots\ldots\ldots\ldots\ldots \qquad (6)\end{aligned}$$

Where the first part of the equation 6 represents the short-run coefficients, while the second part of the equation is the long-run coefficient, FIDt is financial development and $£_t$ is the stochastic error term. Notice that Δ is the difference operator, ln is the natural log of the variables, β_i represents the coefficient of short-run dynamics, α_i represents coefficients of long run dynamics, and t is the time period. Deductions from the above show that β_4 and α_4 represent the short-run and long-run symmetric impact of financial development on output growth.

3.5 Empirical Results and Discussions

3.5.1 Unit Roots and Bounds Testing of the Variables

In this subsection, we focus on the stationarity or unit roots properties of our selected variables. This is an essential pre-diagnostic test which determines the most appropriate technique to be employed based on whether or not the variables are integrated of order zero (I (0)), one (I (1)) or both. To confirm the presence and level of integration of unit roots, the study adopted the Augmented Dickey-Fuller and Phillip-Perron methods for testing level of stationarity. The augmented Dickey-Fuller and Phillip-Perron test results are presented in Table 2. From Table 2, it can be observed from the Augmented Dickey-Fuller test result which generally confirms that most of the variables namely; GDP growth (GDP), agricultural output growth (AGP), bank deposit (BDEP), market capitalization (MCAP), credit to private sector (CRED), gross capital formation (CAPFORM), human capital (HCAP), broad money supply (MS) and trade openness (TOPN) are stationary at order one (I (1)). However, variables such as bank deposit, GDP growth and money supply are stationary at order zero (I (0)), while the rest are not stationary at level. Thus, they become stationary only after first differencing at order one (I (1)). The mixed levels of integration is the foundation upon which the study selected the ARDL method.

Table 3.2: Unit Roots Test using Augmented Dickey-Fuller and Phillip-Perron Tests

	ADF Test		**Phillip-Perron Test**	
Variable	***Level I(0)***	***Ist Diff I(1)***	***Level I(0)***	***Ist Diff 1(1)***
	t-stat.	***t-stat.***	***t-stat***	***t-stat.***
AGP	-2.559	-6.964 ***	-2.764 *	-6.415 ***
BDEP	-3.411 **	-6.152 ***	-3.563 **	-6.941 ***
CRED	-2.212	-5.908 ***	-1.531	-7.831 ***
MCAP	-1.588	-7.095 ***	-1.321	-9.325 ***
CAPFORM	-1.271	-2.957 **	-1.901	-2.566 *
GDP	-3.142 **	-10.358***	-4.274***	-10.706 ***
HCAP	-1.608	-7.122 ***	-1.608	-7.104 ***
MS	-3.583 **	-6.780 ***	-3.364 **	-12.741 ***
TOPN	-2.378	-7.760***	-2.283	-8.595 ***

Source: Author's computation, 2023 ***, **, *** implies 10%, 5% and 1% levels of significance**

Where AGP = Agricultural output growth, BDEP = Ration of Bank deposit to GDP, CRED = Ratio of Private credit to GDP, MCAP = Ratio of Market capitalization to GDP, CAPFORM = Gross capital formation, GDP = GDP growth rate (Economic growth), HCAP = Human capital, MS = Broad money supply, TOPN = Trade openness (ratio of total trade to GDP).

Interestingly, the results from the unit roots test results as computed by Phillip-Perron in Table 2 lay credence as well as validates the unit roots test result computed by Augment Dickey-Fuller in Table 2. Given these outcomes from the unit roots tests in Tables 2, the bounds test cointegration for variables are conducted to ascertain whether or not variables in the model cointegrate in the long run. The bounds test cointegration result is presented in Table 3.3 below.

Table 3.3: Bounds test for cointegration of variables

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif	I (0)	I (0)
F-Statistic	7.299	10%	3.03	4.06
		5%	3.47	4.57
K	4	1%	4.4	5.72

Source: Author's computation, 2023

The co-integration analysis as presented in Table 3 shows that the probability of the F-statistic (5.87) is 0.0006. Based on this observation, it can be concluded that the mean of the series reverses back to their steady-state after a short-term distortion. Thus, the variables co-integrate in the long run. This finding is a litmus test and sufficient condition for the selection of the ARDL methodology from the basket of options. Given that the variables cointegrate in the long-run, the Autoregressive Distributed Lag (ARDL) model proposed best fits our models and technique for analysis.

Later, we present the various econometrics results and discussions in line with the laid down research objectives. Here, the ARDL result that has financial development as the main regressor is presented in Table 3. Financial development is disaggregated into credit to private sector (CRED), bank deposit (BDEP) and market capitalization (MCAP) expressed as ratio of GDP. We focus our discussion on only the coefficients of financial development indicators, which expresses their impacts on output growth (economic and agricultural output growth) (see Tables 3 and 4 below). The models confirm presence of long-run association as the F-statistic from the bound testing procedure is statistically significant. Hence, the null hypothesis of no association is rejected because the value of the upper bound exceeds the critical values. This confirms the existence of long-run relationship or co-integration among the variables.

3.5.2 Impacts of Financial Development Indicators on Output Growth

This sub-section presents the results showing the impacts of financial development indicators on economic growth. From Table 2, it can be observed that results presented in model 1 shows positive relationship between bank deposits and economic growth, since one unit increase in bank deposit positively enhances economic growth. In model 2, it can be observed that market capitalization has a positive impact on economic growth, since one unit increase in market capitalization positively drives economic growth by 12.4 units. Similarly, in model 3, it can be observed that credit to private sector which is a conventional measure of financial development also exerts positive impact on economic growth. In model 3, it can be observed that one unit increase in credit to private sector triggers approximately 57.8 units increase in economic growth. The regression result in model 4 validates the results in model 1, 2 and 3; as observed financial development indicators positively drive economic growth. Comparatively, bank deposit exerted the highest impact on economic growth, while credit to private sector and market capitalization ranked second and third respectively.

Table 3.4: Long-run and Short-run under ARDL
Dependent Variable: GDP
Method: ARDL
Selected Model: ARDL (1,1,0,0,0,0)

Variable	Model 1	Model 2	Model 3	Model 4
GDP(-1)	0.26	0.196	0.234	0.211**
CAPFORM	1.21E-10	7.05E-11	-	1.42**
CAPFORM(-1)	-1.47E-10	-1.64E-10	-	-2.08*
HCAP	0.068	0.254	0.294	0.191
HCAP(-1)	-	-0.446	-0.390	-0.364*
MS	0.014	0.002	-0.021	-0.005
MS(-1)	-	-0.107	-0.091	-0.083*
TOPN	0.0368	-0.007	0.004	0.001
BDEP	120.5711	-	-	115.601**
MCAP	-	12.443	-	15.620
MCAP(-1)	-	33.272	-	-
CRED	-	-	57.827	52.718*
C	-2.142	11.308	4.898	4.664
R-Squared	0.536	0.597	0.569	0.636
Prob(F-Stat)	0.000	0.001	0.001	0.000
Bound Test (F-stat)	2.776	3.001	2.896	2.716
Durbin-Watson Stat	2.0946	1.914	1.794	1.800
Breusch-Godfrey Test	1.862	1.770	1.800	1.910
LM Test	0.354	0.372	0.270	0.410

Source: Author's computation, 2023

Providing economic interpretations to the relationship between financial development and economic growth, it can be deduced that improvement in financial development system provides cheap funds for investment. This allusion is drawn from the endogenous growth theory (Romer, 1986). Arguably, provision of cheaper investment funds through financial development or credits to private sector enhances macroeconomic indicators namely; employment, balance of payments or trade, income generation and economic growth. Specifically, an improvement in bank deposits initially drives down cost of borrowing, and as such makes available cheap loanable funds for investment purposes. Increase in investment, an important variable in the Keynesian model contributes enormously towards generating economic growth (Keynes, 1956). Thus, the role of lower interest rates cannot be overemphasized as a pathway towards driving promoting growth of small and medium scale enterprises.

Similarly, it was confirmed that improvement in market capitalization which is an important measure for financial development in most cases increases investors' confidence in the Nigerian Stock Market (Iheanacho, 2016). Following economic theory, it can be argued that improvement in market capitalization not only provide secondary funds for private investment and infrastructural financing; favourable stock market performance tends to attract both domestic and foreign investors to invest within listed Nigerian firms. As such, this move drives sectoral growth, which in turn generates economic growth. This theoretical argument also encapsulate the link between credit to private sector and economic growth, since availability of credits for private sector stimulates investments and economic growth. The above theoretical argument is well-stated in the new growth theory.

As noted above, bank deposits contributes the most to economic growth compared to other financial development indictors. The implication of this empirical findings drawn from the result is that a robust banking system will attract huge amount of bank deposits because of customers' confidence in the banking institution. Banking system performs its role as an efficient allocator of credit, by channeling these funds into more productive investments and utilization (Ogege & Boloupremo, 2024). This function of financial intermediary allows deposit money banks to devote funds to the best productive use, and as results in greater multipliers effects by enhancing economic growth. This is usually the case when credits are allocated into the real sector of the Nigerian economy.

Drawing from the above, the result confirms the a-priori expectations of positive relationship between financial development and GDP growth. Following macroeconomic theories, it can be argued that financial development provide funds through credit to private sectors targeted at filling existing resource-gaps. This provides cheaper funds for the private sector to expand their investments, employment and aggregate demand, which in turn drives economic growth. Although this research outcomes contradicts the works of Sajo and Li (2017) and Iheanacho (2016); however, they support the findings of Puatwoe and Piabuo (2017), Iyo and Ekpete (2019) and Ibrahim and Alagidede (2018). The implication of these findings is that financial development indicators remain veritable factor towards driving economic growth process in Nigeria. This outcome is robust even after controlling for the effects of other covariates, as the Adjusted R-squared confirms the model could explain at least 53 percent of variations in the dependent variable in the models 1-4. The post-estimation statistics reveals the results are free from first order serial-correlation because the value of the Durbin-Watson test statistic is approximately 2.0 in models 1-4. The results of the Breusch-Godfrey and LM-test accepts the null hypothesis of absence of multicollinearity and second order serial-correlation in the models.

In the next subsection, we present the results and discussion for the impacts of financial development indicators (bank deposits, market capitalization and credit to private sector as a ratio of GDP) on agricultural output growth in Nigeria. In Table 3, it can be observed that the impact of lagged value of agricultural output growth has positive and significant effects on agricultural output growth. In the case of impact of financial development indicators on agricultural output growth, the result revealed that bank deposits exerted negative impacts, while market capitalization and credit to private sector had significant positive impacts on agricultural output growth, as presented in models 1, 2 and 3 respectively. However, when these financial development indicators were introduced simultaneously into the model 4, it was observed that they all exerted significant positive impacts on agricultural output growth.

Table 3.5: NARDL Estimation Output, Long-run and Short-run Results
Dependent Variable: AGP
Method: ARDL
Selected Model: ARDL (1,0,0,0,1,0)

Variable	Model 1	Model 2	Model 3	Model 4
AGP(-1)	0.608***	0.458***	0.493***	0.211*
CAPFORM	-1.320	1.930	3.330	1.420**
CAPFORM(-1)	-	-5.490	-5.190*	-2.080***
HCAP	-0.049*	-0.156*	-0.126*	0.191
HCAP(-1)	-	-	-	-0.364*
MS	-0.024	-0.056*	-0.036	-0.005
MS(-1)	-	-	-	-0.083*
TOPN	-0.043*	-0.070	-0.070**	0.001
TOPN(-1)	0.125**	0.147**	0.142**	-
BDEP	-5.571	-	-	115.600**
MCAP	-	15.389*	-	15.620
CRED	-	-	24.587*	52.720*
C	9.5870***	16.783***	13.628***	4.664
R-Squared	0.704	0.729	0.730	0.636
Prob(F-Stat)	0.000	0.000	0.000	0.001
Bounds Test (F-stat)	2.615	2.795	2.999	2.664
Durbin-Watson Stat	1.600	1.720	1.722	1.804
Breusch-Godfrey Test	1.810	1.700	1.670	1.762
LM Test	0.310	0.370	0.361	0.355

Source: Author's computation, 2023

In model 1, it can be argued that bank deposits channeled towards the agricultural sector was not enough to drive down the rate of interest. Therefore, flows of fund to this sector could not accelerate expansion in agricultural investments and related value-chains. As such, the sector did not witness appreciable growth. On the other hand, it was witnessed that the flows of stock market funds as well as credit to agricultural sector was appreciable, which reflected in these financial flows indicators driving agricultural output growth positively. From economic theoretical arguments, it can be argued that these flows or availability of funds to the agricultural sector increases the capacity of farmers/investor to build their capital formation in terms of purchasing improved seedlings, machineries, stock their warehouse with raw materials and parts, purchase or lease more arable lands or expand their factories for entrepreneurs in the agro-allied or processing value-chains which are in tandem with the findings of Rafiu and Aminu (2020), Adeniyi et al., (2022) and Jima and Makodi (2023). With this development, investors can access funds to export agricultural products in order to create more jobs, earn revenue and foreign exchange for the government. The combination of all these drives the growth rate of agricultural output. More importantly, credit to private sector had the greatest impact on agricultural output growth compared to bank deposit and market capitalization in

models 1, 2 and 3 respectively. However, in model 4, it was observed that bank deposit contributed more towards explaining variations in agricultural output growth.

This outcome is robust even after controlling for the effects of other covariates, as the Adjusted R-squared confirms the model could explain at least 63 percent of variations in the dependent variable in the models 1-4. The post-estimation statistics reveals the results are free from first order serial-correlation because the value of the Durbin-Watson test statistic is approximately 2.0 in models 1-4; while the results of the Breusch-Godfrey and LM-test accepts the null hypothesis of absence of multicollinearity and second order serial-correlation in the models.

3.6 Policy Implications and Recommendations

Research on financial development and economic growth has been on-going, with emphasis on financial system development. Thus, it is recommended that development of the financial system should be made a priority by development macroeconomic experts in Nigeria, focused at improving the rate and level of output growth. More significantly, the monetary authority should adjust her policy rates and other instruments of monetary policy, in order to enhance the flows of credits or funds to the private sector. Therefore, increase in output growth can be sustained through the CBN interventions to mobilize funds, drive down interest rates, stabilize exchange rate, and accelerate the process of convergence in the rates. This will eliminate rigidities in the financial system structure, increase access to funds, lower interest rate, increase productivity and then promote output growth.

Also, the results obtained suggests that financial development indicators has a positive impact on Nigeria's output growth. Hence, sustainable growth could be promoted if policy makers should focus on medium and long-run policies including efficient and strong financial institutions, and creation of modern digital platforms that can drive Nigeria's economic growth. To achieve enhanced growth, concerted efforts should be channeled towards broadening the financial sector, particularly the microfinance system which is more prominent in the rural areas of Nigeria. In addition, to fast track markets and institutions for efficient credit system, it is key to ensure legal reforms and finally regulatory and supervisory bodies of financial system should be reinforced through capacity building and human resources development. Conclusively, lowering cost of managing financial institution is another pathway towards driving down interest rate and fund availability, financial development and sustainable economic growth in Nigeria.

The principal policy recommendation propagates continuing the process and speed of financial liberalization, especially the credit to private sector which has been found to enhance output growth more than market capitalization and bank deposits. This encourages more firms to enter the financial system platform and operate. The higher the entrance of firm into the Nigerian financial operations, the higher the competition and innovations which in turn make private credit available by easing the process and access to funds as well as monitoring and retrieval upon expiration of the loan period. This further promotes the development of the financial system, and spurs it's immerse benefits derived from relationship.

Lastly, it is important for policy makers to install policies that would generate growth, and sustain such high rate of growth for some reasonable period to ensure the macroeconomic objective of the government are achieved. Following simple economics theories of demand and supply, availability of funds would imply fall in interest rate and then easier means of expanding agricultural sector investments and GDP growth in the broader perspective.

3.7 Conclusion

Finance-growth relationship is key to understanding nation's growth path, since financial sector development plays prominent role in driving output growth via efficient and effective resource allocation. Financial intermediaries provide innovative and efficient instruments, as well as incentives to spur savings mobilization, adopt symmetric information on fund availability to project costs, and mobilized liquidity and reduce risks. In Nigeria, financial sector development is an essential credit provider for sectoral growth, and overall output growth by enhancing flows of credits through bank deposits, market capitalization and credits to private sector to the most appropriate productive agents. The above notwithstanding, low levels of output growth has been witnessed in recent times, despite outstanding financial sector developments, hence, casting doubt about the actual role of the financial sector in enhancing output growth in Nigeria. This noticeable trend and relationship provides a foundation upon which the argument for policy reevaluation, as well as workable policy recommendations to reinforce the financial systems framework as a pathway towards accelerating growth by leveraging on output advancements and growth in the Nigerian financial system cannot be overemphasized. In an attempt to reevaluate this relationships, as well as the research objectives, the study employed ARDL framework. The bounds test confirms long run relationship between financial development (bank credits, market capitalization and credit to

private sector) and output growth, i.e they co-integrated or possess long-run relationships. Thus, deductions from the estimated model reveals that the impacts of financial development indicators on output growth were positive and significant in most of the models. Drawing from the above, the ARDL results reveals that financial flows indicators exert positive significant impacts on economic growth and agricultural output growth in Nigeria. Thus, it could be deduced that financial development indicators are important driver of output growth within the study area and covering periods between 1980 and 2022. Literally, financial sector development is an important enhancer of economic growth, since it assists to accelerate credit flows towards enhancing output growth and productive private sectors within the economy.

CHAPTER FOUR

AGRICULTURAL FINANCE, FINANCIAL DEVELOPMENT, AND INCLUSIVE GROWTH: ROLE OF THRESHOLD AND INTERACTION EFFECT

4.1 Introduction

Developing nations prioritize inclusive growth, considered crucial for addressing socioeconomic challenges by benefiting and involving the impoverished in the growth process (Kazeem, 2022). Inclusive growth ensures equitable access to new economic opportunities. Despite economic growth, Nigeria, like many African countries, faces increasing inequality, with persistent poverty and high unemployment (Onuorah, 2022). The World Bank identified Nigeria as the global poverty hub in 2018, with unemployment rising from 27% in 2019 to approximately 30% in 2021 (NBS, 2021). Nigeria, although Africa's largest economy, has a low GDP per capita ($2184 in 2022), significantly less than Kenya, Egypt, and South Africa (World Bank, 2022). This disparity highlights Nigeria's non-inclusive growth, prompting governmental and stakeholder efforts to identify its determinants.

The government leverages inclusive growth to improve living standards, alleviate poverty, and foster socioeconomic development (Nkoro & Uko, 2023). Nigeria’s rich agricultural resources make this sector crucial for inclusive growth, significantly affecting GDP per capita and sustaining numerous livelihoods (Akadiri et al., 2022). Agricultural products provide substantial industrial value, enhancing incomes for farmers and stakeholders in processing and marketing (Awoyemi et al., 2017). However, despite favorable conditions, Nigeria's agriculture remains underdeveloped due to challenges like limited farmer financing and inadequate private-sector investment (Athanasius, 2017). Agricultural credit, crucial for funding, represents a major investment source for developing nations, facilitating production through temporary purchasing power redistribution (Ayeomoni & Aladejana, 2016). To improve farmer credit access, Nigeria has implemented various policies to bolster financial sector growth.

Financial development encompasses the evolution of markets, institutions, and services essential for funding various sectors (Raifu & Aminu, 2020). In agriculture, accessible finance enhances productivity by enabling the use of advanced technology, improved seeds, and effective risk management against environmental and market volatility (Mgbenka et al., 2016). An advanced financial system ensures optimal resource allocation, lowers capital costs, and facilitates easier loan access. The synergy between formal banks and informal credit sectors

provides borrowing flexibility and controls interest rates. This integration promotes efficient financial services, improving national welfare through secure savings mechanisms and diverse financing options (Enueshike & Okpebru, 2020).

Recent years have seen Nigeria's financial growth through improved banking, broader financial services, and market deepening, driven by regulatory reforms from the Central Bank and other bodies to enhance financial inclusion (Akintola et al., 2020). The relationship between agricultural finance, financial development, and inclusive growth is intricate, involving interactive and threshold effects that significantly influence growth beyond certain levels (Ayinde & Yinusa, 2016). This complexity indicates a mutual impact on accessibility and availability, fostering inclusive development.

The intertwined challenges of limited agricultural finance access and Nigeria's evolving financial landscape necessitate exploring their interrelation and impact on inclusive growth. Nigerian scholars have extensively studied the connection between financial inclusion/development and inclusive growth, highlighting that a well-developed financial sector enhances resource allocation, savings, and investments, thereby boosting productivity and inclusive growth (Ayinde & Yinusa, 2016; Oluwasogo et al., 2017; Olanrewaju et al., 2019; Odeleye & Olusoji, 2020; Raji, 2021; Onuorah, 2022; Kazeem, 2022; Maku et al., 2022; Nkoro & Uko, 2023). Additionally, studies on agricultural financing indicate that increased productivity supports food security, employment, and revenue, essential for inclusive growth (Oluwaseyi & Risikat, 2020; Atu, 2021; Afolabi et al., 2021; Ogbonnaya et al., 2022; Samaila & Idris, 2023; Helen, 2023).

Despite extensive studies, there is a notable dearth in literature addressing the combined relationship between agricultural finance, financial development, and inclusive growth in Nigeria. This research aims to fill this gap by examining how these factors interact to influence inclusive growth, identifying optimal thresholds for agricultural finance that maximize this growth, and investigating if there are critical levels beyond which its impact wanes. This study is crucial for understanding Nigeria's pursuit of sustainable inclusive growth by analyzing the complex dynamics between agricultural finance and financial development, providing valuable insights for finance-driven economic progress.

4.2 Literature Review

4.2.1 Brief Conceptual Framework

Agricultural financing is crucial for alleviating farmers' financial constraints, promoting technology adoption, and enhancing inclusive development by improving incomes and living standards (Samaila & Idris, 2023). Zuberu et al. (2017) highlight the importance of financial capital in achieving inclusive growth, stressing the need for targeted credit in rural areas to aid rural farmers. Ayeomoni & Aladejana (2016) describe agricultural finance as resource mobilization to boost production and productivity. Rapid population growth pressures agricultural systems to increase food production via financial support, with higher investments expected to enhance agricultural productivity and overall inclusive growth (Samaila & Idris, 2023).

Financial development involves enhancing financial access, deepening services, and expanding options to drive societal progress. Duruechi (2017) associates it with the robustness of the financial sector through diverse financial options, while Hassan, Sanchez, and Yu (2011) define it as the growth of markets, intermediaries, and institutions, ensuring resource availability and economic performance enhancement. A well-developed financial system efficiently allocates resources (Nnanna & Dogo, 2008). Adusei (2013) categorizes financial development metrics into bank and non-bank measures, including financial depth, size, credit ratios, and private-sector credit. Effective financial development channels capital into productive sectors, promoting growth and technological advancements, which is crucial for developing nations like Nigeria. This development targets innovative enterprises, facilitating successful implementation and sustained economic growth.

Inclusive growth, a multifaceted concept, lacks a unanimous definition among scholars, posing complexities in assessment. Researchers categorize it into four primary aspects, aligning with OECD factors: fair distribution of growth benefits, inclusive market functioning, equal future opportunities, and effective governance (Stawska & Jabłonska, 2021). It emphasizes reducing poverty through productive employment, surpassing mere income redistribution (World Bank, 2019). This entails balancing economic growth with equitable income distribution, fostering widespread progress. Effective strategies blend economic growth initiatives with measures ensuring equal opportunities and social protection for vulnerable groups. These strategies encompass job creation, structural transformation, and investments in education and social programs, aiming to provide fair employment access (Alexander, 2015).

The conceptual framework reveals the complex interplay between agricultural finance, financial development, and inclusive growth. Agricultural finance, including access to finance, financial instruments, investment, lending practices, and government expenditure, is pivotal, in shaping the financial landscape within the agricultural sector. The accessibility and nature of financial resources profoundly impact the sector's growth trajectory, thus influencing inclusive economic development (Farooq et al., 2023).

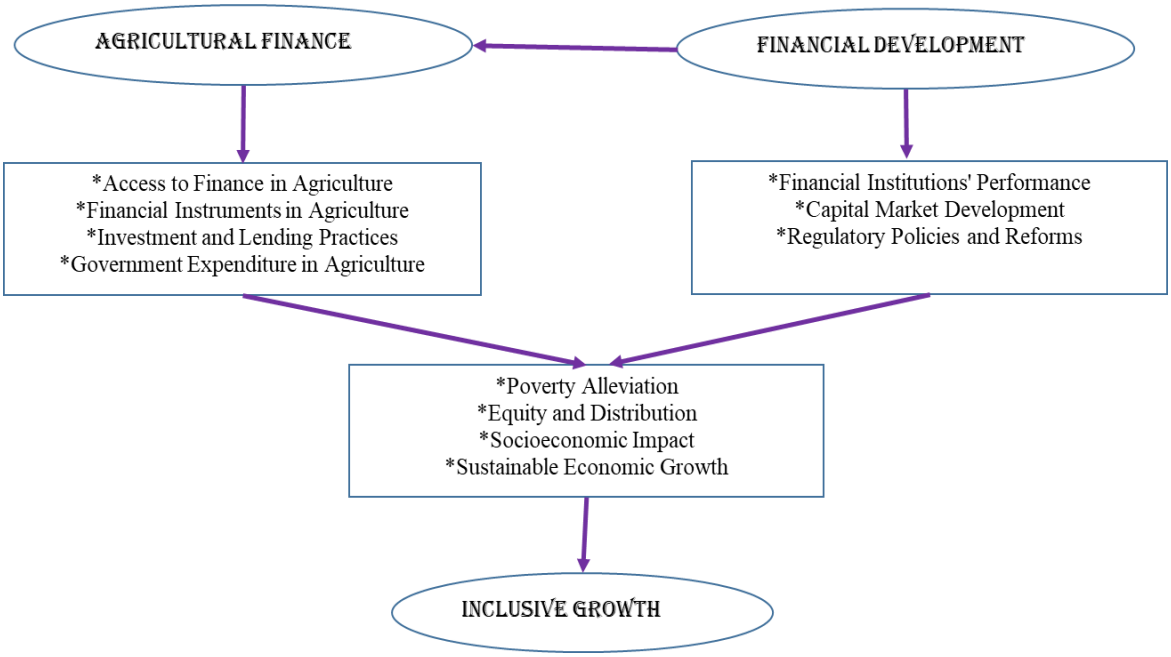

Figure 4.1: Agricultural Finance, Financial Development, and Inclusive Growth

Source: *Author's Compilation, 2024*

Financial development, encompassing the performance of financial institutions, capital market expansion, and regulatory policies, acts as a parallel force. The efficiency of financial institutions and regulatory frameworks dictates the availability and utilization of financial resources crucial for agriculture (Kazeem, 2021). The interplay between these mechanisms shapes agricultural operations, reflecting inclusive growth. Inclusive growth, addressing socioeconomic impact, poverty alleviation, equity, and sustainable growth, embodies the overarching objective. Within agriculture, it signifies not just economic progress but also equitable resource distribution and opportunities, vital for sustainable development and poverty reduction (Oyinlola & Adedeji, 2019).

The intricate connections between agricultural finance, financial development, and inclusive growth are pivotal. Access to finance and financial instruments directly impacts socioeconomic outcomes and poverty alleviation in agriculture. Financial development, via institutional performance and regulations, influences equity, distribution, and sustainability of economic growth (Jammeh, 2022; Raji, 2021). These elements operate synergistically, shaping the trajectory of inclusive growth, and emphasizing their interdependence and collective influence on the nation's development path.

4.2.2 Stylized Facts

The graph below presents valuable insights into the intricate relationship between agricultural finance, financial development, and inclusive growth between 1990 and 2022. Several stylized facts emerge from this graph, highlighting trends and potential causal connections over the years.

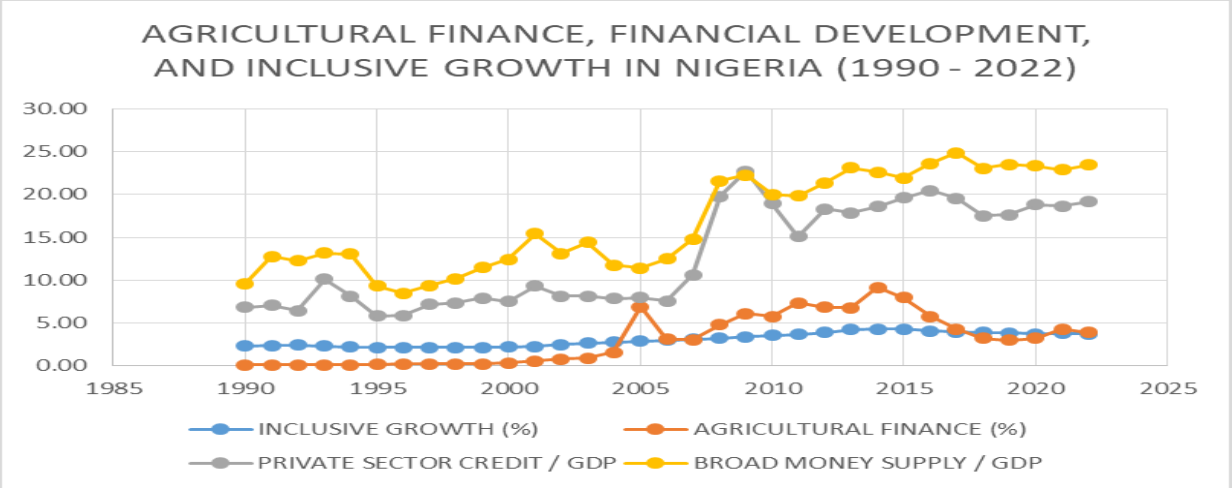

Figure 4.2: Graph of Agricultural Finance, Financial Development, and Inclusive Growth
Source: *Author's Computation, 2024.*

During the study period, Nigeria's inclusive growth, measured by GDP per person employed, exhibited fluctuating trends. Starting at 2.25% in 1990, it peaked at 4.28% in 2014, declining slightly to 3.70% in 2022, indicating an overall increasing trajectory with intermittent variations (World Bank, 2023). Fluctuations in inclusive growth can be attributed to various factors such as changes in government policies, economic shocks, and global economic conditions. Agricultural finance, represented by credit and loans to the agricultural sector, displayed significant variability, ranging from 0.06% in the early '90s to peaks of 9.11% in 2014, stabilizing between 3-6% in recent years (CBN, 2023). Such fluctuations may stem from

shifts in lending practices, changes in agricultural policies, and fluctuations in global commodity prices. Financial development indicators, such as credit to the private sector and broad money supply to GDP ratios, showed fluctuating yet upward trends. Both ratios increased over time, experiencing occasional fluctuations, notably peaking in 2009 and maintaining relatively high levels thereafter (CBN, 2023). These fluctuations in financial development may result from changes in regulatory frameworks, shifts in investor confidence, and responses to macroeconomic conditions both domestically and globally.

The observations indicate a potential positive correlation between agricultural finance and inclusive growth, with intermittent increases in inclusive growth aligning with peaks in agricultural finance. Enhanced financial support in agriculture may have stimulated productivity and income growth, positively influencing GDP per employed person. Similarly, the concurrent rise in financial development indicators—credit to the private sector and broad money supply—alongside periods of increased inclusive growth suggests a possible association between financial development and inclusive growth. Improved access to credit and liquidity in the economy could have facilitated economic activities, contributing to inclusive growth (CBN, 2023; World Bank, 2023). These findings underscore the importance of financial mechanisms in driving inclusive growth, emphasizing the need for targeted policies and interventions to enhance financial access and development, particularly in sectors like agriculture, crucial for sustainable economic progress and poverty reduction.

4.2.3 Theoretical Linkage between Finance and Inclusive Growth

Finance-inclusive growth theory stands at the intersection of finance and economic development, aiming to elucidate the mechanisms through which financial systems contribute to inclusive economic growth. This theory posits that an efficiently functioning financial system, characterized by robust intermediation and inclusive access to financial services, fosters economic growth that benefits all segments of society. In this exposition, four theories are incorporated to support the theoretical framework of the finance-growth model.

4.2.3.1 Financial Intermediation and Allocation Efficiency

At the heart of the finance-inclusive growth theory lies the concept of financial intermediation, where financial institutions act as intermediaries between savers and investors, facilitating the flow of funds towards productive investments. The intermediation process is essential for mobilizing savings from surplus units to deficit units in the economy, thereby fueling investment, innovation, and economic expansion. Boyd and Prescott's (1986) intermediation cost model provides a theoretical framework for understanding the relationship between intermediation efficiency and economic output. The model posits that efficient intermediation, characterized by lower intermediation costs, leads to higher levels of economic output, as resources are allocated more effectively to productive investments.

$$Y_t = \frac{1}{\varphi}(A * K)_t^{\alpha} L_t^{1-\alpha} \qquad (4.1)$$

In this equation, Y denotes economic output, A represents total factor productivity, K signifies capital stock, L denotes labor input, and ϕ captures the intermediation cost. Lower intermediation costs facilitate the mobilization of savings and the allocation of funds towards inclusive investments that benefit all segments of society, thereby fostering inclusive growth.

Empirical studies corroborate the importance of inclusive intermediation in promoting inclusive growth. Beck et al., (2007) found a positive correlation between financial inclusion and human capital development, emphasizing the role of intermediaries in providing access to financial services for marginalized communities. Similarly, Demirgüç-Kunt and Levine (2009) demonstrated that countries with more inclusive financial systems tend to experience higher levels of economic growth, highlighting the importance of broad-based access to finance in driving inclusive development.

Inclusive intermediation enhances financial access and opportunities for underserved populations, including small and medium enterprises (SMEs), women, rural communities, and low-income households. By providing access to credit, savings, insurance, and investment opportunities, financial intermediaries empower individuals and businesses to participate actively in economic activities, thereby reducing income inequality and promoting social mobility. Moreover, inclusive intermediation fosters entrepreneurship, innovation, and job creation, contributing to sustainable and inclusive economic growth.

4.2.3.2 Financial Inclusion and Human Capital Development

Financial inclusion, a cornerstone of finance-inclusive growth theory, emphasizes equitable access to financial services for all population segments, including marginalized groups. This access is critical for fostering inclusive economic growth by enabling individuals and communities to invest in their future, improve their livelihoods, and actively contribute to the economy. Empirical studies, such as Beck et al., (2007), establish a positive correlation between financial inclusion and human capital development, underscoring the transformative potential of inclusive financial systems.

The relationship between financial inclusion and human capital development can be captured through a comprehensive equation that integrates various channels through which financial inclusion impacts education, healthcare, and entrepreneurship:

$$H_t = \theta_0 + \theta_1 F + \theta_2\left(\beta_1 F + \beta_2 I + \gamma_1 F + \gamma_2 H_{exp} + \delta_1 F + \delta_2 B\right) + \varepsilon \qquad (4.2)$$

In this equation, H_t represents aggregate human capital, F denotes financial inclusion, I signifies investment in education, H_{exp} denotes healthcare expenditures, and B represents business investments. The coefficients θ_2, β_1, β_2, γ_1, γ_2, δ_1, and δ_2 capture the impacts of financial inclusion on various aspects of human capital. This integrated model illustrates how financial inclusion enhances educational opportunities, healthcare access, and entrepreneurial activities, thereby contributing to overall human capital development and inclusive growth.

Access to education and skills training is one of the primary channels through which financial inclusion enhances human capital development. By providing access to educational loans, savings products, and scholarships, financial intermediaries enable low-income households to afford educational expenses. This leads to improved literacy rates, higher skill levels, and increased employability, which are essential for economic growth (Wang et al., 2023; Xun et al., 2020). Financial inclusion allows families to invest in education, ensuring that children and adults have access to quality schooling and vocational training.

Healthcare access and outcomes also benefit significantly from financial inclusion. Access to financial services enables individuals to afford medical expenses through savings, insurance, and credit facilities. Financial inclusion ensures that even low-income households can seek timely and adequate medical care, improving health outcomes and enhancing overall productivity (Sarpong & Nketiah-Amponsah, 2022). This relationship is reflected in improved

health-related human capital, as access to health insurance and credit for medical emergencies plays a crucial role in enhancing overall well-being.

Moreover, financial inclusion empowers individuals to engage in entrepreneurial activities by providing access to credit and financial services necessary for starting and growing businesses. By supporting small and medium enterprises (SMEs) and fostering innovation, inclusive financial systems create job opportunities and stimulate economic activities. This contributes to inclusive economic growth by ensuring that the benefits of economic development are widely shared (Sakanko et al., 2020).

Empirical evidence supports the theoretical framework linking financial inclusion to human capital development. For instance, microfinance institutions in developing countries have been instrumental in providing financial services to marginalized communities, enabling them to invest in education, healthcare, and small businesses. These investments have led to improved literacy rates, better health outcomes, and increased economic participation, contributing to overall economic growth and poverty alleviation (Sakanko, et al., 2020; Wang et al., 2023; Xun et al., 2020).

4.2.3.3 Financial Stability and Long-Growth

Finance-inclusive growth theory underscores the critical interplay between financial stability and long-term economic growth. Financial stability is essential for sustaining economic progress and ensuring that growth benefits all segments of society. Conversely, financial instability, characterized by systemic disruptions and liquidity constraints, can derail growth trajectories and exacerbate inequality, making it imperative to understand the mechanisms through which stability influences growth (Kazeem, 2021; Yinusa et al., 2020).

The Minskyan framework, particularly the financial instability hypothesis, provides a robust theoretical basis for examining the nonlinear dynamics of financial systems. This framework posits that financial markets are inherently prone to cycles of boom and bust, driven by speculative borrowing and lending behaviors. The dynamics can be captured through the following differential equation:

$$\frac{\partial Y}{\partial t} = c + \alpha_1 Y + \alpha_2 Y^2 - \delta_1 D - \delta_2 D^2 \qquad (4.3)$$

Where Y denotes economic output, D represents debt levels, and c, α1, α2, δ1, and δ2 capture various parameters influencing economic dynamics. This equation illustrates how the accumulation of debt can amplify fluctuations in output, highlighting the crucial role of financial stability in maintaining sustainable growth.

The relationship between financial stability and long-term growth is complex and multifaceted. In periods of financial stability, characterized by manageable debt levels and stable financial institutions, economic output (Y) tends to grow steadily. The coefficients α1 and α2 capture the positive impacts of stable financial conditions on output, reflecting how well-functioning financial markets facilitate investment, innovation, and productivity improvements.

However, as debt levels (D) increase, the risk of financial instability rises. The coefficients δ1 and δ2 represent the adverse effects of rising debt on economic output. High levels of indebtedness can lead to liquidity constraints, reduced investment, and ultimately, financial crises. These crises can have severe and lasting impacts on economic growth, disproportionately affecting marginalized and low-income populations, thereby exacerbating inequality.

Empirical evidence supports the Minskyan hypothesis, showing that financial instability can severely disrupt economic growth. Studies by Reinhart and Rogoff (2009) demonstrate that financial crises are often followed by prolonged periods of economic stagnation, reduced output, and increased inequality. The global financial crisis of 2008-2009 is a case in point, where excessive borrowing and risk-taking behaviors led to a systemic collapse, resulting in widespread economic hardship and exacerbating income disparities.

Financial stability is thus paramount for inclusive growth. Stable financial systems ensure that credit is available for productive investments, support the smooth functioning of financial markets, and foster an environment conducive to sustainable economic development. When financial systems are stable, businesses can plan for the long term, households can invest in education and health, and governments can undertake necessary infrastructure projects—all contributing to inclusive growth.

4.2.3.4 Innovation and Financial Development

In the contemporary context, finance-inclusive growth theory underscores the crucial role of financial innovation in driving inclusive economic growth. Financial innovation, encompassing new financial products, services, technologies, and institutional arrangements, facilitates efficient resource allocation, reduces transaction costs, and broadens access to financial services. This process, in turn, fosters innovation and entrepreneurship, catalyzing economic expansion and inclusivity (Raji, et al., 2021; Yinusa, et al., 2020).

The Schumpeterian perspective highlights the role of financial development in spurring innovation and entrepreneurship through a process known as creative destruction. Financial development provides the necessary capital and financial services that enable innovators to invest in new technologies and business models, thereby driving economic growth (Oyinlola & Adedeji, 2019). This perspective is encapsulated in the Romer model of endogenous growth, which formalizes the relationship between financial development and technological progress:

$$\frac{\partial A}{\partial t} = \gamma K^{\alpha}(HL)^{1-\alpha} \qquad (4.4)$$

In this equation, A denotes technological progress, K signifies physical capital, H represents human capital, and L denotes labor input. The parameter γ encapsulates financial development, which accelerates the pace of technological advancement. The model illustrates how financial development fosters inclusive growth by creating opportunities for small and medium enterprises (SMEs) and marginalized communities, enhancing their participation in economic activities.

The Romer model captures this dynamic by showing how financial development (represented by γ) enhances the productivity of physical capital (K) and human capital ($H \times L$). Financial development enables firms to invest in innovative projects that drive technological progress and economic growth by lowering transaction costs, improving risk management, and providing liquidity. This process of continuous innovation leads to the creation of new industries and the transformation of existing ones, contributing to overall economic expansion.

Financial innovation is particularly instrumental in promoting inclusive growth. By expanding access to financial services, financial innovation enables underserved populations, including SMEs, women, and rural communities, to participate more fully in the economy. Innovative financial products, such as microfinance, mobile banking, and peer-to-peer lending, provide

these groups with the capital they need to invest in education, healthcare, and entrepreneurial activities (Fe & Kouton, 2023).

Empirical evidence supports the positive impact of financial innovation on inclusive growth. For instance, studies have shown that the adoption of mobile banking in developing countries has significantly increased financial inclusion, enabling millions of previously unbanked individuals to access financial services (Jammeh, 2022; Kambali, 2021; Nkoro & Uko, 2023). This increased access to finance has led to higher investment in human capital and entrepreneurship, contributing to economic growth and poverty reduction.

4.2.4 Empirical Literature

4.2.4.1 Agricultural Finance and Inclusive Growth

Samaila & Idris (2023) conducted a thorough investigation into the impact of agricultural financing on Nigeria's real output growth. Agricultural financing involves the meticulous analysis of the financial aspects of farming to provide accessible funds aimed at improving agricultural output. Employing various advanced econometric techniques such as ADF for unit root tests, ARDL for long and short-run coefficients, Bound tests, and Diagnostic tests, the study scrutinized the intricate relationships between agricultural financing and output growth. The findings revealed that agricultural credit guarantee schemes and government agricultural expenditure exerted a positive influence on output growth, indicating their pivotal role in enhancing productivity and economic growth. Conversely, commercial bank credit facilities to agriculture were found to have a detrimental effect on output growth. As a result, the study recommends the implementation of rigorous monitoring mechanisms for agricultural financing schemes by governmental and non-governmental entities. Such monitoring is crucial for ensuring the effective management and regulation of these schemes, thus maximizing their positive impact on productivity and economic growth within the agricultural sector in Nigeria.

Helen (2023) conducted an investigation into the impact of agricultural financing, encompassing both public and private sectors, on crop and livestock production in Nigeria. Employing advanced econometric techniques such as ARDL, Bounds Test, and Granger causality tests on data spanning from 1981 to 2019, the study aimed to unravel the long and short-term relationships between financing and agricultural outputs. Results indicated positive yet statistically insignificant short-term effects for both public and private financing. However, in the long term, private financing exerted a significant positive influence on output, whereas

public financing remained statistically insignificant. Additionally, the study highlighted the adverse impact of high interest rates on crop and livestock production. Consequently, it recommends policies aimed at promoting private-sector investment in agriculture while addressing the issue of high interest rates to facilitate sustainable growth in the agricultural sector in Nigeria.

Mtui (2023) delves into Tanzania's socio-economic landscape from 1970 to 2018, focusing on the intricate relationship between industry and agriculture and their collective impact on poverty alleviation and overall progress. Employing rigorous methodologies such as ARDL and Granger causality tests, the study unravels a robust and enduring interdependence between these sectors. Key determinants, including capital formation and trade openness, emerge as significant influencers of industrial growth, with short-term inflation demonstrating supportive effects and long-term implications. The research underscores a bidirectional causality between agriculture and industry, highlighting the pivotal role of agriculture in fostering inclusive growth. To optimize this symbiotic relationship, the study advocates for policy interventions aimed at enhancing agricultural productivity, aligning industrialization strategies with agricultural objectives, and cultivating a conducive investment environment spanning both sectors.

Ogbonnaya et al., (2022) conducted a comprehensive analysis of Nigeria's agricultural output spanning from 1981 to 2021, investigating its correlation with agricultural credit funding. The study focused on key variables including the Agricultural Credit Guarantee Scheme Fund, Commercial Bank Lending to Agriculture, Money Supply, and Domestic Credit to the Private Sector. Utilizing Vector Auto-regression estimation, the research revealed nuanced relationships between these variables and agricultural output. Specifically, for every 1% increase in the agricultural credit guarantee scheme and bank lending to agriculture, there was a corresponding increase of 0.07% and 0.04%, respectively, in agricultural output. Conversely, a unit increase in money supply was associated with a notable 2.8% increase in agricultural output, while a similar increase in private sector credit led to a 2% decrease in output. Consequently, the study emphasizes the significance of enhancing stability and access to funds for Nigerian farmers to bolster agricultural output.

Nwadiubu (2022) conducted an extensive investigation into the influence of agricultural financing on output, utilizing data from Nigeria's Central Bank Statistical Bulletin spanning from 1986 to 2020. Agricultural financing, represented by commercial bank loans to

agriculture and disbursements from the Agricultural Credit Guarantee Scheme Fund, was analyzed against agricultural GDP contribution, indicating output. Through trend analysis and Ordinary Least Squares (OLS) regression, the study unveiled a significant and positive impact of these funding sources on agricultural output. It concluded that heightened agricultural financing plays a pivotal role in bolstering output, underscoring the necessity for inclusive policies aimed at enhancing credit schemes and bank loans. Such initiatives are crucial for benefiting rural farmers and augmenting agricultural production, thereby contributing to overall economic growth and development in Nigeria. These findings highlight the imperative of fostering financial support mechanisms within the agricultural sector to harness its full potential and address key challenges in ensuring food security and sustainable livelihoods for rural communities.

Osabohien et al., (2022) meticulously analyze the nexus between agricultural trade, Foreign Direct Investment (FDI), and inclusive growth across West African developing nations. Drawing on comprehensive World Bank data spanning 2000 to 2019 and encompassing 15 ECOWAS member countries, the study employs sophisticated methodologies such as Principal Component Analysis (PCA) to gauge inclusive growth and mitigate endogeneity concerns through Two-stage Least Squares (2SLS). Findings underscore the substantial impact of agricultural trade, suggesting a noteworthy enhancement of inclusive growth by approximately 0.88% to 0.99% with every 1% increment in trade activities. Conversely, FDI exhibits an insignificant influence on inclusive growth. The study's policy implications advocate for the implementation of flexible trade policies to invigorate the exchange of goods and services, especially pertinent in the post-COVID-19 landscape within ECOWAS. These recommendations are poised to steer West African nations towards sustainable and inclusive economic development, underscoring the pivotal role of agricultural trade in driving regional prosperity.

Kambali & Panakaje (2022) underscore the pivotal significance of agricultural financing in augmenting productivity and fostering overall development within the agricultural sector. Their study endeavors to discern the multifaceted factors influencing agricultural finance, confront the challenges faced by farmers, juxtapose income growth pre- and post-financial intervention, and delineate strategies aimed at ameliorating credit accessibility. Employing a comprehensive analysis of secondary data drawn from reputable sources such as NABARD and RBI reports, the findings illuminate notable enhancements in smallholder farming systems, infrastructural development, and the provision of financial services. Nonetheless, persisting challenges

emerge, particularly concerning regulatory frameworks, which contribute to issues such as high interest rates and excessive risk-taking. Therefore, the study underscores the imperative for more robust financial access mechanisms and regulatory measures tailored to support the agricultural community, thereby fostering sustainable growth and development in the sector.

Afolabi et al., (2021) conducted a comprehensive study on the impact of agricultural credit on Nigeria's economic growth from 1981 to 2017, utilizing data from the Central Bank of Nigeria and the World Development Indicator. The research focused on assessing the effects of the Agricultural Credit Guarantee Scheme Fund (ACGSF) and Deposit Money Bank Credit to Agriculture (DMBCA) on economic growth. Employing the Auto-Regressive Distributed Lag (ARDL) method due to variable stationarity, the study uncovered significant findings. It revealed a notable and direct relationship between DMBCA and economic growth in the short run. However, ACGSF showed insignificance in both short and long runs, with a direct short-term impact but an inverse long-term relationship. The study's recommendations underscore the imperative of coordinated government efforts to ensure seamless access and appropriate disbursement of financial assistance to small-scale farmers. This entails implementing robust policies and mechanisms to streamline the allocation of agricultural credit, thereby fostering economic growth and development within the agricultural sector.

Ebere et al., (2021) conducted an in-depth investigation into the sustainability of agricultural output in Nigeria, focusing on the role of agricultural credit. Utilizing data from the Central Bank of Nigeria spanning from 1981 to 2019 and employing advanced econometric methods such as Cointegration, DOLS, and Granger Causality, the study elucidated significant insights. It revealed substantial positive impacts of agricultural credit on agricultural output, highlighting the pivotal role of credit in bolstering productivity within the agricultural sector. However, the analysis indicated an insignificant direct relationship between agricultural expenditure and output. Additionally, the study unveiled a unidirectional causality from agricultural credit to expenditure, coupled with a one-way feedback effect from output to expenditure. These findings underscore the critical importance of agricultural financing in ensuring the sustainability of agricultural output. The research advocates for policymakers to prioritize funding for the agricultural sector to safeguard food security and combat hunger in Nigeria. Moreover, it recommends an increase in budget allocation for the agricultural sector to support initiatives aimed at enhancing agricultural productivity and resilience.

Atu (2021) underscores the paramount importance of agriculture in Nigeria, where it engages approximately 60% of the workforce and significantly contributes to the GDP, encompassing both crop cultivation and livestock farming. The study's primary objective lies in establishing sustainable financing mechanisms tailored for small, medium, and large-scale agricultural stakeholders. Employing rigorous econometric techniques such as the Unit Root Test, Vector Correction Model (ECM), and Autoregressive Distributed Lag Model, the research scrutinized secondary data from diverse governmental sources. The findings of the study revealed a robust positive correlation between agricultural output and Real GDP, underlining the pivotal role of agriculture in driving economic growth. However, the analysis indicated that Agricultural Loans (AL) and interest rates (INTR) exhibited insignificant impacts on economic growth. In light of these findings, the study offers pertinent recommendations aimed at enhancing the efficacy of agricultural financing. It advocates for the judicious utilization of agricultural loans and stresses the necessity for comprehensive government support, including the provision of incentives and the enhancement of services, to catalyze private investment in agriculture and its allied sectors.

Kambali (2021) assesses the trajectory of agricultural credit development in India, probing its implications for agricultural growth and governmental policies. The study accentuates the strides made in agricultural financial mechanisms and technological innovations, underscoring their pivotal role in nurturing agricultural expansion and fostering financial inclusivity. Drawing upon a corpus of secondary data gleaned from diverse sources, including academic journals, websites, and reports from prominent institutions like NABARD and RBI, the analysis unveils a notable decline in informal credit as a proportion of total debt. Concurrently, institutional credit allocated to agriculture has experienced a pronounced upswing, attributed to the deepening penetration of institutional agencies into rural hinterlands, the landmark nationalization of major banks, and the proactive measures initiated by the Reserve Bank of India to establish regional rural banks.

Orji et al., (2020) delve into the pivotal role of agriculture in propelling economic development within developing nations, particularly focusing on Nigeria. Despite its multifaceted contributions encompassing food provision, raw material supply, job creation, and foreign exchange generation, the study endeavors to scrutinize the causal relationship between agricultural financing and output growth. Leveraging data derived from esteemed sources such as the Central Bank of Nigeria and the World Bank, the research employs the Pairwise Granger Causality test to unravel the intricate dynamics. Surprisingly, the findings unearthed no direct

causal link between agricultural financing and output growth. In response to these revelations, the study advocates for intensified farmer education initiatives aimed at enhancing awareness regarding diverse funding sources. Additionally, it underscores the critical importance of judicious fund utilization to drive augmented agricultural productivity. Furthermore, the research accentuates the imperative for proactive governmental interventions in financing mechanisms and diligent oversight of the agricultural sector to catalyze productivity enhancements effectively.

Oluwaseyi & Risikat (2020) delve into the intricate dynamics of finance's influence on Nigeria's agricultural sector across two pivotal periods, spanning from 1986 to 2000 and 2001 to 2017, employing the rigorous Auto-Regressive Distributed Lag (ARDL) analysis methodology. Within the pre-2000 epoch, the study unveils a significant positive impact of both the Agricultural Credit Guarantee Scheme Fund (ACGSF) and industrial output on agricultural output. However, in the post-2000 landscape, the dynamics shift, with only industrial output demonstrating a positive effect, while ACGSF and Rural Commercial Bank Credit exhibit adverse impacts on agricultural output. Urgently, the study advocates for the efficacious disbursement of ACGSF and rural bank credit towards agriculture, highlighting the imperative for meticulous attention to ensure these financial resources are effectively channeled to bolster agricultural productivity. Furthermore, the research underscores the critical importance of fortifying industrial-agricultural linkages as a strategic pathway towards sustainably augmenting agricultural productivity, thereby fostering resilience and vitality within Nigeria's agricultural landscape.

Okunlola et al., (2019) conducted a comprehensive evaluation of the impact of guaranteed agricultural finance on Nigeria's real gross domestic product (GDP) across multiple sectors spanning 37 years from 1981 to 2017. Employing robust analytical methodologies, including the Autoregressive Distributed Lag (ARDL) model and the Phillip Perron stationarity test, the study meticulously scrutinized time series data sourced from the Central Bank of Nigeria. Despite the exhaustive analysis encompassing various lag criteria, both short-run and long-run models failed to reveal statistically significant relationships between guaranteed agricultural finance and real GDP. As a result, the study underscores the necessity for heightened financial allocation and targeted initiatives aimed at identifying and prioritizing the most impactful agricultural sectors for fostering economic growth. This recommendation emerges as a crucial strategic imperative for policymakers and stakeholders, aiming to optimize the utilization of financial resources to catalyze sustainable economic development within Nigeria's agricultural

landscape. Through enhanced funding mechanisms and strategic sectoral prioritization, Nigeria can navigate towards a more resilient and prosperous economic trajectory, leveraging its agricultural potential to drive enduring prosperity and growth.

Adesanya & Ajala (2019) emphasize the indispensable role of the agricultural sector in national development, serving as a linchpin for sustenance, the provision of industrial raw materials, and income generation. Despite concerted governmental efforts to enhance economic growth through agricultural credit interventions, substantial progress within the sector remains elusive. The study rigorously examines the impact of agricultural credit on Nigeria's economic growth by analyzing extensive time series data sourced from publications by the Central Bank spanning from 1985 to 2016. Leveraging a sophisticated three-stage least squares analysis, the research reveals that agricultural credit plays a pivotal role in mitigating cyclical fluctuations in agricultural output and stabilizing GDP in the short term. However, the efficacy of long-term policies in sustaining economic growth shows signs of diminishing returns over time. Importantly, the study underscores the critical influence of agricultural credit, interest rates, and exchange rates on Nigeria's overall output, emphasizing the imperative of expanding credit accessibility to fuel agricultural production and stimulate sustained economic expansion.

Hon (2019) underscores the critical role of agricultural financing in enhancing productivity within Myanmar, identifying challenges in farmer access to funds as a barrier to efficiency. Employing qualitative methods, the study delves into the nexus between agricultural financing and productivity, focusing on macroeconomic variables such as agricultural loans and productivity levels. The analysis reveals a positive albeit moderately strong relationship between loans and production. To address the identified challenges, the study advocates for governmental interventions, including the reinforcement of credit schemes and the expansion of Microfinance Institutions (MFIs). These initiatives aim to ameliorate farmer access to loans, consequently bolstering agricultural productivity levels in Myanmar.

Adama et al., (2018) employed a rigorous analytical approach, employing the three-stage least squares technique to delve into comprehensive datasets. In their investigation, they utilized metrics such as inequality, poverty rates, and unemployment levels as proxies for measuring inclusive growth. Concurrently, indicators encompassing agricultural output, value-added, labor participation, government expenditure, capital formation, and bank loans were scrutinized to assess the dynamics of agricultural development within Nigeria. Surprisingly, the findings of the study unveiled a notable lack of substantial influence from the agricultural

sector on Nigeria's broader agenda of achieving inclusive growth. In light of these results, the study advocates for a strategic recalibration of governmental policies, emphasizing the imperative of significant investments targeted at catalyzing the development of the agricultural sector. Such interventions, the study contends, are pivotal for not only revitalizing agricultural activities but also for unlocking the sector's latent potential to become a more significant driver of inclusive growth within the Nigerian economy.

Koko et al., (2018) scrutinized Nigeria's considerable governmental expenditure in agriculture, aimed at fostering inclusive growth and sustainable development. Despite these efforts, the translation of such investments into tangible progress has been limited. Their research focused on unraveling the intricate relationship between agricultural financing and economic development spanning from 1986 to 2015, employing the Autoregressive Distributed Lag (ARDL) model for analysis. Surprisingly, their findings revealed that individual and company-based agricultural financing exerted a positive influence on economic development. Conversely, cooperative financing and bank loans exhibited adverse effects on economic development within the agricultural sector. In response to these revelations, the study advocates for a strategic realignment of governmental investment priorities, emphasizing the necessity for increased allocations towards individual and company-based agricultural financing initiatives. Additionally, the study underscores the imperative for policy overhauls within commercial banks, urging for redesigned strategies to enhance the distribution and monitoring of agricultural loans.

4.2.4.2 Financial Development and Inclusive Growth

Nkoro & Uko (2023) investigated Nigeria's Foreign Direct Investment (FDI) impact on inclusive growth, particularly concerning the development of the domestic financial sector, spanning from 1981 to 2020. Their findings revealed a nuanced relationship: FDI positively influenced inclusive growth only when the domestic financial sector had attained a specific threshold. Intriguingly, FDI alone exhibited a negative effect on inclusive growth. This underscores the critical importance of a well-developed domestic financial sector as a prerequisite for FDI to effectively contribute to inclusive growth in Nigeria. The study implies that efforts to attract FDI should be accompanied by concurrent measures to strengthen the domestic financial infrastructure, ensuring optimal utilization of foreign investment for sustainable and inclusive economic development.

Wang et al., (2023) underscored the critical significance of Information and Communication Technology (ICT) within global frameworks, particularly in attracting Foreign Direct Investment (FDI), sustaining commercial activities, and fostering inclusive growth. Through their study, they addressed existing knowledge gaps concerning the relationship between ICT diffusion and inclusive growth across leading African nations, utilizing an enhanced Generalized Method of Moments (GMM) technique spanning the period from 2000 to 2020. Their findings revealed that ICT diffusion, coupled with trade openness, FDI inflows, and financial inclusion, significantly contribute to inclusive growth, although inflation poses a hindrance. The study advocates for prioritizing initiatives aimed at advancing ICT infrastructure, fostering trade relationships, attracting FDI, and enhancing financial inclusion to effectively promote inclusive growth, providing valuable insights for policymakers in crafting strategic interventions.

Ofori et al., (2023) conducted a comprehensive analysis of macroeconomic data from 42 African nations, focusing on the intricate relationship between financial development, remittances, and inclusive growth. Employing the system Generalized Method of Moments (GMM) estimator, their study elucidated that although remittances do not exhibit statistical significance in propelling overall inclusive growth in Africa, they contribute to exacerbating income inequality without commensurate enhancements in economic growth. Moreover, the underdeveloped state of Africa's financial sector diminishes the positive effects of remittances. The research underscores the critical importance of attaining a minimum 14.5% threshold in financial development to foster inclusive growth, providing valuable insights for policymakers to prioritize investments aimed at achieving more equitable income distribution across Africa.

Fe & Kouton (2023) concentrate on assessing inclusive growth within the West African Economic and Monetary Union (WAEMU) and the pivotal role of the banking sector therein. They construct a comprehensive composite indicator that encompasses various dimensions such as economic growth, poverty levels, income inequalities, human capabilities, and governance standards. Employing the LSDVC (Least Squares Dummy Variable Corrected) method spanning from 1996 to 2017, their analysis reveals that while inclusive growth within WAEMU remains relatively feeble, there have been discernible advancements over the examined period. Notably, the study highlights a positive correlation between the performance and inclusiveness of the banking sector and the promotion of inclusive growth. Consequently, it underscores the tangible contributions made by the banking sector and recommends policy

adjustments based on the empirical findings to further bolster inclusive growth within the WAEMU region.

Onuorah (2022) investigated the influence of financial inclusion on Nigeria's inclusive growth from 1981 to 2020, utilizing data from the Central Bank of Nigeria (CBN). The study examined various metrics of financial inclusion, such as Rural Bank Deposits, Loans of Rural Branches, Loans and Advances to Small and Medium Scale Enterprises, Bank Branches Spread, and financial deepening indicators, in relation to the real GDP growth rate. Methodologically, the analysis encompassed descriptive statistics, stationary tests, correlation analysis, and multiple regression techniques. Results revealed significant impacts of Rural Bank Deposits, Loans and Advances to Small and Medium Scale Enterprises, and Foreign Direct Investment (FDI) on the real GDP growth rate, underscoring the pivotal role of financial inclusion. Recommendations advocate for the development of inclusive financial products and the mitigation of high interest rates to fortify Nigeria's GDP growth trajectory and promote economic inclusivity.

Kazeem (2022) scrutinized the influence of Nigeria's financial development on inclusive growth, employing time series data spanning from 1999 to 2019. Metrics such as broad money supply and domestic credit to the private sector were used to gauge financial development. Results unveiled a positive correlation between financial development indicators and per capita income as well as household consumption expenditure. However, domestic credit to the private sector exhibited a negative impact on per capita income. To optimize inclusive growth, the study advocates for leveraging a broad money supply while ensuring a more efficient allocation of funds to counterbalance the adverse effects of private sector funding on Nigeria's inclusive growth trajectory.

Maku et al., (2022) conducted an investigation into Nigeria's enduring relationship between financial inclusion and growth spanning from 1981 to 2017. Drawing upon data from the Central Bank of Nigeria and the World Development Indicator, the study employed advanced econometric methods to scrutinize the impact of various factors such as credit to the private sector, money supply, interest rates, and government expenditure on Per Capita GDP. The ARDL analysis revealed a positive correlation between financial inclusion and inclusive growth, particularly in facilitating easier access to investment loans. Supporting the finance-led growth theory, the study underscores the importance of policymakers prioritizing long-term financial policies to fortify Nigeria's financial sector and promote growth. It emphasizes the

necessity of creating an enabling environment and fostering public trust in the financial system to sustainably enhance economic development.

Ofori et al., (2022) examine the combined influence of ICT diffusion and financial development on inclusive growth in sub-Saharan Africa (SSA), utilizing dynamic system GMM to analyze data from 42 SSA countries spanning 1980 to 2019. Their findings confirm that ICT skills, access, and usage directly enhance inclusive growth, with these positive effects being further amplified when supported by robust financial development. The study underscores the critical role of both ICT and financial development in fostering inclusive growth in SSA. It offers policy recommendations aligned with the region's green growth agenda and socioeconomic advancement, emphasizing the dual importance of technological and financial infrastructure for sustainable development.

Olayiwola (2022) investigates the causal relationship between financial sector development and inclusive growth in 32 sub-Saharan African (SSA) countries from 2000 to 2019 using the Dumitrescu-Hurlin panel causality test. The findings reveal unidirectional causality in West and South African sub-regions, but no causality in East and Central African regions. At the country level, 24 out of 32 countries show no causality, while 8 demonstrate unidirectional causality. The study concludes that reciprocal causality between inclusive growth and financial sector development is generally absent in most SSA countries. It advocates for policymakers to implement enhanced inclusive growth strategies and innovative financial reforms to stimulate the financial sector's impact on inclusive growth in the region.

Sarpong & Nketiah-Amponsah (2022) investigate the relationship between financial inclusion and inclusive growth in sub-Saharan Africa, analyzing data from 46 countries between 2004 and 2018. They find that increased usage of financial services has a significant positive impact on inclusive growth, more so than service availability or knowledge. Specifically, a 0.03 unit increase in financial service usage enhances inclusive growth. Their study introduces a comprehensive index of inclusive growth and quantifies the effects of different financial inclusion indicators. The research underscores the need for policymakers to establish equitable financial systems by ensuring reasonable lending rates, improving access to various loan types, and implementing user-friendly technologies to promote fair growth distribution across the region.

Raji (2021) delves into the intricate causal relationships among financial inclusion, institutional quality, and inclusive growth in Nigeria during the period 2003-2018. Employing a

comprehensive four-variate ARDL-ECM framework alongside forecast error variance decomposition, the research incorporates institutional quality variables, specifically government effectiveness and regulatory quality. The findings unveil robust and bidirectional long-term connections between financial inclusion and inclusive growth. Additionally, short-term linkages emerge between financial inclusion and government effectiveness, as well as between inclusive growth and regulatory quality. The study underscores the critical need for disciplined policy measures aimed at nurturing widespread financial inclusion and fostering sustainable, equitable growth. It advocates for proactive governance strategies to effectively manage these interrelated dimensions, ensuring conducive environments for economic advancement and social inclusivity.

Kazeem (2021) conducted a meticulous examination of financial development's impact on inclusive growth in Nigeria, employing a robust analysis of time series data spanning from 1999 to 2019. Financial development indicators, specifically broad money supply and domestic credit to the private sector were meticulously evaluated alongside metrics of inclusive growth such as per capita GDP and household consumption expenditure. Through ARDL analysis, the study unearthed compelling insights. Notably, it revealed a significantly positive correlation between broad money supply and both per capita income and household spending across both short and long-term horizons. Conversely, domestic credit exhibited a negative influence on per capita income in both temporal dimensions. The study underscores the pivotal role of broad money supply, advocating for its strategic utilization by the government to foster inclusive growth paradigms within Nigeria.

Rumbogo et al., (2021) examine financial inclusion's impact on inclusive development in Southeast Asia, with a focus on Indonesia. They develop a conceptual model connecting bank branch access to economic growth. By conducting cross-country comparisons in Asia and regional analyses within Indonesia, they find a positive correlation between access to regional bank branches and economic development at the provincial level. These findings highlight the challenge for the Indonesian government to direct development towards inclusivity through enhanced financial inclusion. The study advocates for targeted interventions aimed at expanding regional bank coverage to foster inclusive economic growth in Indonesia.

Feng & Cheng (2021) highlight the necessity of inclusive economic growth in China, examining the role of financial development through an empirical study. Utilizing generalized moment estimation and Sobel intermediary effect tests, the research reveals that financial

development positively influences inclusive growth, moderated by the scale, structure, and efficiency of development. Technological innovation emerges as a crucial intermediary, enhancing inclusive growth. The study also identifies significant regional differences in these intermediary effects, emphasizing the need for harmonizing financial development and technological innovation across regions. The paper concludes with policy recommendations focused on integrating financial development and technological innovation to foster comprehensive regional development in China.

Jombo (2021) examines the effects of financial inclusion and financial depth on inclusive growth in 26 sub-Saharan African countries. Using random effects panel regressions, the study finds a positive correlation between financial inclusion and inclusive growth, while financial depth shows no significant impact. However, at higher levels of financial inclusion, its positive impact on inclusive growth diminishes. The evidence indicates limited transmission from financial deepening to inclusive growth. The study advocates for enhanced efforts to increase financial inclusion, particularly in regions where its levels are low but still significantly contribute to inclusive growth.

Kumari (2021) highlights the crucial link between financial inclusion and inclusive growth in Sri Lanka, focusing on challenges such as limited access to formal financial services, especially in rural areas. Using secondary data and regression analysis from 1985 to 2019, the study investigates the impact of financial inclusion on various dimensions of inclusive growth: economic growth, poverty reduction, equality, and employment. The results reveal a significant positive influence of financial inclusion on inclusive growth, with economic growth being the most positively impacted and employment the least. This underscores the importance of enhancing financial inclusion to foster comprehensive and equitable economic development in Sri Lanka.

Yinusa et al., (2020) conducted a comprehensive analysis of Nigeria's institutional quality, financial development, and inclusive growth dynamics spanning from 1984 to 2017. Employing asymmetric cointegration techniques, the study unveiled a robust long-term interconnection among these critical factors. Notably, the findings elucidated asymmetric adjustment processes toward equilibrium, underscoring the profound impact of institutional quality and financial development on shaping Nigeria's inclusive growth trajectory. The study's conclusive insights affirm the pivotal roles these variables play in navigating and influencing the intricate landscape of inclusive growth within Nigeria, thus highlighting the imperative for

policymakers to prioritize and foster advancements in institutional quality and financial development to catalyze sustainable inclusive growth paradigms.

Odeleye & Olusoji (2020) underscore the pivotal role of financial inclusion in augmenting economic growth, with the overarching goal of poverty alleviation and improving living standards. Their extensive study spanning from 1981 to 2014 meticulously examines the intricate relationship between financial inclusion and economic growth in Nigeria, employing a battery of rigorous econometric tests. The findings prominently highlight the significance of factors such as money supply, liquidity ratio, and private sector credit as primary drivers propelling Nigeria's economic growth, thereby substantiating the finance-led growth theory. The study strongly advocates for the formulation and implementation of enduring financial policies and the cultivation of a conducive environment conducive to fostering public trust in the financial system. Central to this endeavor is the imperative for policymakers to concentrate their efforts on initiatives aimed at promoting sustained economic growth.

Sakanko et al., (2020) employed ARDL bounds testing to meticulously investigate the intricate relationship between financial inclusion and inclusive growth in Nigeria, meticulously scrutinizing quarterly data spanning from 2007 to 2018. The findings unveiled a compelling cointegration between various financial inclusion indicators and dimensions of inclusive growth, encompassing poverty alleviation, household expenditure, employment generation, and per capita income augmentation. However, the results illuminated a landscape of complexities, wherein heightened account ownership and enhanced access to banks and ATMs could potentially exacerbate poverty in the short term while fostering employment and income growth over the long haul. Moreover, access to credit emerged as a potent instrument for poverty reduction and bolstering household consumption.

Skliar et al., (2020) employ an inclusive growth framework to reorient economic policy towards well-being rather than mere income increase. Analyzing the qualitative development of the banking sector across 46 economies, the study assesses its impact on inclusive growth using panel regression. Findings indicate that an increase in automated teller machines universally enhances inclusive growth. However, the expansion of commercial banking branches yields mixed effects across different income groups. Additionally, the expansion of bank credit negatively affects high and lower-middle-income countries. While banking sector stability significantly boosts inclusive growth in high-income nations, it lacks statistical significance in upper-middle and lower-middle-income economies. These results highlight the

nuanced role of the banking sector in promoting inclusive growth across diverse economic contexts.

Olanrewaju et al., (2019), in their meticulous analysis employing Toda-Yamamoto Granger tests within an augmented VAR framework spanning from 1998 to 2017, unravel the intricate dynamics among institutional quality, financial factors, and inclusive growth in Nigeria. Their findings illuminate a nuanced landscape wherein, barring the financial inclusion index, various variables exert a Granger causality on inclusive growth without reciprocal feedback. Notably, bidirectional causality characterizes the relationship between inclusive finance and the intertwined influences of institutional quality and financial inclusion. Moreover, the study underscores institutional quality as the primary catalyst propelling inclusive growth, highlighting the indispensable role of robust institutions transcending mere democratic standards in harnessing human capital effectively. Consequently, the study advocates for the implementation of labor-intensive development strategies aimed at integrating marginalized households, thereby addressing critical issues of poverty, inequality, and unemployment within the Nigerian socio-economic landscape.

Oyinlola & Adedeji (2019) explored the role of financial development in the relationship between human capital and inclusive growth across 19 sub-Saharan African nations from 1999 to 2014. Using the system-generalized method of moment's estimation, the study evaluated the impact of various human capital measures on inclusive growth and the catalytic role of the financial sector. The results revealed a positive direct influence of both human capital and financial development on inclusive growth. Additionally, the study highlighted that improving financial sector efficiency through reforms could significantly enhance human capital development, thereby promoting more inclusive economic growth across the region.

Munir & Ullah (2018) estimate Pakistan's inclusive growth measure from 1987 to 2016, integrating GDP per capita growth and income inequality GINI coefficient. Using a social mobility function, they gauge pro-poor growth. Employing a two-step methodology, they assess inclusive growth empirically, linking income distribution and GDP per capita, and then applying time series analysis. Results highlight macroeconomic stability and structural changes as pivotal for inclusive growth. External sector improvements, favorable terms of trade, and financial deepening also contribute positively, encouraging greater inclusiveness within the country.

Oluwasogo et al., (2017) underscore the pivotal role of financial development in Nigeria's sustained economic growth, albeit recognizing the prevalence of short-term gains and external influences leading to economic fluctuations. In response, the government implemented various policy measures such as the Stabilization Policy (1981-1983), Structural Adjustment Program (1986-1992), and Economic Reforms (1999-2007) aimed at fostering long-term economic stability. However, persistent challenges persist, including inefficiencies in fund allocation, insufficient long-term funding, and a decline in domestic credit. To address these issues, the researchers aim to investigate the impact of financial development on inclusive growth in Nigeria utilizing a Bound testing approach. Their findings reveal a positive long-term relationship between financial development and inclusive growth, underscored by significant short-term impacts emanating from government expenditure and financial development initiatives.

Ayinde & Yinusa (2016) investigated the nuanced relationship between Nigeria's financial development and inclusive growth spanning from 1980 to 2013, employing quantile regression analysis. Their study discerned a critical threshold at the 90th percentile, delineating the point where financial development significantly impacts inclusive growth. Notably, they found that the magnitude of this impact varies depending on the level of financial development leading up to this threshold. Granger causality tests revealed a bidirectional relationship, indicating that inclusive growth also influences financial development. Additionally, the research highlighted the differential impact of government involvement: while adverse effects were observed with financial deepening, positive outcomes were associated with financial widening, underscoring the nuanced role of government policies in shaping financial development dynamics.

4.2.5 Research Gap

Despite the extensive body of literature examining the nexus between agricultural finance, financial development, and inclusive growth, significant research gaps persist that warrant further investigation. One critical gap lies in the fragmented understanding of the synergistic effects of agricultural finance and financial development on inclusive growth in Nigeria. Existing studies predominantly analyze these elements in isolation, failing to comprehensively integrate them to capture their combined impact on economic inclusivity.

Firstly, the literature extensively documents the impact of agricultural finance on output growth and productivity (Samaila & Idris, 2023; Ogbonnaya et al., 2022). However, there is a paucity

of research exploring how these financial mechanisms translate into broader inclusive growth metrics, such as poverty reduction and income distribution. While studies like those by Nwadiubu (2022) and Ebere et al., (2021) underscore the positive effects of agricultural financing on output, they do not sufficiently address its implications for inclusive growth, thus overlooking critical dimensions such as equitable access to finance among rural populations and marginalized groups.

Secondly, while financial development has been shown to influence inclusive growth (Nkoro & Uko, 2023; Onuorah, 2022), the specific pathways through which it impacts the agricultural sector remain underexplored. Research by Kazeem (2022) and Maku et al., (2022) highlights the role of financial inclusion in promoting economic growth, yet there is a gap in understanding how these financial development indicators specifically enhance agricultural productivity and inclusivity. The existing studies tend to generalize the effects of financial development without dissecting sector-specific impacts, particularly in agriculture, which is crucial for Nigeria's economy.

Moreover, there is limited empirical evidence on the interaction effects between agricultural finance and broader financial development variables in fostering inclusive growth. The interplay between sector-specific financing mechanisms, such as agricultural credit schemes, and broader financial development indicators, such as financial inclusion and ICT diffusion, remains inadequately explored. Studies like those by Wang et al., (2023) and Fe & Kouton (2023) emphasize the importance of financial and technological infrastructure for inclusive growth, yet their implications for agricultural finance are not explicitly addressed.

Finally, there is a need for longitudinal studies that consider the dynamic and evolving nature of financial development and agricultural finance. Most existing studies utilize cross-sectional or short-term data, which may not capture the long-term effects and sustainability of financial interventions in the agricultural sector (Afolabi et al., 2021; Koko et al., 2018). Longitudinal analyses would provide deeper insights into the sustained impacts of financial policies and interventions over time, contributing to a more robust understanding of how agricultural finance and financial development can jointly promote inclusive growth in Nigeria.

4.3 Methodology

This segment focuses on the study's core, examining the methodology used to understand the complex relationship between agricultural finance, financial development, and inclusive growth in Nigeria. It serves as a roadmap, detailing the tools and approaches used to collect and analyze vital data. Through a careful methodology, the study aims to uncover how agricultural finance and financial development impact inclusive growth in Nigeria, emphasizing their interactive and threshold effects.

4.3.1 Data Source and Delimitation

This study investigates the impact of agricultural finance and financial development on inclusive growth in Nigeria from 1990 to 2022, utilizing time series data from the World Development Indicator (WDI) and the Central Bank of Nigeria (CBN) Database. The dependent variable, inclusive growth, is measured through the natural logarithm of real gross domestic product per person employed (GDP per person employed, $/PPP), with data sourced from the WDI. This metric provides a comprehensive indicator of economic productivity and inclusivity, reflecting the economic output relative to the employed population.

The primary independent variable, agricultural finance, is represented by the natural logarithm of credit and loans allocated to the agricultural sector. This data, obtained from the CBN Database, captures the extent of financial support directed towards agriculture, which is crucial for understanding its impact on economic inclusivity and rural development.

Financial development, another key focus of the study, is assessed using three distinct indicators from the CBN Database. Broad money supply as a percentage of GDP serves as a proxy for overall financial depth and liquidity in the economy. Credit to the private sector as a percentage of GDP measures the extent to which private enterprises access financial resources, reflecting the inclusiveness and effectiveness of the financial sector. Total market capitalization as a percentage of GDP, also sourced from the CBN Database, acts as a control variable, representing the size and maturity of the financial markets.

Control variables essential for a comprehensive analysis are sourced from both the WDI and the CBN Database. The natural logarithm of gross fixed capital formation, obtained from the WDI, represents physical capital stock and reflects investment in infrastructure and productive assets. Human capital stock is captured by the natural logarithm of government educational

expenditure, with data from the CBN Database, indicating the government's commitment to enhancing educational outcomes and workforce skills. Trade openness, measured as the sum of total exports and imports divided by GDP and sourced from the WDI, accounts for the economy's exposure to international trade, which can significantly influence economic growth and inclusivity. Consequently, Table 4.1 offers comprehensive details on measurements, sources, and expected relationships of these variables.

Table 4.1: Summary of Variables, Descriptions, and Sources

Variable Name	Description	Measurement	Source
ING	Inclusive Growth	Natural logarithm of real gross domestic product per person employed ($/PPP)	World Development Indicator
AF	Agricultural Finance	Natural logarithm of credit and loan to the agricultural sector	Central Bank of Nigeria Database
BMS	Financial Development	Broad money supply as a percentage of GDP	Central Bank of Nigeria Database
CPS	Financial Development	Credit to private sector as a percentage of GDP	Central Bank of Nigeria Database
MCAP	Financial Development	Total market capitalization as a percentage of GDP	Central Bank of Nigeria Database
GCF	Physical Capital Stock	Natural logarithm of the gross fixed capital formation	World Development Indicator
HCAP	Human Capital Stock	Natural logarithm of government educational expenditure	Central Bank of Nigeria Database
TOP	Trade Openness	Total export plus total import all divided by the GDP	World Development Indicator

Source: *Author's Compilation, 2024.*

The chosen variables are justified based on their theoretical relevance and empirical support in the literature. Inclusive growth, as measured by GDP per person employed, is a comprehensive indicator of economic productivity and inclusivity. Agricultural finance is crucial for sectoral development in Nigeria, providing necessary resources for enhancing agricultural productivity and employment. Financial development indicators capture various dimensions of the financial sector, which are vital for efficient resource allocation and economic stability. The control variables—physical capital stock, human capital stock, and trade openness—are essential for accounting for other significant factors influencing inclusive growth. Physical capital reflects investment in infrastructure, human capital represents the impact of education, and trade openness indicates economic integration with global markets.

While acknowledging the challenges of proxy usage, prior research has validated the reliability and validity of these proxies. The intended data range from 1980 to the present, but the limited availability of gross domestic product per employed person restricts analysis to 1990–2022 (33 years). The study boasts over 30 samples, surpassing the minimum requirement for normal distribution and ensuring robust, credible outcomes for forecasting and policy formulation.

4.3.2 Model Specification

For the model specification, this study adopts the finance-inclusive growth theory by utilizing the financial innovation in the Cobb-Douglas production model. This model, a cornerstone in economic modeling and growth theory, underpins the analysis of input-output relationships in economies or firms, including technology's role in output generation. Consequently, a simplified Cobb-Douglas production function to represent inclusive growth (Y) is given as:

$$Y_t = A_t * K_t^{\beta} * (L_t * H_t)^{1-\beta} \quad (4.5)$$

Where: Y_t implies inclusive growth, A_t represents total factor productivity, K_t represents physical capital (e.g., machinery, infrastructure), L_t stands for labor input, and H_t denotes human capital (e.g., education and skills). Given that:

$$A_t = f(AF, FD) \quad (4.6)$$

Where AF represents agricultural financing and FD signifies financial development indicators, which are used to quantify the level of agricultural credit and financial development in the economy respectively. Furthermore, the financial development indicators (FD) is given as:

$$FD = D^{\omega_1} * M^{\omega_2} * P^{\omega_3} \quad (4.7)$$

Where: D represents the depth of the financial sector (e.g., the ratio of broad money supply to GDP), M represents the efficiency of financial intermediaries (e.g., the ratio of credit to the private sector to broad money supply), P represents financial market development (e.g., the market capitalization-to-GDP ratio), and $\omega_1, \omega_2, \omega_3$, are weights representing the relative importance of each component in the financial development indicators (FD).

For the interactive effect through the assumption that agricultural financing (AF) directly affects inclusive growth, which can be represented as:

$$AF = \gamma_F * F_0 * e^{\beta f * FD} \quad (4.8)$$

Where γ_F represents the initial level of agricultural financing, F_0 represents the baseline agricultural financing, and β_f measures the sensitivity of agricultural financing to changes in the financial development indicators (FD). Furthermore, for the interactive effect through the assumption that financial development (FD) positively influences inclusive growth, which can be represented as:

$$FD = \gamma_{FD} * FD_0 * e^{\beta fd * AF} \quad (4.9)$$

Where γ_{FD} represents the initial level of financial development, FD_0 represents the baseline financial development index, and β_{fd} measures the sensitivity of financial development to changes in agricultural financing (AF). Notably, there is a feedback loop between agricultural financing and financial development as given in the equations (4.8) and (4.9) above. These two equations capture the dynamic relationship where improvements in one (e.g., increased agricultural financing) positively affect the other (e.g., enhanced financial development), leading to a reinforcing cycle.

Consequently, the modified Cobb-Douglas production function in log-linear transformation is given as:

$$Y_t = \beta_0 + \beta_1 AF_t + \beta_2 FD_t + \beta_3 K_t + \beta_4 (L * H)_t \quad (4.10)$$

This above model illustrates how agricultural finance, financial development, and inclusive growth interact. These connections are dynamic, meaning shifts in agricultural finance and financial development impact one another and subsequently influence inclusive growth. Consequently, the econometric model for this study is thus given as:

$$ING_t = \beta_0 + \beta_1 AF + \beta_2 BMS + \beta_3 CPS + \beta_4 MCAP + \beta_5 GCF + \beta_6 HCAP + \beta_7 TOP + \varepsilon_t \quad (4.11)$$

Where ING_t = inclusive growth at time t, AF = agricultural financing, BMS = broad money supply to GDP ratio, CPS = credit to private sector to GDP ratio, MCAP = market capitalization to GDP ratio, GCF = gross fixed capital formation to proxy for K_t, HCAP = human capital stock to proxy for $(L*H)_t$, TOP = trade openness, and ε_t = stochastic error term at time t.

4.3.3 Estimation Technique

This study employs the Quantile Autoregressive Distributed Lag (QARDL) model to analyze the relationship between agricultural finance, financial development, and inclusive growth. It aims to conduct an interactive and threshold analysis of these interconnections. By utilizing

this method, the study aims to determine whether the agricultural finance-financial development nexus in the Nigerian economy contributes positively to inclusive growth or not.

The Quantile Autoregressive Distributed Lag (QARDL) model is an extension of the standard Autoregressive Distributed Lag (ARDL) model, allowing for the examination of the impact of variables at different quantiles of the conditional distribution of the dependent variable. It is a valuable tool for understanding how variables affect each other across various levels of the dependent variable's distribution (Gujarati, 2014).

The QARDL model, an advanced tool in econometrics, delves into time series data to analyze both short and long-term relationships among variables. Its innovation lies in extending the autoregressive model to incorporate lagged values of dependent and independent variables, enabling a comprehensive exploration of temporal patterns. Notably, its adaptable nature accommodates different integration orders among variables—essential for diverse economic scenarios. This model's flexibility makes it suitable for examining variables with orders of integration (I(0)), (I(1)), or a mix, crucial for empirical studies.

4.3.3.1 Interactive Effect

For the interactive QARDL model focusing on the impact of agricultural financing (AF) and financial development (BMS and CPS) on inclusive growth (ING), two different models will be employed to capture the long-run and short-run interactions to ensure robust estimates. Consequently, the models are formulated as follows:

Model 1:

$$\begin{aligned}\Delta ING_t = {} & C_0 + \partial_1 ING_{t-1} + \partial_2 AF_{t-1} + \partial_3 BMS_{t-1} + \partial_4 MCAP_{t-1} + \partial_5 (AF * BMS)_{t-1} \\ & + \partial_6 GCF_{t-1} + \partial_7 HCAP_{t-1} + \partial_8 TOP_{t-1} + \sum_{i=1}^{p} \omega_i \, \Delta ING_{t-i} + \sum_{j=0}^{q} \tau_j \, \Delta AF_{t-j} \\ & + \sum_{l=0}^{q} \sigma_l \, \Delta BMS_{t-l} + \sum_{m=0}^{q} \rho_m \, \Delta MCAP_{t-m} + \sum_{n=0}^{q} \pi_n \, \Delta (AF * BMS)_{t-n} \\ & + \sum_{r=0}^{q} \mu_r \, \Delta GCF_{t-r} + \sum_{s=0}^{q} \theta_s \, \Delta HCAP_{t-s} + \sum_{s=0}^{q} \gamma_u \, \Delta TOP_{t-u} \\ & + \varepsilon_t \qquad (4.12)\end{aligned}$$

Model 2:

$$\Delta ING_t = C_0 + \partial_1 ING_{t-1} + \partial_2 AF_{t-1} + \partial_3 CPS_{t-1} + \partial_4 MCAP_{t-1} + \partial_5 (AF * CPS)_{t-1} + \partial_6 GCF_{t-1} + \partial_7 HCAP_{t-1} + \partial_7 TOP_{t-1} + \sum_{i=1}^{p} \omega_i \Delta ING_{t-i} + \sum_{j=0}^{q} \tau_j \Delta AF_{t-j} + \sum_{l=0}^{q} \sigma_l \Delta CPS_{t-l} + \sum_{m=0}^{q} \rho_m \Delta MCAP_{t-m} + \sum_{n=0}^{q} \pi_n \Delta (AF * CPS)_{t-n} + \sum_{r=0}^{q} \mu_r \Delta GCF_{t-r} + \sum_{s=0}^{q} \theta_s \Delta HCAP_{t-s} + \sum_{s=0}^{q} \gamma_u \Delta TOP_{t-u} + \varepsilon_t \quad (4.13)$$

Where; ∂_i = long run multiplier ($i = 1, 2, 3, 4, 5, 6, 7, 8$), C_0 = the intercept, $\mathcal{E}_t$ = white noise. $\omega, \tau, \sigma, \rho, \pi, \mu, \ \theta, and\ \gamma$ are the short run dynamic coefficients of the model convergence to equilibrium and γ is the speed of adjustment. Furthermore, the above models assess how changes in AF, BMS, and CPS interactively influence inclusive growth in the long-run and short-run. To incorporate quantiles, we would use the quantile regression framework by exploring the interactive impact at various quantiles q (e.g., q = 0.25, 0.5, 0.75). Moreover, AF*BMS and AF*CPS respectively represents the interactive variables for model 1 and 2. For model 1 and 2, ∂_5 and π_n are the coefficients of the interactive variables in the short and long-run periods respectively. Notice that if ∂_5 and π_n are positive, then agriculture finance and financial development are complements. Conversely, if ∂_5 and $\pi_n$are negative, then it means agriculture finance and financial development are substitutes in nature.

4.3.3.2 Threshold Effect

Additionally, the threshold for agricultural financing determines the ideal point of agricultural investment where inclusive growth reaches its maximum potential. In this context, the threshold variable is integrated into equation 4.12 in the form of the square of agricultural financing (Ogbuagu et al., 2022). Hence, this integration is depicted in equation 4.14 below as:

$$\Delta ING_t = C_0 + \partial_1 ING_{t-1} + \partial_2 AF_{t-1} + \partial_3 AF^2{}_{t-1} + \partial_3 CPS_{t-1} + \partial_4 MCAP_{t-1} + \partial_5 (BMS)_{t-1} + \partial_6 GCF_{t-1} + \partial_7 HCAP_{t-1} + \partial_7 TOP_{t-1} + \sum_{i=1}^{p} \omega_i \Delta ING_{t-i} + \sum_{j=0}^{q} \tau_j \Delta AF_{t-j} + \sum_{k=0}^{q} \sigma_j \Delta AF^2{}_{t-k} + \sum_{l=0}^{q} \sigma_l \Delta CPS_{t-l} + \sum_{m=0}^{q} \rho_m \Delta MCAP_{t-m} + \sum_{n=0}^{q} \pi_n \Delta (BMS)_{t-n} + \sum_{r=0}^{q} \mu_r \Delta GCF_{t-r} + \sum_{s=0}^{q} \theta_s \Delta HCAP_{t-s} + \sum_{s=0}^{q} \gamma_u \Delta TOP_{t-u} + \varepsilon_t \quad (4.14)$$

Threshold of agriculture finance is computed by the partial differentiation of ΔING_t with respect to ΔAF_{t-1} and AF_{t-1} respectively. The partial differentiation of ΔING_t with respect to the ΔAF_{t-1} represents the short-run threshold, while with respect to the AF_{t-1} is the long-run threshold. The ability of the QARDL method to provide both short-run and long-run analysis makes its results more robust and desirable. Hence, the partial differentials of ΔING_t with respect to ΔAF_{t-1} and AF_{t-1} are specified in equations 4.15 and 4.16 as:

$$\frac{d\Delta ING_t}{d\Delta AF_{t-1}} = \tau_j + 2\sigma_k \Delta (AF)_{t-i} = 0 \quad (4.15)$$

From equation 4.15, we can make ΔAF_{t-1} the subject of the formula by dividing both sides by $-2\sigma_k$. Owing from the above, the short-run threshold of agriculture finance is specified as:

Short-run threshold of AF:

$$\Delta AF^{**}_{t-i} = -\frac{\tau_j}{2\sigma_k} \quad (4.16)$$

Similarly;

$$\frac{d\Delta ING_t}{dAF_{t-1}} = \partial_2 + 2\partial_3 AF_{t-1} = 0 \quad (4.17)$$

Therefore, the long-run threshold of agriculture finance is derived as:

$$AF^{**}_{t-1} = -\frac{\partial_2}{2\partial_3} \quad (4.18)$$

Prior to estimating the model, variable properties underwent scrutiny to ensure the absence of order two integration (I(2)) and to establish long-term relationships. The Augmented Dickey-

Fuller (ADF) tested each variable for unit root. To examine the long-term association between inclusive growth and underlying variables, the study imposed zero constraints on lag 1 variables in the unrestricted error correction model (UECM). A joint significance test assessed this relationship.

$H_0: \partial_1 = \partial_2 = \partial_3 = \partial_4 = \partial_5 = \partial_6 = \partial_7 = \partial_8 = 0$ against the alternative hypothesis

$H_1: \partial_1 \neq \partial_2 \neq \partial_3 \neq \partial_4 \neq \partial_5 \neq \partial_6 \neq \partial_7 \neq \partial_7 \neq 0$

The joint significance test evaluated the lag 1 variables. Testing the long-term relationship utilized the bounds test via an F-statistic. If the F-statistic for restricted coefficients surpasses Pesaran et al., (2001) upper bound critical value, it rejects the null hypothesis of no long-term relationship; conversely, it retains the null hypothesis if it falls below the critical value.

4.4 Presentation of Result

4.4.1 Descriptive Analysis

Descriptive statistics are essential to analyze central tendencies, data spread, and unique characteristics. It evaluates normal distribution and employs Jarque-Bera (JB) statistics for this purpose. If JB's probability value is below 5%, we reject the null hypothesis of normal distribution; otherwise, we accept the alternative. Additionally, the standard deviation from these statistics gauges data dispersion from the mean.

Table 4.2: Statistical Properties of Variables

Variable	ING	AF	CPS	BMS	MCAP	GCF	HCAP	TOP
Mean	9.43	14.25	12.79	16.76	0.14	24.50	4.27	35.86
Median	9.44	15.22	10.11	14.79	0.16	24.79	4.78	36.06
Maximum	9.81	16.34	22.75	24.90	0.38	25.75	6.45	53.28
Minimum	9.09	11.28	5.81	8.46	0.03	23.24	-1.23	16.35
Std. Dev.	0.26	1.81	5.80	5.60	0.08	0.71	1.96	9.41
Skewness	-0.00	-0.48	0.22	0.06	0.63	-0.03	-0.99	-0.09
Kurtosis	1.39	1.59	1.28	1.34	3.11	1.83	3.35	2.39
Jarque-Bera	3.58	3.96	4.32	3.81	2.21	1.90	5.59	0.55
Probability	0.17	0.14	0.12	0.15	0.33	0.39	0.06	0.76
Sum	311.13	470.22	422.11	553.07	4.55	808.65	140.77	1183.23
Sum Sq. Dev.	2.19	104.32	1077.2 8	1002.9 2	0.23	16.24	123.34	2833.78
Observations	33	33	33	33	33	33	33	33

Source: *Author's Computation, 2023.*

The descriptive statistics in Table 4.2 provide a comprehensive overview of the characteristics and distributions of eight variables from 1990 to 2022. Inclusive Growth (ING) exhibits a mean of 9.43, with a narrow spread indicated by a low standard deviation of 0.26. The minimal skewness, close to 0, and a nearly normal distribution, evidenced by a low Kurtosis of 1.39 and a Jarque-Bera statistic of 3.58 (p-value = 0.17), suggest a well-distributed dataset over the observed period. This result implies that inclusive growth remained relatively stable, likely due to consistent economic policies aimed at equitable development (Yinusa, et al., 2020).

Agricultural Financing (AF) portrays a higher mean of 14.25, coupled with a larger spread indicated by a higher standard deviation of 1.81. The mildly negatively skewed distribution (-0.48) and slightly peaked distribution (Kurtosis = 1.59, Jarque-Bera = 3.96, p-value = 0.14) suggest variability and some degree of asymmetry in agricultural financing. This variability could stem from fluctuating agricultural yields, changes in government subsidies, and varying levels of investment in the agricultural sector over the years (Rafie & Aminu, 2020).

Credit to Private Sector to GDP Ratio (CPS) and Broad Money Supply to GDP Ratio (BMS) display means of 12.79 and 16.76, respectively, with moderate standard deviations (CPS = 5.80, BMS = 5.60). The fairly symmetric distributions (CPS Skewness = 0.22, BMS Skewness = 0.06) indicate relatively balanced data distributions. These results suggest that credit availability and money supply remained relatively stable, which is crucial for sustaining economic growth and ensuring liquidity in the financial system (Oluwasogo, et al., 2017). The BMS specifically, with a mean of 16.76, reflects the extent of liquidity available in the economy, facilitating transactions and investments. The moderate standard deviation of 5.60 implies a reasonable level of variation, suggesting that while there are fluctuations, they are not extreme, pointing to effective monetary policy management by central authorities.

Total Market Capitalization to GDP Ratio (MCAP) has a smaller mean of 0.14, reflecting its scale difference compared to other variables. Its higher standard deviation (0.08) and positive skewness (0.63) suggest a positively skewed distribution. This indicates periods of high market capitalization relative to GDP, likely driven by stock market expansions and economic booms, influenced by investor sentiment and macroeconomic conditions (Kumari, 2021).

Gross Fixed Capital Formation (GCF) records a mean of 24.50, showing a wider spread with a moderate standard deviation of 0.71 and a nearly symmetric distribution. This reflects stable investment levels in fixed capital, critical for long-term economic growth and infrastructure

development. Consistent government policies and investments in infrastructure could explain this stability (Jammeh, 2022).

Government Educational Expenditure (HCAP) has a mean of 4.27 with a moderate spread (Std. Dev. = 1.96), negative skewness (-0.99), and substantial peakedness (Kurtosis = 3.35, Jarque-Bera = 5.59, p-value = 0.06). The significant negative skewness and kurtosis indicate periods of relatively higher educational expenditure. This trend is essential for understanding public investment trends in human capital development, reflecting policy shifts prioritizing education (Akintola, et al., 2020).

Lastly, Trade Openness (TOP) demonstrates a high mean of 35.86, with a considerable standard deviation of 9.41. The negligible skewness (-0.09) and a fairly normal distribution, indicated by a low Kurtosis of 2.39 and a Jarque-Bera statistic of 0.55 (p-value = 0.76), suggest consistent trade openness levels. This stability is crucial for evaluating international trade policies and economic integration, likely driven by global trade agreements and liberalization policies (Fe & Kouton, 2023).

4.4.2 Unit Root Test

The unit root test, specifically the Augmented Dickey-Fuller (ADF) test, is crucial in verifying regression estimation credibility by addressing mean-reversion tendencies in time series variables (Gujarati, 2014). These variables often deviate from their mean, leading to biased outcomes. ADF and PP testing assess variable stationarity, rectifying issues and accommodating their weaknesses. Establishing stationarity is vital in preventing spurious results in regression models. Additionally, this test determines if a series is stationary, pivotal for selecting appropriate estimation techniques like QARDL. Ensuring stationarity aligns with accurate regression outcomes, enhancing the reliability of the study.

Table 4.3: Augmented Dickey-Fuller Test

Variable	Level			First Difference			Order of Integration
	Intercept	Trend	None	Intercept	Trend	None	
ING	-0.9078	-2.3359	0.6982	-2.4792	-2.4369	-2.4030**	I(1)
AF	-1.4069	-0.6615	1.5690	-5.1576***	-4.6855***	-4.7344***	I(1)
CPS	-0.9561	-3.2085	0.6684	-5.2057***	-5.1073**	-5.0467***	I(1)
BMS	-1.0464	-3.0912	0.8410	-5.1184***	-5.0343**	-5.0757***	I(1)
MCAP	-1.8374	-3.1978	-0.3239	-5.4601***	-5.3564***	-5.3417***	I(1)
GCF	0.2804	-3.4281*	1.6342	-4.3684***	-4.3719**	-4.0605***	I(0)
HCAP	-6.1306***	-5.6081***	1.0973	-7.9510***	-8.0647***	-7.2930***	I(0)
TOP	-2.8732*	-3.4693**	-0.7176	-5.6305***	-5.6172***	-5.6968***	I(0)

Source: *Author's Computation, 2023.*[1]

Table 4.3 presents the results of the Augmented Dickey-Fuller (ADF) test, a method to assess stationarity in time series data. Stationarity implies that a series' statistical properties remain constant over time. The test assesses the presence of a unit root, indicating the degree to which a variable is influenced by its own past values. Each row in the table corresponds to a specific variable, displaying test statistics at different levels: with intercept, with trend, and without both intercept and trend. The test outcomes reveal the nature of the variables' integration orders (degree of differencing required to achieve stationarity). For variables inclusive growth (ING), agricultural finance (AF), credit to private sector ratio (CPS), broad money supply ratio (BMS), and total market capitalization ratio (MCAP), the intercept, trend, and no trend or intercept all demonstrated statistical significance in their first difference, confirming their integration as I(1), suggesting they are non-stationary in their raw form but stationary after differencing once. Furthermore, gross fixed capital formation (GCF) showed stationarity without differencing (I(0)) when assessed with the trend, implying it is stationary at its raw level.

However, human capital (HCAP) and trade openness (TOP) appeared stationary at level (I(0)) in their intercept or trend form without requiring differencing, suggesting they are stationary in their original series. Conclusively, the unit root test implies that most variables achieve stationarity after differencing, suggesting they are integrated of order 1 (I(1)), except GCF, HCAP, and TOP which show stationarity in their original form (I(0)). The ADF test reveals that the series is a combination of I(1) and I(0), which is one of the requirements for employing the quantile autoregressive distributed lag (QARDL) technique.

Table 4.4: Phillip-Perron Unit Root Test

Variable	Level			First Difference			Order of
	Intercept	Trend	None	Intercept	Trend	None	Integration
ING	-0.7472	-1.4681	1.4190	-2.5294	-2.4861	-2.4295**	I(1)
AF	-1.4040	-0.6935	1.5659	-5.1455***	-5.5544***	-4.7529***	I(1)
CPS	-0.9505	-2.1472	0.9850	-6.4363***	-6.1869**	-4.3411***	I(1)
BMS	-0.9430	-2.3784	1.5170	-5.3432***	-5.2650***	-5.1248***	I(1)
MCAP	-1.6774	-3.2570*	0.2337	-9.3830***	-9.1519***	-7.0021***	I(0)
GCF	0.1020	-3.2028	1.4665	-4.3048***	-4.2497***	-4.0419***	I(1)
HCAP	-1.5030	-2.9522	1.2847	-9.3972***	-27.5456***	-7.4352***	I(1)
TOP	-2.8732*	-3.4343*	-0.5215	-12.4965***	-17.3241***	-10.8296***	I(0)

Source: *Author's Computation, 2023.*[2]

[1] Note that *** is significant at 1%, ** represents significance at 5%, and * implies significance at 10%
[2] Note that *** is significant at 1%, ** represents significance at 5%, and * implies significance at 10%

For robustness, the Phillip-Perron test provides insights into the stationarity of economic variables. Total Market Capitalization to GDP Ratio (MCAP) and Trade Openness (TOP) are integrated of order zero, denoted as I(0), indicating stationarity at the level without differencing. This implies stable long-term behavior without the need for transformations.

Conversely, Inclusive Growth (ING), Agricultural Financing (AF), Credit to Private Sector to GDP Ratio (CPS), Broad Money Supply to GDP Ratio (BMS), Gross Fixed Capital Formation (GCF), and Government Educational Expenditure (HCAP) display integration of order one, denoted as I(1). These variables require first differencing to achieve stationarity, indicating predictable long-term relationships after differencing once.

In summary, while MCAP and TOP are stationary at the level, the other variables need differencing for stability. These findings, similar to ADF test, reveal that the series is a combination of I(1) and I(0), which is one of the requirements for employing the quantile autoregressive distributed lag (QARDL) technique.

4.4.3 Baseline Result

4.4.3.1 Interactive Effects:

This section scrutinizes the interactive effect of agricultural finance and financial development on inclusive growth via two distinctive models. The initial model assesses the interplay between agricultural finance (AF) and financial development represented by the credit to the private sector to GDP ratio (CPS), revealing the interactive effect as (AF*CPS). Meanwhile, the second model delves into the nexus between agricultural finance (AF) and financial development gauged through the broad money supply to GDP ratio (BMS), demonstrating the interactive effect as (AF*BMS). By employing these models, the study aims for robust estimations to elucidate the intricate dynamics shaping inclusive growth in Nigeria within the context of agricultural finance and financial development.

The study explored the quantile autoregressive distributed lag model, encompassing traditional quantiles like the 25th, 50th, 75th, and 85th percentiles. These quantiles correspond to specific positions within the data distribution. The 25th, 50th, and 75th percentiles are also known as the first, second, and third quartiles, respectively, delineating the dataset into four equal parts. Meanwhile, the 85th percentile signifies the boundary where 85% of the data falls below it, capturing a significant portion of the distribution's tail end. This approach allowed for a comprehensive analysis of various segments of the data, offering insights into different sections

of the interactive effect of agricultural finance and financial development on inclusive growth with distinct significance as shown in Table 4 below.

Table 4.5: Interactive Effect of Agricultural Financing and Financial Development on Inclusive Growth

Variables	Model One (1): Dependent = D(ING)				Model Two (2): Dependent = D(ING)			
	25th Quartile	50th Quartile	75th Quartile	85th Quartile	25th Quartile	50th Quartile	75th Quartile	85th Quartile
D(AF)	0.048***	0.056**	0.060***	0.061***	0.065	0.058**	0.057**	0.057**
	(0.001)	(0.002)	(0.000)	(0.001)	(0.262)	(0.013)	(0.004)	(0.006)
D(AF(-1))	0.035**	0.048	0.052**	0.055**	0.064**	0.064**	0.063**	0.063**
	(0.043)	(0.140)	(0.032)	(0.020)	(0.037)	(0.006)	(0.005)	(0.006)
D(AF(-2))	0.023	0.020	0.021	0.020	0.058	0.042*	0.037	0.037*
	(0.293)	(0.297)	(0.328)	(0.373)	(0.421)	(0.067)	(0.112)	(0.074)
D(CPS(-2))	0.005**	0.004	0.001	0.002				
	(0.021)	(0.153)	(0.718)	(0.659)				
D(BMS(-2))					0.005	0.005	0.006**	0.006**
					(0.448)	(0.190)	(0.024)	(0.030)
D(MCAP(-1))	0.223*	0.134	0.163	0.170	-0.060	0.130	0.211*	0.211*
	(0.061)	(0.316)	(0.177)	(0.224)	(0.900)	(0.237)	(0.068)	(0.061)
D(AF*CPS)	0.002***	0.003	0.002	0.002				
	(0.003)	(0.231)	(0.253)	(0.194)				
D(AF(-1)*CPS(-1))	0.003***	0.003	0.003	0.003				
	(0.002)	(0.192)	(0.201)	(0.156)				
D(AF*BMS)					0.002	0.001	0.001	0.001
					(0.129)	(0.368)	(0.459)	(0.486)
D(AF(-1)*BMS(-1))					0.002**	0.002	0.002	0.002
					(0.034)	(0.245)	(0.214)	(0.231)
D(GCF)	0.055	0.051	0.044	0.043	0.124**	0.077	0.059	0.059
	(0.302)	(0.208)	(0.320)	(0.352)	(0.048)	(0.276)	(0.266)	(0.284)
D(HCAP)	0.019**	0.012	0.011	0.011	0.013	0.002	-0.004	-0.004
	(0.008)	0.544)	(0.534)	(0.477)	(0.504)	(0.889)	(0.730)	(0.739)
D(TOP)	-0.002***	-0.003**	-0.003**	-0.003**	-0.002*	-0.002**	-0.002**	-0.002***
	(0.000)	(0.002)	(0.001)	(0.001)	(0.083)	(0.001)	(0.005)	(0.001)
ING	0.235***	0.247**	0.230**	0.248**	0.268	0.239**	0.251**	0.251**
	(0.001)	(0.003)	(0.029)	(0.046)	(0.187)	(0.020)	(0.033)	(0.030)
AF	-0.044***	-0.056**	-0.053**	-0.056**	-0.061*	-0.048**	-0.047**	-0.047**
	(0.003)	(0.002)	(0.018)	(0.024)	(0.065)	(0.042)	(0.030)	(0.043)
CPS	-0.044**	-0.044	-0.041	-0.044				
	(0.005)	(0.219)	(0.227)	(0.180)				
BMS					-0.033*	-0.021	-0.019	-0.019
					(0.053)	(0.340)	(0.348)	(0.363)
MCAP	0.204**	0.240	0.275	0.294	0.242	0.210*	0.201	0.201
	(0.006)	(0.235)	(0.132)	(0.133)	(0.107)	(0.090)	(0.121)	(0.106)
AF(-2)*CPS(-2)	0.002**	0.002	0.002	0.003				
	(0.005)	(0.243)	(0.258)	(0.203)				
AF(-2)*BMS(-2)					0.002*	0.001	0.001	0.001
					(0.079)	(0.417)	(0.438)	(0.465)
GCF	-0.076***	-0.076**	-0.073**	-0.078*	-0.079	-0.076**	-0.081**	-0.081**
	(0.001)	(0.009)	(0.034)	(0.052)	(0.261)	(0.025)	(0,041)	(0.043)
HCAP	0.014	0.035	0.029*	0.031*	0.026	0.023	0.032**	0.032*
	(0.309)	(0.121)	(0.055)	(0.052)	(0.421)	(0.444)	(0.046)	(0.074)
TOP	0.004***	0.004***	0.005***	0.005***	0.003**	0.003***	0.003***	0.003**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.014)	(0.001)	(0.001)	(0.002)
TREND	0.008**	0.006	0.004	0.005	0.003	0.005	0.004	0.004
	(0.022)	(0.332)	(0.196)	(0.263)	(0.645)	(0.319)	(0.365)	(0.401)
PSEUDO R-SQUARED	**0.869**	**0.858**	**0.875**	**0.898**	**0.828**	**0.848**	**0.871**	**0.896**
BOUNDS TEST (F-STAT.)	14.924				10.838			
	(0.000)				(0.000)			
LM TEST	1.312				0.703			

	(0.328)	(0.527)
BREUSCH-PAGAN-GODFREY	24.051	14.376
	(0.240)	(0.811)
JARQUE-BERA	0.672	0.906
	(0.715)	(0.636)

Source: *Author's Computation, 2023.*

In model one (1), the coefficient estimates for variable D(AF) reveal consistent positive links with inclusive growth in all quartiles. For instance, at the 25th quartile, the coefficient is 0.048 (p-value = 0.001), suggesting a rise of 0.048 units in inclusive growth with a one-unit increase in agricultural finance in the short run. This supports the expected positive impact of agricultural investment on inclusive growth, echoing previous studies (Samaila & Idris, 2023; Nwadiubu, 2022). Surprisingly, long-run coefficients show a negative impact, contradicting the anticipated positive effects of agricultural finance on inclusive growth over time.

The short-term positive impact of agricultural finance on inclusive growth can be attributed to its direct injection into the agricultural sector, stimulating productivity, income generation, and employment opportunities. This aligns with theoretical frameworks suggesting that investments in agriculture have multiplier effects on economic growth and poverty reduction (Rao, 2014). However, the unexpected long-term negative impact could be explained by factors such as inefficiencies in resource allocation, inadequate infrastructure, and limited technology adoption in the agricultural sector, hindering its sustained contribution to inclusive growth (World Bank, 2008).

In the short run, the lagged impact of agricultural finance (D(AF(-1))) shows varied results across quartiles. Positive coefficients are evident but significant only at the 25th, 75th, and 85th quartiles. The 85th quartile particularly displays significance (0.055, p-value = 0.020), revealing a positive influence from previous agricultural finance on inclusive growth. Notably, effects increase from lower to upper quartiles. However, D(AF(-2)) lacks a significant impact on short-run inclusive growth, aligning with Nwadiubu's (2022) study on agriculture's past performance in Nigerian inclusive growth.

Moreover, the lagged financial development indicators (previous private sector credit and market capitalization to GDP ratio) display a positive impact, notably significant solely at the 25th quartile (0.005, p = 0.021 and 0.223, p = 0.061 respectively). This suggests that heightened financial development might notably influence inclusive growth at the lower end of data distribution in the short term. These results support the expected positive link between financial

development and inclusivity, resonating with Ayinde & Yinusa's (2016) findings on Nigeria. Interestingly, in the long term, market capitalization (MCAP) echoes a positive and significant effect, while private sector credit (CPS) exhibits a negative and significant impact solely at the 25th quartile.

Regarding the short-term interactive term D(AF*CPS), a consistent positive nexus emerges across quartiles, notably significant at the 25th quartile (0.002, p-value = 0.003). This indicates that when agricultural finance and financial development interact, they amplify inclusive growth, particularly in lower quantiles. This underscores the importance of aligning these factors for short-term inclusive growth. Similar trends occur with the short-term lagged interactive effect D(AF(-1)*CPS(-1)) and long-term lagged effect AF(-2)*CPS(-2) on inclusive growth. These findings echo Nkoro & Uko's (2023) study, emphasizing how financial growth bolsters agricultural finance's role in Nigeria's inclusive growth. Stronger financial development, especially in private sector credit, facilitates agricultural investment, yielding immediate and long-term gains for inclusive growth.

Contrarily, variables like D(GCF) and D(HCAP) show varying short-term impacts across quartiles with inconsistent significance, except for HCAP, positively significant only in the 25th quartile. This variability suggests diverse effects on inclusive growth at different data levels. Conversely, D(TOP) has a consistently negative and significant impact on inclusive growth across all quartiles in the short term. In the long run, GCF consistently negatively affects inclusive growth across quartiles, while TOP positively impacts inclusive growth across all quartiles. However, HCAP only positively influences long-term inclusive growth at the 75th and 85th quartiles.

The implications of the above findings suggest that while agricultural finance plays a significant role in fostering inclusive growth, its effectiveness is influenced by the dynamics of financial development, emphasizing the need for synchronized policy interventions targeting both sectors for sustainable inclusive growth in Nigeria.

Across quartiles, pseudo-R-squared values range from 0.858 to 0.898, indicating the model explains a substantial portion of inclusive growth variation. Analysis reveals a long-term relationship among model 1 variables, aligning with Helen's (2023) and Onuorah's (2022) research, suggesting co-integration over the long run. Employing the QARDL method combines short and long-term models robustly. The post-estimation tests including LM, Breusch-Pagan-Godfrey, Jarque-Bera, stability—confirm the model's validity, showing the

absence of serial correlation, heteroskedasticity, abnormality, instability issues with p-values exceeding the 5% significance level. The stability test result is computed with the cumulative sum of squares graph, which can be seen in Figure 4.2 below.

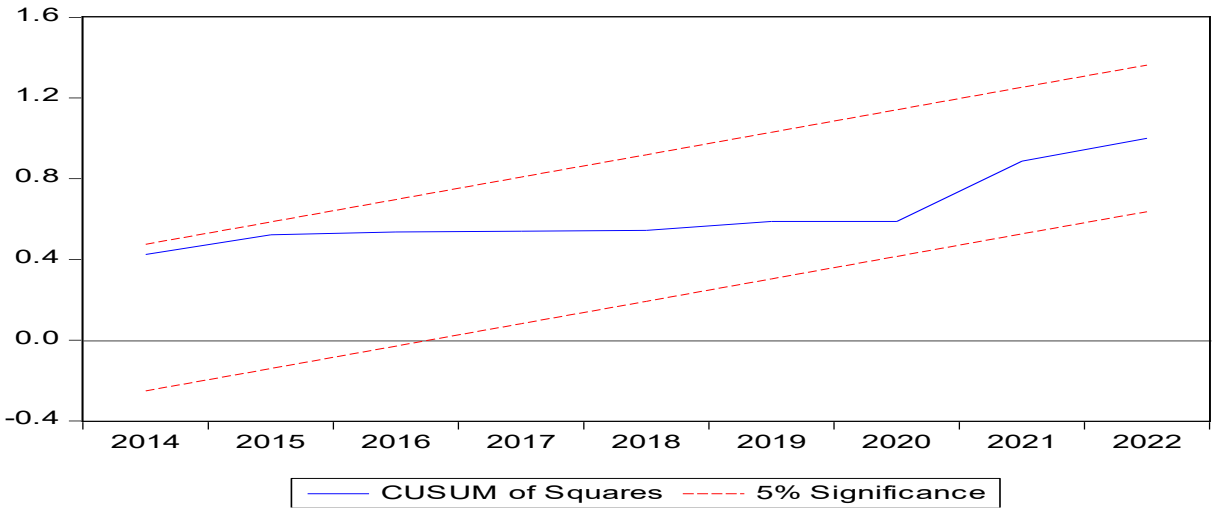

Figure 4.2: Model One (1) Stability Test

For robustness, the short-run coefficient estimate for D(AF) displays consistent positive associations with inclusive growth across quartiles in model 2. At the 25th quartile, the coefficient is 0.065 (p-value = 0.262), suggesting an increase of 0.065 units in inclusive growth with a one-unit rise in agricultural finance. Notably, this positive relationship strengthens as quartiles ascend, reaching significance at the 50th quartile (0.058, p-value = 0.013) and remaining consistent at the 75th and 85th quartiles (both 0.057, p-values = 0.004 and 0.006, respectively). However, in the long run, the relationship shows a contrasting negative and significant impact on inclusive growth across quartiles, indicating an unexpected divergence from short-term trends. This finding aligns with economic a-priori expectation only via the short-run and not the long-run horizons. Furthermore, the finding is evident from the study of Ogbonnaya, et al. (2022) who found a short-run effect of agricultural finance on inclusive growth in Nigeria

The lagged impact of agricultural finance (D(AF(-1))) exhibits varied results across quartiles. Significant positive coefficients are evident at the 25th, 50th, 75th, and 85th quartiles, with the most pronounced impact observed at the 50th quartile (0.064, p-value = 0.006). However, the effect diminishes in significance at higher lags (D(AF(-2))), highlighting a lack of short-term influence on inclusive growth, in line with previous studies on Nigeria's agricultural finance performance (Afolabi, et al., 2021; Ebere, et al., 2021).

The lagged financial development indicators, notably D(BMS(-2)) and D(MCAP(-1)), depict differing impacts on short-term inclusive growth. D(BMS(-2)) exhibits a minor positive effect across quartiles, reaching significance only at the 75th and 85th quartiles (both 0.006, p-values = 0.024 and 0.030, respectively). Conversely, D(MCAP(-1)) demonstrates a mixed impact, with a notable positive and significant effect solely at the 75th and 85th quartiles (both coefficients 0.211, p-value = 0.068). The results underscore varying influences of financial development indicators on short-term inclusive growth at different quartiles. However, in the long-run, financial development (BMS and MCAP) were only significant at the lower quartiles (25^{th} and 50^{th} respectively), while BMS exerts a negative influence and MCAP exhibits a positive impact on inclusive growth in Nigeria. This findings can be attributed to the study of Ayinde & Yinusa (2016) who also found varying short-run and long-run effect of financial development on inclusive growth in Nigeria.

The short-term interactive term D(AF*BMS) suggests a positive relationship with inclusive growth, notably insignificant at all quartiles, contrary to the finding in model 1. Similarly, D(AF(-1)*BMS(-1)) displays a positive and significant effect at only the 25th quartile (0.002, p-value = 0.034) aligning to the findings in model 1. This result emphasize the amplified positive robust impact of agricultural finance and financial development interaction on inclusive growth at lower quantiles. Furthermore, the long-run result also conforms to the short-run findings of positive and significant effect of the interaction between agricultural finance and financial development on inclusive growth along the lower quartile. These results conform to the economic a-priori theoretical expectation and evidently from the findings of Kazeem (2021).

Variables like D(GCF), D(HCAP), and D(TOP) exhibit varying impacts on inclusive growth in the short term across quartiles, with inconsistent significance levels. Notably, D(TOP) consistently displays a negative and significant impact across all quartiles. In the long run, GCF negatively affects inclusive growth across quartiles (excluding the 25th quartile), while TOP positively and significantly impacts inclusive growth. However, HCAP's positive and significant influence is observed only at higher quartiles (75th and 85th).

The model's pseudo-R-squared values, ranging from 0.828 to 0.896 across quartiles, suggest substantial explanatory power in understanding the variation in inclusive growth. Additionally, post-estimation tests affirming model validity, such as the LM, Breusch-Pagan-Godfrey, Jarque-Bera, and stability tests, further support the model's robustness and suitability for

analysis, validating the absence of serial correlation, heteroskedasticity, abnormality, and instability issues at a 5% significance level. The stability test result is computed with the cumulative sum of squares graph, which can be seen in Figure 4.3 below.

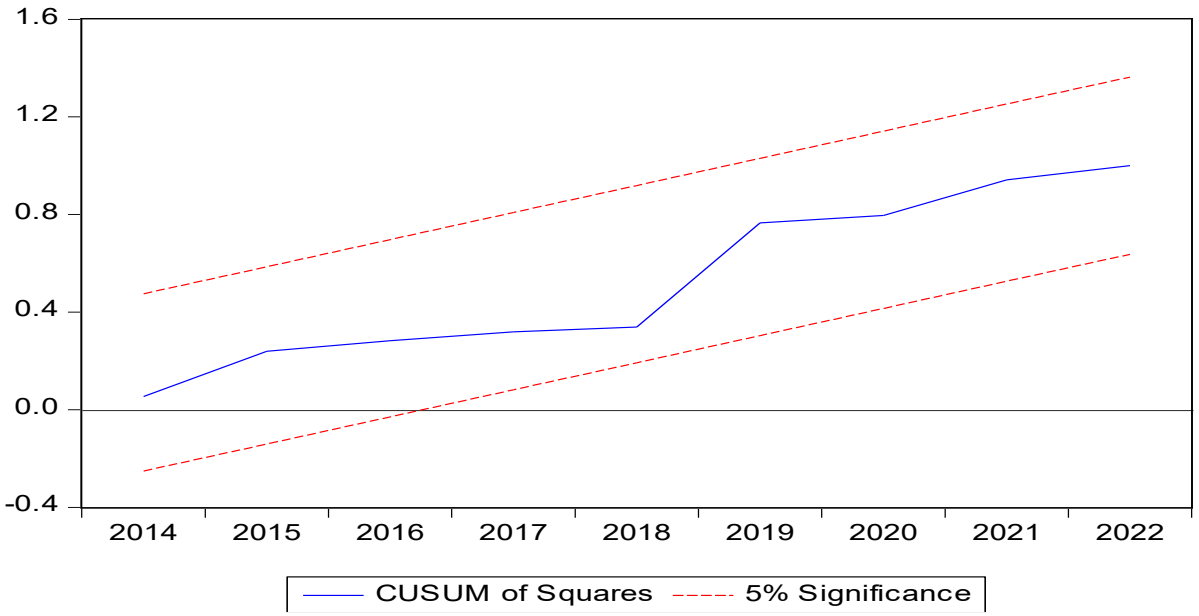

Figure 4.3: Model Two (2) Stability Test

4.4.3.2 Threshold Effects

This section examines how agricultural finance impacts inclusive growth at optimal levels. Using the quantile autoregressive distributed lag model, it studies specific data positions: the 25th, 50th, 75th, and 85th percentiles. These markers divide data into sections. The 85th percentile represents where 85% of data lies below it, capturing the tail end. This analysis method offers insights into diverse data segments, shedding light on the threshold effect of agricultural finance for inclusive growth as shown in Table 5 below.

Table 4.6: Threshold Effect of Agricultural Finance Required to Enhanced Inclusive Growth to the Optimum Level

Variables	Threshold Effect: Dependent Variable = D(ING)			
	25th Quartile	50th Quartile	75th Quartile	85th Quartile
D(AF(-1))	0.078**	0.074***	0.037	0.040
	(0.011)	(0.004)	(0.265)	(0.511)
D(AF(-2))	0.056***	0.052**	0.053	0.056
	(0.004)	(0.026)	(0.143)	(0.251)
D((AF)^2)	0.001**	0.001*	0.001	-0.001
	(0.044)	(0.057)	(0.392)	(0.957)
D(MCAP)	-0.369**	-0.334*	-0.547	-0.391
	(0.012)	(0.064)	(0.172)	(0.341)

D(GCF)	0.104**	0.087**	0.059	0.089
	(0.004)	(0.027)	(0.303)	(0.288)
D(HCAP(-1))	-0.006	-0.004	-0.008	-0.006
	(0.528)	(0.613)	(0.386)	(0.439)
D(TOP)	-0.002	-0.002*	-0.002**	-0.001
	(0.237)	(0.059)	(0.031)	(0.434)
ING	0.262**	0.227**	0.158	0.079
	(0.033)	(0.029)	(0.196)	(0.734)
(AF(-1))^2	-0.002**	-0.002**	-0.001	-0.001
	(0.047)	(0.035)	(0.117)	(0.763)
MCAP	0.652**	0.568**	0.442	0.356
	(0.005)	(0.005)	(0.397)	(0.215)
GCF	-0.103**	-0.091**	-0.065	-0.037
	(0.026)	(0.020)	(0.159)	(0.675)
HCAP	0.066	0.055	0.057*	0.062
	(0.181)	(0.147)	(0.073)	(0.073)
TOP	0.002*	0.002**	0.002	0.002
	(0.083)	(0.012)	(0.132)	(0.614)
TREND	-0.003	-0.002	-0.005	-0.008
	(0.510)	(0.688)	(0.554)	(0.540)
PSEUDO R-SQUARED	**0.785**	**0.748**	**0.710**	**0.752**
BOUNDS TEST (F-STAT.)		14.942		
		(0.000)		
LM TEST		1.312		
		(0.328)		
BREUSCH-PAGAN-GODFREY		24.051		
		(0.240)		
JARQUE-BERA		0.672		
		(0.715)		

Source: *Author's Computation, 2023.*[3]

For the short-run, D(AF(-1)) and D(AF(-2)) represent the changes in agricultural finance from the previous periods. D(AF(-1)) has a significant positive impact on inclusive growth across only the 25th and 50th quartiles, indicating that an increase in agricultural finance in the previous period positively influences inclusive growth in the short run and at the lower quartiles. However, the effect diminishes over time as the lag increases (from D(AF(-1)) to D(AF(-2))) with lower positive coefficient values at the 25th and 50th quartiles.

Interestingly, the squared term of short-run agricultural finance (D(AF)^2) shows a significant but small positive effect on inclusive growth in the short run at the 25th and 50th quartiles. However, this effect diminishes at higher quartiles, becoming statistically insignificant. Conversely, in the long run, the squared of agricultural finance exhibits a negative and significant impact on inclusive growth only in the lower quartiles (25th and 50th quartiles).

[3] Note that *** is significant at 1%, ** represents significance at 5%, and * implies significance at 10%. P-values are in parentheses.

This implies a short-run nonlinear positive relationship between agricultural finance and inclusive growth in the lower quartiles. This positive relationship suggests a nonlinear effect, indicating that beyond a certain threshold level of AF, the impact on ING becomes more pronounced. However, a long-run nonlinear negative nexus between agricultural finance ((AF)^2) and inclusive growth can be found in the lower quartiles. This suggests a potential ceiling effect, where excessively high levels of agricultural finance might hinder inclusive growth in the long term. The presence of a threshold effect suggests that simply increasing agricultural finance might not linearly or consistently enhance inclusive growth.

Moreover, the short-run negative and significant associations of market capitalization (D(MCAP)) and the long-run negative and significant effect of gross capital formation (GCF) at the lower quartiles (25th and 50th) highlight the significance of financial and investment activities in impeding inclusive growth. Strengthening financial markets and encouraging sustainable investment can potentially, but may not necessarily contribute to inclusive economic development in Nigeria across the short-term horizon. However, the long-run positive and significant effect of market capitalization (MCAP) and the short-run positive and significant effect of gross capital formation (D(GCF)) showcase that the potential investment in the financial market can contribute positively to inclusive growth along the long-term frame.

Both human capital (HCAP) and trade openness (TOP) exhibit relatively weaker impacts on inclusive growth. The lagged human capital D(HCAP(-1)) shows a negative but statistically insignificant impact on inclusive growth across quartiles in the short run. However, the long-run human capital (HCAP) reveals a positive relationship with inclusive growth across all quartiles but it is only significant at the 75th quartile. Meanwhile, short-run trade openness (D(TOP)) displays a minor negative relationship with inclusive growth, with statistical significance observed only at the 50th and 75th quartiles. Nevertheless, the long-run trade openness (TOP) exhibits a minor positive nexus with inclusive growth across all quartiles but is significant only at the lower quartiles (25th and 50th quartiles).

To obtain the threshold value of agricultural finance that is required to enhance inclusive growth at the optimum level, the study adopts the short-run and long-run coefficients of agricultural finance and its average variable only at the lower quartiles (25^{th} and 50th), which exert a significant influence. The partial derivative of the quadratic equation is given below:

Short-run Optimal Level:

25th Quartile:

$$\frac{d\Delta ING_t}{d\Delta AF_{t-1}} = \tau_{25^{th}} + 2\sigma_{25^{th}}\Delta(AF)_{t-i} = 0$$

$$\frac{d\Delta ING_t}{d\Delta AF_{t-1}} = 0.048 + 2(0.001)\Delta(AF_{t-1}^2) = 0$$

$$AF = \Delta AF_{t-i}^{**} = -\frac{0.048}{0.002} = -24\% \qquad (4.19)$$

50th Quartile:

$$\frac{d\Delta ING_t}{d\Delta AF_{t-1}} = \tau_{50^{th}} + 2\sigma_{50^{th}}\Delta(AF)_{t-i} = 0$$

$$\frac{d\Delta ING_t}{d\Delta AF_{t-1}} = 0.056 + 2(0.001)\Delta(AF_{t-1}^2) = 0$$

$$AF = \Delta AF_{t-i}^{**} = -\frac{0.056}{0.002} = -28\% \qquad (4.20)$$

Long-run Optimal Level:

25th Quartile:

$$\frac{d\Delta ING_t}{dAF_{t-1}} = \tau_{25^{th}} + 2\sigma_{25^{th}}(AF)_{t-i} = 0$$

$$\frac{d\Delta ING_t}{dAF_{t-1}} = -0.044 + 2(0.002)(AF_{t-1}^2) = 0$$

$$AF = AF_{t-i}^{**} = -\left(-\frac{0.044}{0.004}\right) = 11\% \qquad (4.21)$$

50th Quartile:

$$\frac{d\Delta ING_t}{dAF_{t-1}} = \tau_{50^{th}} + 2\sigma_{50^{th}}(AF)_{t-i} = 0$$

$$\frac{d\Delta ING_t}{dAF_{t-1}} = -0.056 + 2(0.002)(AF_{t-1}^2) = 0$$

$$AF = AF_{t-i}^{**} = -\left(-\frac{0.056}{0.004}\right) = 14\% \qquad (4.22)$$

The study used short-run and long-run coefficients of agricultural finance variables, focusing primarily on long-run estimations due to their positive optimal levels. Through long-run partial differentiation, it found optimal agricultural finance values for the 25th and 50th quartiles at 11% and 14% of GDP per person employed in logarithmic terms. To maximize Nigerian inclusive growth and use financial resources efficiently, it is recommended that the finance allocated to agriculture should be either 11% or 14% of GDP per employed person. Calculating 11% of the average GDP per person employed during the study period ($424002.63), the thresholds for optimized inclusive growth are approximately $46640.29 or $59360.37. Thus, it is concluded that a credit increase of 11% or 14% to the agricultural sector significantly impacts inclusive growth in Nigeria.

The 25th and 50th quantiles correspond to values of -24% and -28%, respectively, for the short-run optimal levels. Here, the negative coefficients insinuate that increasing agricultural finance in the short run might not have the immediate positive effect on inclusive growth that is observed in the long run. This could be due to several short-run factors such as imperfections in credit allocation, time lags between financial inputs and physical agricultural outputs, or complementary investment needs in infrastructure or technology. In other words, in agriculture, credit expansion could first result in misallocation of funds, absorptive capacity constraints, or market disruptions that will eventually lead to the initial lowering of productivity or inclusive growth.

For the pseudo R-squared, the model shows good explanatory power across quartiles, ranging from 71% to 78%, indicating that the included variables collectively explain a significant portion of the variation in Inclusive Growth. For the bound test, the significant F-statistic (14.942) confirms the presence of threshold effects in the model, reinforcing the importance of considering nonlinear relationships, particularly with agricultural finance.

The post-estimation tests namely; LM, Breusch-Pagan-Godfrey, Jarque-Bera, and stability tests indicate no issues with autocorrelation, heteroscedasticity, normality of residuals, and instability respectively, supporting the robustness of the model. The stability test result is computed with the cumulative sum of squares graph, which can be seen in Figure 4.4 below.

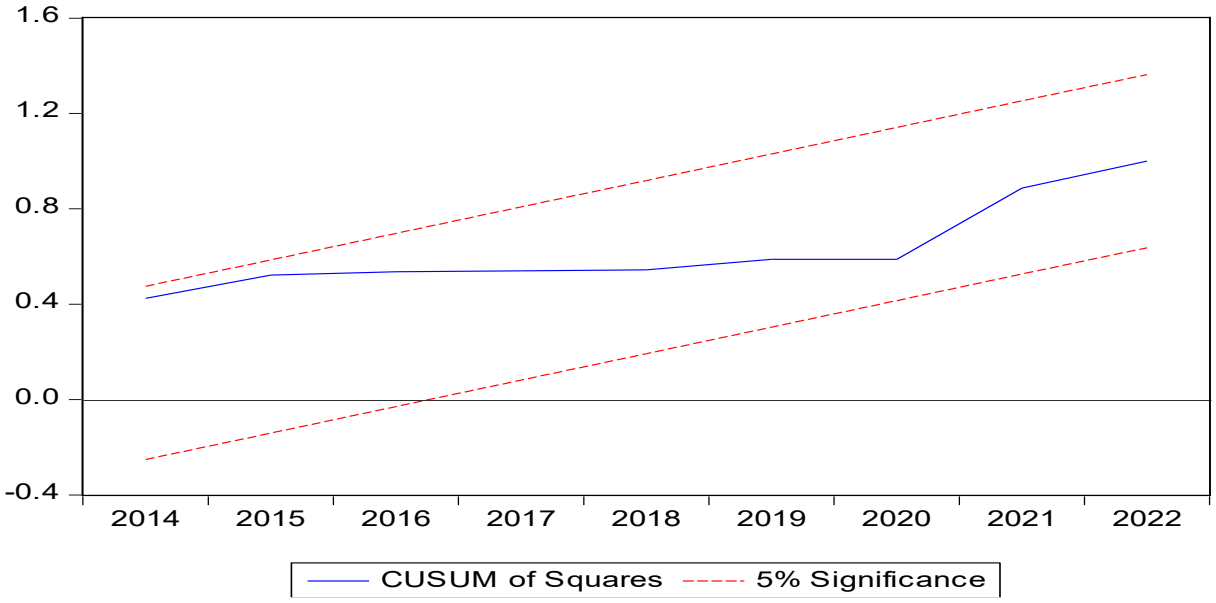

Figure 4.4: Threshold Stability Test

4.5 Policy Implication and Conclusion

4.5.1 Policy Implication

Based on the findings, several policy recommendations emerge to foster sustainable inclusive growth in Nigeria. Firstly, policymakers should implement integrated strategies that align agricultural finance and financial development for mutual benefit. Initiatives focusing on improving access to finance for agricultural activities, fostering financial inclusion, and enhancing financial market development could strengthen their collective impact on inclusive growth (World Bank, 2018).

Secondly, policymakers should consider allocating around 11% to 14% of GDP per employed person to the agricultural sector to maximize inclusive growth. This targeted approach aims to optimize the impact of agricultural finance without surpassing potential thresholds that could impede long-term inclusive growth (OECD, 2019).

Thirdly, while the impact of human capital and trade openness on inclusive growth may be relatively weaker, policymakers should still prioritize initiatives that enhance human capital development and promote trade openness. Investments in education, skills training, and initiatives that facilitate international trade can contribute to overall inclusive growth (UNESCO, 2020; World Bank, 2021).

In conclusion, a holistic approach to policymaking that integrates agricultural finance optimizes resource allocation, and prioritizes human capital and trade openness is essential for

fostering sustainable inclusive growth in Nigeria. These policy recommendations, when implemented effectively, have the potential to address structural constraints and drive long-term economic prosperity while ensuring inclusivity across various sectors of the economy.

4.5.2 Conclusion

Various studies spanning decades demonstrate that bolstering the financial market stands as a key strategy for enhancing growth in developing economies, particularly by directing reforms toward agricultural sector improvements. A strong financial system and enhanced financial service quality drive inclusive growth and development by invigorating the economy. Research consistently highlights the positive impact of finance on growth. This study dissects finance into agricultural finance, broad money supply, and private sector credits. Agricultural finance stimulates rural sectors, while broad money supply and private sector credit bolster urban manufacturing. These sectors significantly contribute to inclusive growth, as indicated by gross domestic product per employed person, reflecting the economy's overall welfare. More so, the study adopts a complementary–substitution effect approach to analyze the correlation among agriculture finance, financial development, and inclusive growth. Drawing from the finance-growth theory based on the Cobb-Douglas model, the research utilizes Quantile ARDL interactive and threshold regression models to explore these dynamics. Key findings highlight a significant positive relationship between the interactive impact of agricultural finance and financial development (represented by the credit-to-private sector ratio) on short-term inclusive growth, particularly evident at the 25th quartile. Similar positive trends emerge concerning short-term lagged interactive effects and long-term lagged effects on inclusive growth, underscoring the importance of these interactions in driving immediate and prolonged inclusivity within the economy. Furthermore, the research identified threshold effects concerning agricultural finance, suggesting an optimal level that maximizes inclusive growth. The findings indicate that an increase of 11% to 14% of GDP per employed person allocated to the agricultural sector could significantly impact inclusive growth in Nigeria. Beyond these thresholds, excessively high levels of agricultural finance might hinder long-term inclusive growth, indicating a potential ceiling effect that policymakers need to consider. The research also confirmed the positive impact of agricultural finance on inclusive growth in the short run, supporting the notion that increased investment in agriculture contributes to inclusive economic development. However, the unexpected negative impact observed in the long run emphasizes the need for a deeper understanding of temporal effects and the existence of potential thresholds

that influence the effectiveness of agricultural finance in fostering inclusive growth. Moreover, the study highlighted the significance of financial development indicators, particularly private sector credit and market capitalization, in influencing inclusive growth, especially in the short term. The positive interactions between agricultural finance and financial development indicated a potential synergy that can amplify inclusive growth, particularly at lower quantiles, necessitating synchronized policy interventions targeting both sectors. Additionally, the study highlighted the varying impacts of other variables like gross capital formation, human capital, and trade openness on inclusive growth, underscoring the multidimensional nature of factors influencing inclusive development.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The final chapter of this thesis contains the summary, findings, and policy suggestions. The chapter opens with a summary of major findings, then moves on to the study's contributions and policy implications. Finally, the study proposed several potential areas for future research on the topic.

5.2 Summary and Conclusions

This research re-investigated the relationship between agricultural finance and growth in Nigeria focusing on a key mediating variable, which hitherto has been ignored and, as such, created a lacuna in the stock of existing literature. Particularly, the study is novel because it investigated financial development's role in the agricultural credit-growth trajectory. To achieve this, the study examined the mediating effects of financial development on agricultural credit-growth relations. Also, it examined the symmetric effects of agricultural finance on GDP growth, as well as dynamic relationships between the above variables. More so, the dynamic impacts of financial development on economic growth were re-examined. Besides the above, the study computed the agricultural finance thresholds at which inclusive growth reaches its optimal, steady-state, or equilibrium point. Thus, the thesis focused on leading areas in the finance-growth nexus, which have remained neglected in the literature. Therefore, the thesis proffered solutions to some pressing research questions:

I. Are the symmetric effects of agricultural finance and financial development on economic growth significant? Is there a dynamic nexus between agricultural finance and growth, as well as between financial development and growth, in Nigeria?

II. Is the agricultural finance-growth nexus contingent on the role of financial development?

III. To what extent is the overall impact of agricultural finance on growth threshold specific, and at what level of agricultural finance will inclusive growth reach optimum?

5.2.1 Agricultural Finance-Economic Growth Nexus: A Dynamic Relationship

The study investigated the symmetric effects of agricultural finance on economic growth, as well as their dynamic relationships, by employing the ARDL model and VAR techniques. The research findings reveal that while agricultural finance decelerates growth in the short-run period, it accelerates growth in the long term. Also, the VAR results showed that agricultural finance exerts a dynamic, positive impact on economic growth in the first- and second-year lag periods. Similarly, the impulse response function revealed that one standard deviation positive shocks in agricultural finance arising from the residual, the response of GDP growth on agricultural finance, was positive in the first period and increased slightly in the second period before stabilizing in the third period through to period ten. More so, the impulse response of one standard deviation positive shock in GDP growth arising from the residual, the response of agricultural finance on GDP, was positive in the first period and rose in the second, followed by a decline in the third period. After a slight rise in the fourth period accompanied by a decrease in the fifth period, the response of agricultural finance to Cholesky's one standard deviation positive shock in GDP growth remained stable through periods six to ten. It can be concluded that the impulse response results support the VAR framework result, which found positive dynamic relationships between agricultural finance and GDP growth within the study periods.

5.2.2 Symmetric Effects of Financial Development on Economic Growth

Investigating the symmetric effects of financial development on economic growth in Nigeria, the study employed the ARDL techniques. The result confirms the a-priori expectations of a positive relationship between financial development and GDP growth. Following macroeconomic theories, it can be argued that financial development provides funds through credit to private sectors to fill existing resource gaps. Importantly, the result found this positive relationship both in the short and long term. When re-validating these results using the VAR model, it was observed that the GDP growth and financial development values' response are positive because a one percent increase in the first lag of financial development causes current GDP growth and financial development values to rise by 0.075 percent and 1.092 percent, respectively. This result is significant at 5.0 percent levels. The economic intuition from the VAR result indicates that substantially, financial development influences economic growth and economic growth also drives financial development. In addition, the VAR Granger Causality/Block Exogeneity Wald Tests revealed that financial development is not Granger

causality for economic growth, and economic growth is not Granger causality for financial development. Thus, it is recommended that the financial system's development be prioritized by development macroeconomic experts in Nigeria, focused on improving the rate and level of economic growth.

5.2.3 Agricultural Finance, Financial Development and Inclusive Growth: The Role of the Threshold and Interaction Effects

Investigating whether the impact of agricultural finance on inclusive growth is conditioned on the mediating variable, namely financial development, the study used short-run and long-run coefficients of agricultural finance variables, focusing primarily on long-run estimations due to their positive optimal levels. The findings from the interactive models showed that financial development strengthens or complements the effects of agricultural finance on economic growth. Also, through long-run partial differentiation, it found optimal agricultural finance values for the 25th and 50th quartiles at 11 percent and 14 percent of GDP per person employed in logarithmic terms. To maximize Nigerian inclusive growth and use financial resources efficiently, it is recommended that the finance allocated to agriculture should be either 11 percent or 14 percent of GDP per employed person. Calculating 11 percent of the average GDP per person employed during the study period ($424002.63), the thresholds for optimized inclusive growth are approximately $46640.29 or $59360.37, respectively. Thus, it is concluded that a credit increase of 11 percent or 14 percent to the agricultural sector significantly impacts inclusive growth in Nigeria.

5.3 Policy Implications and Recommendations

The policy formulations and recommendations culminated from key empirical evidence and a stock of existing literature on Nigeria's finance-growth nexus. This is drawn from the argument that in an attempt to improve growth performance through the financial sector, the country has embarked on a series of financial reforms and measures with a view to eliminate financial repression and increase financial deepening within the system.

In studying the symmetric and dynamic effects of agricultural financing on output growth in Nigeria, the study confirmed from both literature and empirical analysis that the agricultural sector has the potential to accelerate economic growth, which, in turn, could spur economic development in the long run. Therefore, funds for intervention should be channeled to finance

the agricultural sector targeted at regaining its dominance in exports, employment, contributions to GDP, and the highest raw material supplier to the industrial sector. This can be guaranteed if the federal government, through the CBN, could motivate private financial institutions to prioritize the agricultural sector by issuing lower bank lending rates to agribusiness in Nigeria. With the deliberate decline in bank lending rates, credits could easily reach farmers through policies encouraging tracking small-scale and rural farmers through mobile communication and banking to bridge the rural-urban discrepancies in access to effective loans as most farmers, whether large or small scale, are more domicile in the rural areas.

Also, economic stakeholders, including monetary and fiscal regulatory authorities across the economy's private and public sectors, should collaborate and formulate policies to improve the functions of financial intermediaries, especially providing adequate credit to farmers to attain a solid, productive-based economy and sustainable GDP growth. In this regard, policy formulation should be conducted with meticulousness, effective implementation, monitoring, and adequate checks installed in the form of strict sanctions on defaulters of agricultural credit allocation. This will encourage more farmers to engage in commercialized farming, promote agriculture exports, and increase revenue earnings, which would transmit to growth and improved contributions to GDP in Nigeria.

Financial development and economic growth research has been ongoing, emphasizing financial system development. The results suggest that financial development positively impacts Nigeria's economic growth in the short and long term. Hence, sustainable growth could be promoted if policymakers focus on medium and long-term policies, including efficient and strong financial institutions and creating modern digital platforms to drive Nigeria's economic growth. To achieve enhanced growth, concerted efforts should be channeled toward broadening the financial sector, particularly the microfinance system, which is more prominent in Nigeria's rural areas. In addition, to fast-track markets and institutions for an efficient credit system, it is key to ensure legal reforms, and finally, regulatory and supervisory bodies of the financial system should be reinforced through capacity building and human resources development. Conclusively, lowering the cost of managing financial institutions is another pathway toward driving down interest rates and fund availability, financial development, and sustainable economic growth in Nigeria.

The principal policy recommendation propagates continuing the process and speed of financial liberalization, encouraging more firms to enter the financial system platform and operate. The higher the firm's entrance into the Nigerian financial operations, the higher the competition and innovations, which in turn make private credit available by easing the process and access to funds, as well as monitoring and retrieving upon expiration of the loan period. This further promotes the development of the financial system and spurs its immersing benefits derived from relationships.

Importantly, recognizing the interdependence between agricultural finance and financial development, policymakers should implement integrated strategies that align these sectors for mutual benefit. Initiatives focusing on improving access to finance for agricultural activities, fostering financial inclusion, and enhancing financial market development could strengthen their collective impact on inclusive growth.

More so, policymakers should consider allocating around 11 to 14 percent of GDP per employed person to the agricultural sector to maximize inclusive growth. This targeted approach aims to optimize the impact of agricultural finance without surpassing potential thresholds that could impede long-term inclusive growth.

Lastly, while the impact of human capital and trade openness on inclusive growth may be relatively weaker, policymakers should still prioritize initiatives that enhance human capital development and promote trade openness. Investments in education, skills training, and initiatives that facilitate international trade can contribute to overall inclusive growth.

5.4 Suggestions for Further Studies

Although the evidence based on the study's research findings was robust, there is still a need to suggest further research efforts to re-investigate the finance-growth linkages within the new economic perspective. This current study presents key arguments for conducting further research focused on uncovering clearer channels, broader aspects, and more efficient methods following three key areas.

First, it would be very interesting to re-examine the finance-growth relationship by targeting other channels and mediating factors, especially the role of institutions in strengthening finance as a growth enhancer across countries or regions. This suggestion is drawn from the argument that the financial system is more efficient if robust institutional factors or indicators exist where the former is domiciled to corroborate Ibrahim and Alagidede (2018).

Besides the above, it would be more laudable if the relationship between finance and growth were re-examined in a broader perspective. Based on this, further research efforts should focus on the Economic Community of West African States to avail an opportunity to notice first-hand a region's finance-growth relations with different monetary systems, language, and colonial linkages.

Third, further studies should attempt to extend the frontiers of knowledge to disaggregate the panel data into the West African Monetary Zone and West African Economic and Monetary Zone for comparative analysis. Also, it would be laudable to disaggregate the data into the pre- and post-global financial crisis to identify how the real and financial sectors interact along the growth trajectory.

Lastly, it is important to encourage further research efforts in the finance-growth trajectory by employing the Markov-Switching model. This model will not only capture the nonlinear relationships across variables but will employ multiple equation structures to explain the time series behavior in different regimes.

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Appendix

Table A1: Unit Root Tests

UNIT ROOT TEST TABLE (PP)

	At Level	ING	AF	CPS	BMS	MCAP	GCF	HCAP	TOP
With Constant	t-Statistic	-0.7472	-1.4040	-0.9505	-0.9430	-1.6774	0.1020	-1.5030	-2.8732
	Prob.	***0.8203***	***0.5680***	***0.7585***	***0.7610***	***0.4327***	***0.9609***	***0.5193***	***0.0597***
		n0	n0	n0	n0	n0	n0	n0	*
With Constant & Trend	t-Statistic	-1.4681	-0.6935	-2.1472	-2.3784	-3.2570	-3.2028	-2.9522	-3.4343
	Prob.	***0.8197***	***0.9650***	***0.5013***	***0.3830***	***0.0918***	***0.1018***	***0.1607***	***0.0645***
		n0	n0	n0	n0	*	n0	n0	*
Without Constant & Trend	t-Statistic	1.4190	1.5659	0.9850	1.5170	0.2337	1.4665	1.2847	-0.5215
	Prob.	***0.9581***	***0.9684***	***0.9104***	***0.9652***	***0.7477***	***0.9617***	***0.9463***	***0.4829***
		n0	n0	n0	n0	n0	n0	n0	n0
	At First Difference	d(ING)	d(AF)	d(CPS)	d(BMS)	d(MCAP)	d(GCF)	d(HCAP)	d(TOP)
With Constant	t-Statistic	-2.5294	-5.1455	-6.4363	-5.3432	-9.3830	-4.3048	-9.3972	-12.4965
	Prob.	***0.1185***	***0.0002***	***0.0000***	***0.0001***	***0.0000***	***0.0020***	***0.0000***	***0.0000***
		n0	***	***	***	***	***	***	***
With Constant & Trend	t-Statistic	-2.4861	-5.5544	-6.1869	-5.2650	-9.1519	-4.2497	-27.5456	-17.3241
	Prob.	***0.3322***	***0.0004***	***0.0001***	***0.0009***	***0.0000***	***0.0109***	***0.0000***	***0.0000***
		n0	***	***	***	***	**	***	***
Without Constant & Trend	t-Statistic	-2.4295	-4.7529	-4.3411	-5.1248	-7.0021	-4.0417	-7.4352	-10.8296
	Prob.	***0.0169***	***0.0000***	***0.0001***	***0.0000***	***0.0000***	***0.0002***	***0.0000***	***0.0000***
		**	***	***	***	***	***	***	***

UNIT ROOT TEST TABLE (ADF)

	At Level	ING	AF	CPS	BMS	MCAP	GCF	HCAP	TOP
With Constant	t-Statistic	-0.9078	-1.4069	-0.9561	-1.0464	-1.8374	0.2804	-4.6323	-2.8732
	Prob.	***0.7722***	***0.5665***	***0.7557***	***0.7242***	***0.3564***	***0.9735***	***0.0010***	***0.0597***
		n0	n0	n0	n0	n0	n0	***	*
With Constant & Trend	t-Statistic	-2.3359	-0.6615	-3.2085	-2.2720	-3.1978	-3.4282	-2.7125	-3.4693
	Prob.	***0.4036***	***0.9676***	***0.1013***	***0.4362***	***0.1028***	***0.0659***	***0.2397***	***0.0601***
		n0	n0	n0	n0	n0	*	n0	*
Without Constant & Trend	t-Statistic	0.6982	1.5690	0.6684	0.8410	-0.3239	1.6342	0.5987	-0.7390
	Prob.	***0.8611***	***0.9686***	***0.8549***	***0.8876***	***0.5608***	***0.9724***	***0.8405***	***0.3884***
		n0	n0	n0	n0	n0	n0	n0	n0

	At First Difference	d(ING)	d(AF)	d(CPS)	d(BMS)	d(MCAP)	d(GCF)	d(HCAP)	d(TOP)
With Constant	t-Statistic	-2.4792	-5.1576	-5.2057	-5.1184	-6.3076	-4.3684	-7.9510	-5.6305
	Prob.	***0.1300***	***0.0002***	***0.0002***	***0.0002***	***0.0000***	***0.0017***	***0.0000***	***0.0001***
		n0	***	***	***	***	***	***	***
With Constant & Trend	t-Statistic	-2.4369	-5.4763	-5.1073	-5.0343	-6.1978	-4.3719	-10.5105	-5.6172
	Prob.	***0.3549***	***0.0005***	***0.0014***	***0.0016***	***0.0001***	***0.0081***	***0.0000***	***0.0004***
		n0	***	***	***	***	***	***	***
Without Constant & Trend	t-Statistic	-2.4030	-4.7344	-5.0467	-5.0757	-6.3020	-4.0605	-2.2764	-5.6968
	Prob.	***0.0180***	***0.0000***	***0.0000***	***0.0000***	***0.0000***	***0.0002***	***0.0247***	***0.0000***
		**	***	***	***	***	***	**	***

Notes: (*)Significant at the 10%; (**)Significant at the 5%; (***) Significant at the 1%. and (no) Not Significant
*MacKinnon (1996) one-sided p-values.

Table A2: Model 1 (25% Quantile)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(AF)	0.048	0.011	4.474	0.001
D(AF(-1))	0.035	0.015	2.286	0.043
D(AF(-2))	0.023	0.021	1.104	0.293
D(CPS(-2))	0.005	0.002	2.695	0.021
D(MCAP(-1))	0.223	0.107	2.086	0.061
D((AF)*(CPS))	0.002	0.001	3.736	0.003
D(AF(-1)*CPS(-1))	0.003	0.001	3.983	0.002
D(GCF)	0.055	0.051	1.084	0.302
D(HCAP)	0.019	0.006	3.205	0.008
D(TOP)	-0.002	0.000	-5.036	0.000
ING	0.235	0.053	4.443	0.001
AF	-0.044	0.011	-3.836	0.003
CPS	-0.044	0.013	-3.504	0.005
MCAP	0.204	0.060	3.422	0.006
AF(-2)*CPS(-2)	0.002	0.001	3.547	0.005
GCF	-0.076	0.018	-4.297	0.001
HCAP	0.014	0.013	1.065	0.309
TOP	0.004	0.000	9.491	0.000
@TREND	0.008	0.003	2.662	0.022

Pseudo R-squared	0.869	Mean dependent var	0.015
Adjusted R-squared	0.655	S.D. dependent var	0.040
S.E. of regression	0.025	Objective	0.048
Quantile dependent var	-0.017	Restr. objective	0.370
Sparsity	0.021		

Table A3: Model 1 (50% Quantile)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(AF)	0.056	0.014	4.031	0.002
D(AF(-1))	0.048	0.030	1.592	0.140
D(AF(-2))	0.020	0.018	1.094	0.297
D(CPS(-2))	0.004	0.003	1.536	0.153
D(MCAP(-1))	0.134	0.128	1.051	0.316
D((AF)*(CPS))	0.003	0.002	1.268	0.231
D(AF(-1)*CPS(-1))	0.003	0.002	1.388	0.192
D(GCF)	0.051	0.038	1.338	0.208

D(HCAP)	0.012	0.019	0.625	0.544
D(TOP)	-0.003	0.001	-3.980	0.002
ING	0.247	0.066	3.754	0.003
AF	-0.056	0.014	-3.916	0.002
CPS	-0.044	0.034	-1.305	0.219
MCAP	0.240	0.191	1.256	0.235
AF(-2)*CPS(-2)	0.002	0.002	1.233	0.243
GCF	-0.076	0.024	-3.165	0.009
HCAP	0.035	0.021	1.683	0.121
TOP	0.004	0.001	5.035	0.000
@TREND	0.006	0.006	1.015	0.332

Pseudo R-squared	0.858	Mean dependent var	0.015
Adjusted R-squared	0.626	S.D. dependent var	0.040
S.E. of regression	0.016	Objective	0.071
Quantile dependent var	0.013	Restr. objective	0.498
Sparsity	0.029		

Table A4: Model 1 (75% Quantile)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(AF)	0.060	0.010	5.719	0.000
D(AF(-1))	0.052	0.021	2.458	0.032
D(AF(-2))	0.021	0.021	1.023	0.328
D(CPS(-2))	0.001	0.004	0.371	0.718
D(MCAP(-1))	0.163	0.113	1.444	0.177
D((AF)*(CPS))	0.002	0.002	1.205	0.253
D(AF(-1)*CPS(-1))	0.003	0.002	1.360	0.201
D(GCF)	0.044	0.043	1.040	0.320
D(HCAP)	0.011	0.017	0.642	0.534
D(TOP)	-0.003	0.001	-4.572	0.001
ING	0.230	0.092	2.514	0.029
AF	-0.053	0.019	-2.783	0.018
CPS	-0.041	0.032	-1.279	0.227
MCAP	0.275	0.169	1.626	0.132
AF(-2)*CPS(-2)	0.002	0.002	1.194	0.258
GCF	-0.073	0.030	-2.414	0.034
HCAP	0.029	0.014	2.141	0.055
TOP	0.005	0.001	5.678	0.000
@TREND	0.004	0.003	1.375	0.196

Pseudo R-squared	0.875	Mean dependent var	0.015
Adjusted R-squared	0.669	S.D. dependent var	0.040
S.E. of regression	0.020	Objective	0.047
Quantile dependent var	0.040	Restr. objective	0.376
Sparsity	0.031		

Table A5: Model 1 (85% Quantile)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(AF)	0.061	0.013	4.852	0.001
D(AF(-1))	0.055	0.020	2.710	0.020
D(AF(-2))	0.020	0.021	0.929	0.373
D(CPS(-2))	0.002	0.004	0.454	0.659
D(MCAP(-1))	0.170	0.132	1.288	0.224
D((AF)*(CPS))	0.002	0.002	1.383	0.194
D(AF(-1)*CPS(-1))	0.003	0.002	1.522	0.156

D(GCF)	0.043	0.044	0.972	0.352
D(HCAP)	0.011	0.015	0.736	0.477
D(TOP)	-0.003	0.001	-4.608	0.001
ING	0.248	0.110	2.244	0.046
AF	-0.056	0.022	-2.620	0.024
CPS	-0.044	0.031	-1.433	0.180
MCAP	0.294	0.181	1.622	0.133
AF(-2)*CPS(-2)	0.003	0.002	1.355	0.203
GCF	-0.078	0.036	-2.181	0.052
HCAP	0.031	0.014	2.178	0.052
TOP	0.005	0.001	4.941	0.000
@TREND	0.005	0.004	1.181	0.263

Pseudo R-squared	0.898	Mean dependent var	0.015
Adjusted R-squared	0.732	S.D. dependent var	0.040
S.E. of regression	0.020	Objective	0.028
Quantile dependent var	0.051	Restr. objective	0.278
Sparsity	0.045		

Table A6: Model 2 (25% Quantile)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(AF)	0.065	0.055	1.182	0.262
D(AF(-1))	0.064	0.027	2.365	0.037
D(AF(-2))	0.058	0.069	0.836	0.421
D(BMS(-2))	0.005	0.006	0.787	0.448
D(MCAP(-1))	-0.060	0.468	-0.129	0.900
D((AF)*(BMS))	0.002	0.001	1.639	0.129
D(AF(-1)*BMS(-1))	0.002	0.001	2.420	0.034
D(GCF)	0.124	0.056	2.219	0.048
D(HCAP)	0.013	0.018	0.691	0.504
D(TOP)	-0.002	0.001	-1.906	0.083
ING	0.268	0.191	1.406	0.187
AF	-0.061	0.030	-2.049	0.065
BMS	-0.033	0.015	-2.172	0.053
MCAP	0.242	0.138	1.756	0.107
AF(-2)*BMS(-2)	0.002	0.001	1.935	0.079
GCF	-0.079	0.067	-1.186	0.261
HCAP	0.026	0.031	0.836	0.421
TOP	0.003	0.001	2.920	0.014
@TREND	0.003	0.007	0.473	0.645

Pseudo R-squared	0.828	Mean dependent var	0.015
Adjusted R-squared	0.547	S.D. dependent var	0.040
S.E. of regression	0.022	Objective	0.063
Quantile dependent var	-0.017	Restr. objective	0.370
Sparsity	0.037		

Table A7: Model 2 (50% Quantile)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(AF)	0.058	0.020	2.940	0.013
D(AF(-1))	0.064	0.019	3.424	0.006
D(AF(-2))	0.042	0.021	2.033	0.067
D(BMS(-2))	0.005	0.004	1.398	0.190
D(MCAP(-1))	0.130	0.104	1.250	0.237
D((AF)*(BMS))	0.001	0.002	0.938	0.368

D(AF(-1)*BMS(-1))	0.002	0.001	1.229	0.245
D(GCF)	0.077	0.067	1.145	0.276
D(HCAP)	0.002	0.017	0.142	0.889
D(TOP)	-0.002	0.001	-4.398	0.001
ING	0.239	0.088	2.714	0.020
AF	-0.048	0.021	-2.295	0.042
BMS	-0.021	0.021	-0.997	0.340
MCAP	0.210	0.113	1.860	0.090
AF(-2)*BMS(-2)	0.001	0.001	0.843	0.417
GCF	-0.076	0.029	-2.601	0.025
HCAP	0.023	0.029	0.794	0.444
TOP	0.003	0.001	4.733	0.001
@TREND	0.005	0.005	1.044	0.319

Pseudo R-squared	0.848	Mean dependent var	0.015
Adjusted R-squared	0.599	S.D. dependent var	0.040
S.E. of regression	0.016	Objective	0.076
Quantile dependent var	0.013	Restr. objective	0.498
Sparsity	0.030		

Table A8: Model 2 (75% Quantile)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(AF)	0.057	0.016	3.618	0.004
D(AF(-1))	0.063	0.018	3.462	0.005
D(AF(-2))	0.037	0.021	1.726	0.112
D(BMS(-2))	0.006	0.002	2.614	0.024
D(MCAP(-1))	0.211	0.104	2.022	0.068
D((AF)*(BMS))	0.001	0.001	0.767	0.459
D(AF(-1)*BMS(-1))	0.002	0.001	1.319	0.214
D(GCF)	0.059	0.050	1.172	0.266
D(HCAP)	-0.004	0.010	-0.355	0.730
D(TOP)	-0.002	0.001	-3.539	0.005
ING	0.251	0.103	2.430	0.033
AF	-0.047	0.019	-2.490	0.030
BMS	-0.019	0.019	-0.981	0.348
MCAP	0.201	0.120	1.678	0.121
AF(-2)*BMS(-2)	0.001	0.001	0.804	0.438
GCF	-0.081	0.035	-2.313	0.041
HCAP	0.032	0.014	2.250	0.046
TOP	0.003	0.001	4.242	0.001
@TREND	0.004	0.005	0.944	0.365

Pseudo R-squared	0.871	Mean dependent var	0.015
Adjusted R-squared	0.661	S.D. dependent var	0.040
S.E. of regression	0.021	Objective	0.048
Quantile dependent var	0.040	Restr. objective	0.376
Sparsity	0.033		

Table A9: Model 2(85% Quantile)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(AF)	0.057	0.017	3.412	0.006
D(AF(-1))	0.063	0.018	3.441	0.006
D(AF(-2))	0.037	0.019	1.975	0.074

D(BMS(-2))	0.006	0.003	2.494	0.030
D(MCAP(-1))	0.211	0.101	2.082	0.061
D((AF)*(BMS))	0.001	0.001	0.721	0.486
D(AF(-1)*BMS(-1))	0.002	0.001	1.267	0.231
D(GCF)	0.059	0.052	1.127	0.284
D(HCAP)	-0.004	0.011	-0.341	0.739
D(TOP)	-0.002	0.001	-4.202	0.001
ING	0.251	0.101	2.493	0.030
AF	-0.047	0.021	-2.285	0.043
BMS	-0.019	0.020	-0.949	0.363
MCAP	0.201	0.114	1.761	0.106
AF(-2)*BMS(-2)	0.001	0.001	0.757	0.465
GCF	-0.081	0.035	-2.289	0.043
HCAP	0.032	0.016	1.972	0.074
TOP	0.003	0.001	4.065	0.002
@TREND	0.004	0.005	0.874	0.401

Pseudo R-squared	0.896	Mean dependent var	0.015
Adjusted R-squared	0.725	S.D. dependent var	0.040
S.E. of regression	0.021	Objective	0.029
Quantile dependent var	0.051	Restr. objective	0.278
Sparsity	0.046		

Table A10: Threshold (25% Quantile)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(AF(-1))	0.078	0.027	2.875	0.011
D(AF(-2))	0.056	0.017	3.324	0.004
D(AF*AF)	0.001	0.000	2.189	0.044
D(MCAP)	-0.369	0.130	-2.830	0.012
D(GCF)	0.104	0.031	3.330	0.004
D(HCAP(-1))	-0.006	0.009	-0.646	0.528
D(TOP)	-0.002	0.001	-1.229	0.237
ING	0.262	0.112	2.336	0.033
AF(-1)*AF(-1)	-0.002	0.001	-2.156	0.047
MCAP	0.652	0.200	3.255	0.005
GCF	-0.103	0.042	-2.452	0.026
HCAP	0.066	0.047	1.399	0.181
TOP	0.002	0.001	1.851	0.083
@TREND	-0.003	0.005	-0.673	0.510

Pseudo R-squared	0.785	Mean dependent var	0.015
Adjusted R-squared	0.610	S.D. dependent var	0.040
S.E. of regression	0.024	Objective	0.079
Quantile dependent var	-0.017	Restr. objective	0.370
Sparsity	0.046		

Table A11: Threshold (50% Quantile)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(AF(-1))	0.074	0.022	3.411	0.004
D(AF(-2))	0.052	0.021	2.453	0.026

D(AF*AF)	0.001	0.000	2.048	0.057
D(MCAP)	-0.334	0.168	-1.986	0.064
D(GCF)	0.087	0.036	2.443	0.027
D(HCAP(-1))	-0.004	0.008	-0.516	0.613
D(TOP)	-0.002	0.001	-2.033	0.059
ING	0.227	0.094	2.401	0.029
AF(-1)*AF(-1)	-0.002	0.001	-2.310	0.035
MCAP	0.568	0.175	3.250	0.005
GCF	-0.091	0.035	-2.589	0.020
HCAP	0.055	0.036	1.525	0.147
TOP	0.002	0.001	2.832	0.012
@TREND	-0.002	0.004	-0.409	0.688

Pseudo R-squared	0.748	Mean dependent var	0.015
Adjusted R-squared	0.543	S.D. dependent var	0.040
S.E. of regression	0.021	Objective	0.126
Quantile dependent var	0.013	Restr. objective	0.498
Sparsity	0.045		

Table A12: Threshold (75% Quantile)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(AF(-1))	0.037	0.032	1.156	0.265
D(AF(-2))	0.053	0.034	1.541	0.143
D(AF*AF)	0.000	0.001	0.879	0.392
D(MCAP)	-0.547	0.383	-1.431	0.172
D(GCF)	0.059	0.056	1.064	0.303
D(HCAP(-1))	-0.008	0.009	-0.891	0.386
D(TOP)	-0.002	0.001	-2.367	0.031
ING	0.158	0.117	1.350	0.196
AF(-1)*AF(-1)	-0.001	0.001	-1.655	0.117
MCAP	0.442	0.508	0.870	0.397
GCF	-0.065	0.044	-1.476	0.159
HCAP	0.057	0.030	1.922	0.073
TOP	0.002	0.002	1.587	0.132
@TREND	-0.005	0.007	-0.604	0.554

Pseudo R-squared	0.710	Mean dependent var	0.015
Adjusted R-squared	0.474	S.D. dependent var	0.040
S.E. of regression	0.029	Objective	0.109
Quantile dependent var	0.040	Restr. objective	0.376
Sparsity	0.059		

Table A13: threshold (85% Quantile)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(AF(-1))	0.040	0.059	0.672	0.511
D(AF(-2))	0.056	0.047	1.191	0.251
D(AF*AF)	-0.000	0.002	-0.054	0.957
D(MCAP)	-0.391	0.399	-0.981	0.341
D(GCF)	0.089	0.081	1.099	0.288
D(HCAP(-1))	-0.006	0.008	-0.794	0.439

D(TOP)	-0.001	0.001	-0.802	0.434
ING	0.079	0.229	0.346	0.734
AF(-1)*AF(-1)	-0.000	0.001	-0.306	0.763
MCAP	0.356	0.276	1.291	0.215
GCF	-0.037	0.086	-0.427	0.675
HCAP	0.062	0.032	1.919	0.073
TOP	0.002	0.003	0.514	0.614
@TREND	-0.008	0.013	-0.626	0.540

Pseudo R-squared	0.752	Mean dependent var	0.015
Adjusted R-squared	0.550	S.D. dependent var	0.040
S.E. of regression	0.036	Objective	0.069
Quantile dependent var	0.051	Restr. objective	0.278
Sparsity	0.085		

Table A14: Five-Year Average of Economic Growth and Agriculture Finance

Period	Five-Year Average for Economic Growth (percent)	Five-Year Average for Agriculture Finance (Million Naira)
1981-1985	-5.213	34,522.5
1986-1990	4.858	103,395.14
1991-1995	0.213	15,821.48
1996-2000	3.063	257,996.00
2001-2005	8.86	2,876,136.10
2006-2010	7.092	6,189,913.80
2011-2015	5.03	10,386,356.31
2016-2021	0.862	5,377,064.10

Source: Author's computation, 2024

Table A15: Phillip-Perron and Augmented-Dickey Fuller Unit Roots Tests

Variables	Phillip-Perron Test		Augmented Dickey-Fuller Test	
	At Level (I(0))	First Diff (I(1))	At Level (I(0))	First Diff (I(1))
GDP Growth	-1.136 (0.7005)	-4.385 (0.0003)*	-3.142 (0.032)**	-10.357 (0.000)*
Agric Finance	-1.035	-5.639	-1.488	-7.157

	(0.740)	(0.0000)*	(0.529)	(0.000)*
Financial Development	-1.834 (0.3639)	-4.785 (0.0001)*	-2.212 (0.205)	-5.908 (0.000)*
Capital Formation	-1.431 (0.5673)	-3.459 (0.0091)*	-1.271 (0.634)	-2.96 (0.04)**
Money Supply	-3.535 (0.0071)*	-7.170 (0.0000)*	-3.583 (0.000)*	-6.780 (0.000)*
Trade Openness	-2.223 (0.1979)	-8.111 (0.0000)*	-2.378 (0.154)	-7.760 (0.000)*

Source: Author's compilation, 2023 *. ** and *** indicate statistical significance at 1%, 5% and 10% respectively. P-values are in parenthesis.

Table A16: Correlation Statistics among Variables

Variables	Agric Finance	Fin Dev	GDP growth	Money Supply	Capital formation	Trade Openness
Agric Finance	1.00					
Fin Dev	0.80	1.00				
GDP growth	0.71	0.66	1.00			
Money Supply	-0.06	0.03	-0.30	1.000		
Capital formation	0.51	0.50	0.93	-0.35	1.000	
Trade Openness	0.38	0.19	-0.10	0.33	-0.27	1.000

Source: Author's compilation, 2023

Table A17: ARDL Symmetric Effects Agricultural Finance on Economic Growth

Dependent Variable: dlog (GDP)

Variables	Coefficient	t-stat	Coefficient	t-stat
LogGDP (-1)	-.386*	-4.13	-.176*	-5.42
D (Agric Finance)	-.049*	3.31	.018	1.25
Agric Finance	.315**	2.29	.309*	6.57
D(Capital Formation)	.060	1.69	.540*	2.99
Capital Formation	.444*	5.13	.173**	2.81
D(Money Supply)	-.001**	-1.89		
Money Supply	.002**	2.86		
D(Trade Openness)	.002**	2.37		
Trade Openness	-.002**	-1.38		
Human Capital	.015*	4.78		
D(Human Capital)	-.004	-1.58		
Adjusted R-Squared	0.82		0.61	
Bound Test (F-Stat)	12.46*		15.11	
Durbin Watson Test	2.52		1.94	
Breusch–Godfrey test	6.31		0.354	
LM Test	3.44		0.010	

Source: Author's compilation, 2023 Note: * p < 0.05, ** p < 0.01, *** p < 0.001

Table A18: Unit Roots Test using Augmented Dickey-Fuller and Phillip-Perron Tests

	ADF Test		**Phillip-Perron Test**	
Variable	***Level I(0)***	***Ist Diff I(1)***	***Level I(0)***	***Ist Diff 1(1)***
	t-stat.	***t-stat.***	***t-stat***	***t-stat.***
AGP	-2.5586	-6.9635 ***	-2.764 *	-6.415 ***
BDEP	-3.4109 **	-6.1516 ***	-3.5628 **	-6.9411 ***
CRED	-2.2121	-5.9076 ***	-1.5307	-7.8306 ***
MCAP	-1.5876	-7.0951 ***	-1.3206	-9.325 ***
CAPFORM	-1.2712	-2.9572 **	-1.9011	-2.5658 *
GDP	-3.142 **	-10.3575 ***	-4.2740 ***	-10.7063 ***
HCAP	-1.6077	-7.122 ***	-1.6077	-7.1044 ***
MS	-3.5831 **	-6.7803 ***	-3.3641 **	-12.7405 ***
TOPN	-2.3784	-7.7599 ***	-2.2833	-8.5945 ***

Source: Author's computation, 2023 ***, **, *** implies 10%, 5% and 1% levels of significance**

Where AGP = Agricultural output growth, BDEP = Ration of Bank deposit to GDP, CRED = Ratio of Private credit to GDP, MCAP = Ratio of Market capitalization to GDP, CAPFORM = Gross capital formation, GDP = GDP growth rate (Economic growth), HCAP = Human capital, MS = Broad money supply, TOPN = Trade openness (ratio of total trade to GDP).

Table A19: Dependent Variable: GDP
Method: ARDL
Selected Model: ARDL (1,1,0,0,0,0)

Variable	Model 1	Model 2	Model 3	Model 4
GDP(-1)	0.2625	0.1958	0.2338	0.211**
CAPFORM	1.21E-10	7.05E-11	-	1.42**
CAPFORM(-1)	-1.47E-10	-1.64E-10	-	-2.08*
HCAP	0.0679	0.2542	0.2943	0.1906
HCAP(-1)	-	-0.4455	-0.3899	-0.3637*
MS	0.01420	0.0022	-0.0205	-0.0045
MS(-1)	-	-0.1066	-0.0906	-0.0829*
TOPN	0.03678	-0.0067	0.0042	0.0013
BDEP	120.5711	-	-	115.601**
MCAP	-	12.4425	-	15.620
MCAP(-1)	-	33.2719	-	-
CRED	-	-	57.8266	52.7176*
C	-2.1421	11.3078	4.8979	4.6643
R-Squared	0.5363	0.5969	0.5686	0.6361
Prob(F-Stat)	0.00044	0.000996	0.000998	0.00007
Bound Test (F-stat)	2.776	3.001	2.896	2.716
Durbin-Watson Stat	2.0946	1.914	1.7937	1.8
Breusch-Godfrey Test	1.862	1.770	1.800	1.910
LM Test	0.354	0.372	0.27	0.410

Source: Author's computation, 2023