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Commercial Banks' Credit and Agricultural Sector Development in Sierra Leone (2000-2024): Trends, Impacts, and Policy Implications

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Abstract: ***Agriculture remains a cornerstone of Sierra Leone's economy, contributing substantially to employment, food security, and national income. However, despite its strategic importance, the sector continues to receive a relatively small share of commercial bank credit. This study investigates the long-run and short-run effects of commercial bank credit on agricultural development in Sierra Leone over the period 2000-2024. Specifically, it examines whether commercial bank lending has significantly contributed to agricultural value added while accounting for the influence of lending rates, exchange rates, and international commodity prices. The study employs an explanatory mixed-methods research design. Annual secondary data were obtained from the Bank of Sierra Leone, the World Bank's World Development Indicators, and the World Bank Pink Sheet commodity price database, while complementary survey data were collected from farmers and commercial banks to provide institutional context. The Autoregressive Distributed Lag (ARDL) modelling approach was adopted to estimate both long-run and short-run relationships after confirming the order of integration using Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests. The ARDL Bounds Test was then applied to determine the existence of a long-run equilibrium relationship among the study variables. The findings reveal a statistically significant long-run equilibrium relationship between commercial bank credit and agricultural development. However, commercial bank credit exhibits a negative and statistically significant long-run effect on Agricultural Value Added ($\beta = -0.0799$, $p = 0.0356$), while the short-run effect is also negative ($\beta = -0.0336$, $p = 0.0556$). These findings suggest that increased lending has not translated into improved agricultural productivity, largely because of structural inefficiencies in credit allocation and utilization. In contrast, international commodity prices positively and significantly influence agricultural performance in both the short run and long run, whereas exchange rate movements produce mixed effects. The error correction coefficient (-0.8851, $p < 0.001$) indicates that approximately 88.5% of short-run disequilibrium is corrected within one year, demonstrating rapid adjustment towards long-run equilibrium. The study concludes that expanding the volume of agricultural credit alone is insufficient to stimulate agricultural development in Sierra Leone. The effectiveness of commercial bank lending depends on improved credit targeting, stronger loan monitoring, agricultural risk management, and complementary investments in rural infrastructure, agricultural extension services, and value-chain development. The study recommends strengthening agricultural credit guarantee schemes, promoting digital agricultural finance, expanding agricultural insurance, and enhancing collaboration among government agencies, commercial banks, and development partners to improve the contribution of formal finance to sustainable agricultural transformation.***

Keywords: Agricultural Development, Commercial Bank Credit, Agricultural Finance, ARDL Model, Agricultural Value Added, Financial Intermediation, Sierra Leone

1. Introduction

Agriculture remains one of the most important sectors for economic growth, employment generation, food security, and poverty reduction in developing countries. Globally, the sector provides livelihoods for billions of people and supplies raw materials to manufacturing industries while contributing significantly to national economic development. In Sub-Saharan Africa, agriculture plays an even greater role because a large proportion of the population depends on farming for income and sustenance. Consequently, improving agricultural productivity has become a central objective of national development strategies and international development agendas.

Access to adequate and affordable finance is widely recognized as one of the most important determinants of agricultural productivity and rural transformation. Agricultural production requires substantial investment in improved seeds, fertilizers, mechanization, irrigation, storage facilities, and modern production technologies. However, many farmers, particularly smallholders, lack sufficient internal financial resources to make these investments. Commercial bank credit therefore represents an important source of external finance capable of relaxing liquidity constraints, facilitating technology adoption, expanding farm investment, and improving agricultural productivity. Efficient financial intermediation enables productive resources to be allocated to profitable agricultural activities, thereby stimulating output growth, employment creation, and overall economic development.

Despite the recognized importance of agricultural finance, lending to agriculture remains relatively limited in many developing economies because commercial banks often perceive the sector as highly risky. Agricultural production is exposed to weather variability, pests and diseases, fluctuating commodity prices, inadequate infrastructure, and weak land tenure systems, all of which increase the probability of loan default. Information asymmetry between lenders and borrowers, together with limited collateral among smallholder farmers, further discourages financial institutions from expanding agricultural lending. Consequently,

agriculture frequently receives a disproportionately small share of total commercial bank credit despite its substantial contribution to national income and employment.

In Sierra Leone, agriculture continues to serve as the backbone of the economy. The sector provides employment for more than half of the country's labour force, contributes significantly to Gross Domestic Product (GDP), and remains central to national food security and poverty reduction efforts. Since the end of the civil conflict, successive governments have implemented several agricultural development initiatives, including the Smallholder Commercialization Programme, the National Agricultural Transformation Programme, and more recently the Feed Salone Initiative. Complementary financial inclusion strategies introduced by the Bank of Sierra Leone have also sought to improve access to formal financial services and expand agricultural financing. Nevertheless, commercial bank lending to agriculture has remained persistently low relative to the sector's contribution to economic activity, limiting investment in agricultural modernization and value addition.

The limited availability of formal agricultural credit has important implications for productivity and structural transformation. Farmers frequently depend on informal financing sources that are inadequate for supporting large-scale investment in productive assets, mechanization, irrigation, and post-harvest technologies. At the same time, commercial banks continue to allocate a greater proportion of their loan portfolios to sectors perceived to involve lower lending risks. This persistent mismatch between agriculture's economic importance and its access to institutional finance raises important questions regarding the effectiveness of existing agricultural financing policies and the actual contribution of commercial bank lending to agricultural development in Sierra Leone.

Although numerous empirical studies have examined the relationship between agricultural credit and agricultural performance in countries such as Nigeria, Uganda, Tanzania, Pakistan, Nepal, and Bangladesh, evidence for Sierra Leone remains limited. Existing studies have largely concentrated on agricultural production or rural finance without comprehensively examining the dynamic relationship between commercial bank credit and agricultural development over time. Furthermore, relatively few studies combine macroeconomic time-series analysis with institutional perspectives to explain how lending behaviour, macroeconomic conditions, and financial sector characteristics jointly influence agricultural performance. This represents an important empirical gap within the literature on agricultural finance in Sierra Leone.

This study addresses that gap by investigating the long-run and short-run effects of commercial bank credit on agricultural development in Sierra Leone over the period 2000-2024. Agricultural Value Added (AVA) is employed as the indicator of agricultural sector development, while commercial bank credit to agriculture serves as the principal explanatory variable. Lending rates, exchange rates, and international commodity prices are incorporated as control variables to account for broader macroeconomic influences on agricultural performance. Given the relatively small sample size and the mixed order of integration among the variables, the study adopts the Autoregressive Distributed Lag (ARDL) modelling framework, which provides robust estimates of both short-run dynamics and long-run equilibrium relationships.

The study contributes to the literature in several important ways. First, it provides updated empirical evidence on the effectiveness of commercial bank credit in promoting agricultural development using recent data covering the period 2000-2024. Second, it applies the ARDL approach to estimate both short-run and long-run relationships, thereby providing a more comprehensive understanding of the dynamics linking agricultural finance and sectoral performance. Third, the study generates evidence that is directly relevant for policymakers, financial institutions, and development partners seeking to strengthen agricultural financing, improve financial inclusion, and accelerate agricultural transformation in Sierra Leone. The findings are expected to inform ongoing reforms aimed at improving agricultural credit allocation, strengthening risk management mechanisms, and enhancing the contribution of commercial banking to sustainable agricultural development.

Financial development and agricultural transformation

The relationship between financial development and agricultural transformation has received considerable attention in development economics over the past five decades. Agricultural finance is increasingly recognised as a catalyst for productivity enhancement, rural income growth, food security, and structural transformation, particularly in developing economies where agriculture remains the principal source of employment and livelihoods. Commercial banks, as the dominant formal financial intermediaries, are expected to mobilize savings and allocate financial resources to productive sectors, including agriculture. Nevertheless, despite the strategic importance of agriculture, empirical evidence consistently demonstrates that commercial banks allocate only a small proportion of their loan portfolios to agricultural activities because of the sector's high exposure to production, market, and institutional risks.

The literature examining the relationship between commercial bank credit and agricultural development presents mixed findings. While many studies report that access to formal credit improves agricultural productivity through increased investment in improved technologies and productive inputs, others argue that institutional weaknesses, inefficient credit allocation, poor monitoring, and macroeconomic instability reduce the effectiveness of agricultural lending. These contrasting findings suggest that the relationship between agricultural finance and agricultural development is context-specific and influenced by both financial sector characteristics and broader institutional environments.

This section reviews the theoretical and empirical literature relevant to commercial bank credit and agricultural development. It first examines the principal theories underpinning agricultural finance before critically analysing empirical evidence from developed and developing economies, with particular emphasis on Sub-Saharan Africa.

The review concludes by identifying the research gap that justifies the present study.

Theoretical Perspectives on Commercial Bank Credit and Agricultural Development

Financial Intermediation Theory

Financial Intermediation Theory, originally advanced by Gurley and Shaw (1960) and later refined by Diamond (1984), provides one of the most influential explanations of how financial institutions contribute to economic development. The theory argues that commercial banks exist because they reduce transaction costs, mobilise savings, minimise information costs, diversify risk, and efficiently allocate financial resources between surplus and deficit economic units. By performing these intermediary functions, banks improve capital allocation and stimulate productive investment across sectors of the economy.

Within agriculture, the theory suggests that commercial banks facilitate productivity growth by providing farmers and agribusinesses with capital for purchasing improved seeds, fertilizers, machinery, irrigation facilities, storage infrastructure, and modern technologies. Access to institutional credit relaxes liquidity constraints that often prevent farmers from undertaking productivity-enhancing investments. Consequently, efficient financial intermediation should contribute to increased agricultural output, higher farm incomes, greater value addition, and rural economic transformation.

However, the assumptions underlying Financial Intermediation Theory have been criticised for being overly optimistic in developing-country contexts. The theory assumes relatively efficient financial markets and rational allocation of credit based primarily on expected productivity. In reality, commercial banks frequently perceive agricultural lending as excessively risky because agricultural production is characterised by weather uncertainty, biological risks, seasonal cash flows, price volatility, and inadequate collateral among borrowers. Consequently, banks often prefer lending to commerce, mining, telecommunications, or urban real estate rather than agriculture, regardless of agriculture's strategic contribution to national development.

In Sierra Leone, this limitation is particularly relevant. Although agriculture remains one of the largest contributors to employment and national income, commercial bank lending to agriculture has consistently represented only a small proportion of total private sector credit. This suggests that efficient financial intermediation alone may not guarantee adequate agricultural financing without complementary institutional and policy interventions.

Agricultural Credit Market Failure Theory

Agricultural Credit Market Failure Theory, largely associated with Stiglitz and Weiss (1981) and Hoff and Stiglitz (1990), argues that agricultural credit markets are characterised by structural imperfections that prevent efficient allocation of financial resources. Unlike conventional markets where prices clear demand and supply, agricultural credit markets frequently experience credit rationing because lenders face incomplete information regarding borrower quality and investment risk.

The theory identifies adverse selection and moral hazard as the principal causes of market failure. Adverse selection occurs when lenders cannot distinguish between low-risk and high-risk borrowers before loan approval, while moral hazard arises after loan disbursement when borrowers undertake actions that increase default risk because monitoring is imperfect. These problems are especially pronounced in agriculture due to weather shocks, biological production cycles, fluctuating commodity prices, and limited accounting records among smallholder farmers.

According to this perspective, increasing lending rates alone cannot eliminate excess demand for agricultural credit because higher interest rates tend to attract riskier borrowers while discouraging relatively safer clients. Consequently, banks frequently ration agricultural credit by imposing stringent collateral requirements, reducing loan sizes, or avoiding agricultural lending altogether.

The theory provides an important explanation for the persistent financing gap observed across many developing countries. Nevertheless, its principal limitation lies in its emphasis on market imperfections while giving relatively limited attention to institutional innovations capable of reducing these constraints. Agricultural credit guarantee schemes, warehouse receipt systems, digital financial services, contract farming, crop insurance, and value-chain financing have increasingly demonstrated the potential to overcome many of the market failures identified by the theory. Consequently, although market failures remain important, they need not permanently constrain agricultural lending when appropriate institutional arrangements are introduced.

Information Asymmetry Theory

Information Asymmetry Theory extends the discussion of agricultural credit by focusing specifically on unequal information between lenders and borrowers. Building upon the work of Akerlof (1970) and Stiglitz and Weiss (1981), the theory argues that borrowers generally possess superior information regarding their investment projects, repayment intentions, managerial capacity, and production risks than financial institutions.

Within agricultural lending, information asymmetry is particularly severe because commercial banks often possess limited knowledge of farming systems, seasonal production cycles, local market conditions, and environmental risks. Farmers, meanwhile, frequently lack formal financial records capable of demonstrating repayment capacity. These information gaps substantially increase loan screening and monitoring costs.

The consequence is that commercial banks adopt conservative lending strategies characterised by strict collateral requirements, high interest margins, and extensive documentation procedures. Such practices disproportionately exclude smallholder farmers, who constitute the majority of agricultural producers in developing countries. Rather than allocating credit according to productive potential, lending

decisions frequently reflect borrowers' ability to satisfy collateral requirements.

Although Information Asymmetry Theory successfully explains many observed lending behaviours, contemporary technological developments have begun to reduce these information barriers. Digital financial services, satellite imagery, mobile banking, electronic farm records, and machine-learning credit scoring models increasingly enable financial institutions to evaluate agricultural borrowers more accurately. Therefore, while information asymmetry remains an important explanation of agricultural credit constraints, technological innovation is gradually modifying its practical significance.

Risk Management Theory

Risk Management Theory argues that lending decisions are fundamentally influenced by the ability of financial institutions to identify, measure, monitor, and mitigate credit risks. Commercial banks seek to maximise risk-adjusted returns rather than simply expanding loan portfolios. Consequently, sectors characterised by high uncertainty are often allocated relatively smaller proportions of available credit.

Agriculture represents one of the highest-risk sectors within commercial banking because production depends heavily upon rainfall, climatic conditions, pests, diseases, international commodity prices, and weak rural infrastructure. Unlike manufacturing or trade, many agricultural risks are systemic, simultaneously affecting large numbers of borrowers. Such covariate risks reduce the effectiveness of traditional portfolio diversification strategies.

To manage these risks, commercial banks typically require land titles, insurance, regular loan monitoring, cash-flow projections, and extensive borrower screening before approving agricultural loans. While these measures improve portfolio quality, they simultaneously increase transaction costs and reduce financial access for many small-scale farmers.

Recent literature argues that effective agricultural risk management increasingly requires integrated approaches involving agricultural insurance, public credit guarantees, climate-risk assessment, digital monitoring technologies, and stronger partnerships between banks, governments, and agricultural value-chain actors. These innovations shift risk-sharing responsibilities across institutions and may substantially improve commercial banks' willingness to finance agriculture.

Critical Synthesis of the Theoretical Literature

Collectively, these four theories offer complementary rather than competing explanations of commercial bank lending behaviour. Financial Intermediation Theory explains why banks exist and how they can stimulate productive investment. Agricultural Credit Market Failure Theory explains why agriculture remains systematically underserved despite its economic importance. Information Asymmetry Theory identifies borrower-lender information gaps that increase transaction costs and constrain lending, while Risk Management Theory explains the institutional mechanisms through which banks attempt to minimise portfolio losses.

However, none of these theories independently provides a complete explanation of agricultural financing in developing countries. Agricultural lending outcomes emerge from the interaction of financial market imperfections, institutional quality, macroeconomic conditions, government policies, technological innovation, and commercial bank behaviour. Consequently, an integrated theoretical perspective provides the most appropriate framework for analysing the contribution of commercial bank credit to agricultural development in Sierra Leone.

Empirical Evidence on Commercial Bank Credit and Agricultural Development

Global Evidence

Empirical evidence from both developed and developing economies generally supports the proposition that access to formal credit enhances agricultural productivity, although the magnitude and sustainability of these effects vary considerably across institutional settings. Studies consistently demonstrate that agricultural credit enables farmers to adopt improved technologies, purchase quality inputs, expand cultivated land, and invest in mechanization, thereby improving productivity and farm incomes. Nevertheless, evidence also suggests that credit alone is insufficient to stimulate agricultural transformation unless accompanied by supportive institutions, effective extension services, adequate infrastructure, and stable macroeconomic conditions.

Research conducted in Pakistan by Chandio et al. (2019) found that commercial bank agricultural credit exerted a significant positive influence on agricultural output, particularly among smallholder farmers. The authors argued that increased access to institutional finance facilitated investment in productivity-enhancing technologies and improved production efficiency. Similarly, Rehman et al. (2017) reported that agricultural credit significantly increased crop production through greater use of fertilizers, improved seeds, and modern farming equipment. These findings reinforce the proposition that financial capital represents an essential production input capable of accelerating agricultural modernization.

Comparable evidence has emerged from South Asia. Khandker and Koolwal (2016), using household panel data from Bangladesh, demonstrated that formal agricultural credit significantly increased technology adoption and crop yields by relaxing liquidity constraints facing smallholder farmers. Likewise, recent evidence from Nepal by Lamsal et al. (2025) showed that commercial bank lending contributed positively to long-run agricultural GDP growth. Their study further established that irrigation infrastructure and fertilizer utilization complemented the effects of agricultural finance, indicating that credit generates the greatest developmental impact when integrated with broader agricultural investments.

Although these studies strongly support the growth-enhancing role of agricultural finance, they also reveal that credit effectiveness depends heavily on institutional quality.

Countries with relatively efficient financial systems, strong agricultural extension services, and supportive government policies tend to experience greater productivity gains from commercial agricultural lending than countries characterized by institutional weaknesses.

Empirical Evidence from Africa

The African literature presents a more nuanced relationship between commercial bank credit and agricultural development. While many studies report positive impacts of agricultural finance, others demonstrate that institutional deficiencies, weak governance, and inefficient credit allocation substantially reduce its effectiveness.

In Ethiopia, Abafita (2020) found that farmers with access to formal agricultural credit achieved significantly higher crop yields and household incomes than non-borrowers. The study concluded that credit facilitated investment in productive farm inputs while improving household welfare. Similarly, research conducted in Kenya by Muyanga et al. (2019) established that access to agricultural credit significantly increased adoption of improved technologies, resulting in higher agricultural productivity.

Evidence from Tanzania also highlights the importance of institutional context. Mwaitete et al. (2022) observed a significant positive relationship between commercial bank lending and agricultural development, while Wagao et al. (2025), employing both ARDL and Markov Switching models, reported that agricultural credit positively influenced agricultural GDP over the long run but produced weak or even negative effects in the short run. These contrasting results suggest that agricultural investments require time before generating measurable improvements in sectoral performance.

Studies from Uganda further reinforce this conclusion. Nakazi et al. (2020) demonstrated that commercial bank credit significantly enhanced agricultural output in the long run, although short-run effects remained statistically insignificant. Their findings suggest that agricultural investments financed through commercial bank credit require sufficient time for technology adoption, production adjustments, and capital accumulation before productivity gains become observable.

Nevertheless, not all African studies report positive outcomes. Ngong et al. (2022), examining countries within the Central African Economic and Monetary Community (CEMAC), found that commercial bank credit did not significantly improve agricultural productivity. Rather than questioning the importance of finance itself, the authors attributed these disappointing outcomes to weak institutional quality, ineffective monitoring systems, inadequate complementary investments, and inefficient allocation of agricultural loans. Their findings imply that increasing the quantity of agricultural credit without improving institutional effectiveness may generate limited developmental benefits.

Collectively, African evidence indicates that agricultural finance contributes to development only when supported by effective institutions, appropriate risk management systems, stable macroeconomic environments, and complementary public investments.

Evidence from West Africa

West African economies exhibit similar patterns. Agriculture contributes substantially to employment and GDP throughout the region, yet commercial banks continue to allocate relatively small proportions of their loan portfolios to agricultural activities.

Nigeria has generated the largest body of empirical evidence on agricultural finance within West Africa. Abubakar et al. (2023), using an ARDL framework, found that commercial bank agricultural financing significantly improved agricultural output over the long run, although high interest rates constrained investment. Likewise, Oyedepo et al. (2022) concluded that commercial bank credit positively influenced agricultural growth while exchange rate instability reduced sectoral performance.

Other Nigerian studies, however, present less optimistic findings. Caleb, Lawal and Ahmed (2023) reported that commercial bank credit exerted a negative but statistically weak effect on agricultural output growth despite evidence of long-run cointegration among the variables. They argued that inefficient credit allocation, weak monitoring systems, and diversion of agricultural loans toward non-agricultural activities limited the effectiveness of formal agricultural finance.

Similarly, Anofe et al. (2024), employing a disaggregated analysis of agricultural subsectors, found that commercial bank credit significantly benefited livestock production but exhibited weak or insignificant effects on crop production, forestry, and fisheries. These findings demonstrate that the developmental impact of agricultural finance may vary considerably across agricultural value chains.

Additional studies, including those by Bada et al. (2017) and Chuba et al. (2022), generally support the existence of long-run relationships between commercial bank credit and agricultural output while emphasizing the importance of improving credit allocation mechanisms, reducing borrowing costs, and strengthening institutional supervision.

Overall, West African evidence suggests that the effectiveness of agricultural credit depends less on the absolute volume of lending than on the quality of credit allocation, monitoring, complementary agricultural policies, and macroeconomic stability.

2. Comparative Assessment of the Empirical Literature

The empirical literature reveals three important patterns.

First, most studies identify a positive long-run relationship between commercial bank credit and agricultural development. Countries including Bangladesh, Pakistan, Nepal, Uganda, Tanzania, and Nigeria generally report that agricultural finance contributes positively to productivity growth and agricultural output when institutional conditions are supportive.

Second, evidence regarding short-run effects remains inconsistent. Several studies report statistically insignificant or even negative short-run impacts, reflecting the biological production cycle of agriculture. Agricultural investments frequently require several production seasons before measurable productivity gains emerge.

Third, considerable differences exist regarding the effectiveness of agricultural credit across countries. These differences appear to arise not from credit availability alone but from broader institutional environments, including financial sector efficiency, government policies, infrastructure development, agricultural extension services, risk management practices, and macroeconomic stability.

An important observation emerging from this literature is that agricultural finance should not be viewed as an isolated policy instrument. Rather, commercial bank credit functions most effectively when integrated with agricultural insurance, value-chain financing, digital financial inclusion, effective extension services, and public investment in rural infrastructure. Consequently, successful agricultural transformation requires coordinated institutional reforms rather than merely increasing loan volumes.

3. Research Gap

Despite the extensive international literature, important empirical gaps remain regarding Sierra Leone. Existing studies largely focus on agricultural production, food security, or financial inclusion without comprehensively analysing the dynamic relationship between commercial bank credit and agricultural sector development. Very limited evidence simultaneously examines both the short-run and long-run effects of commercial bank lending using recent macroeconomic data.

Furthermore, previous studies rarely incorporate broader macroeconomic determinants such as exchange rate movements and international commodity prices within a unified analytical framework. Equally important, few investigations integrate econometric evidence with institutional perspectives relating to agricultural finance, government policy, and commercial bank lending behaviour.

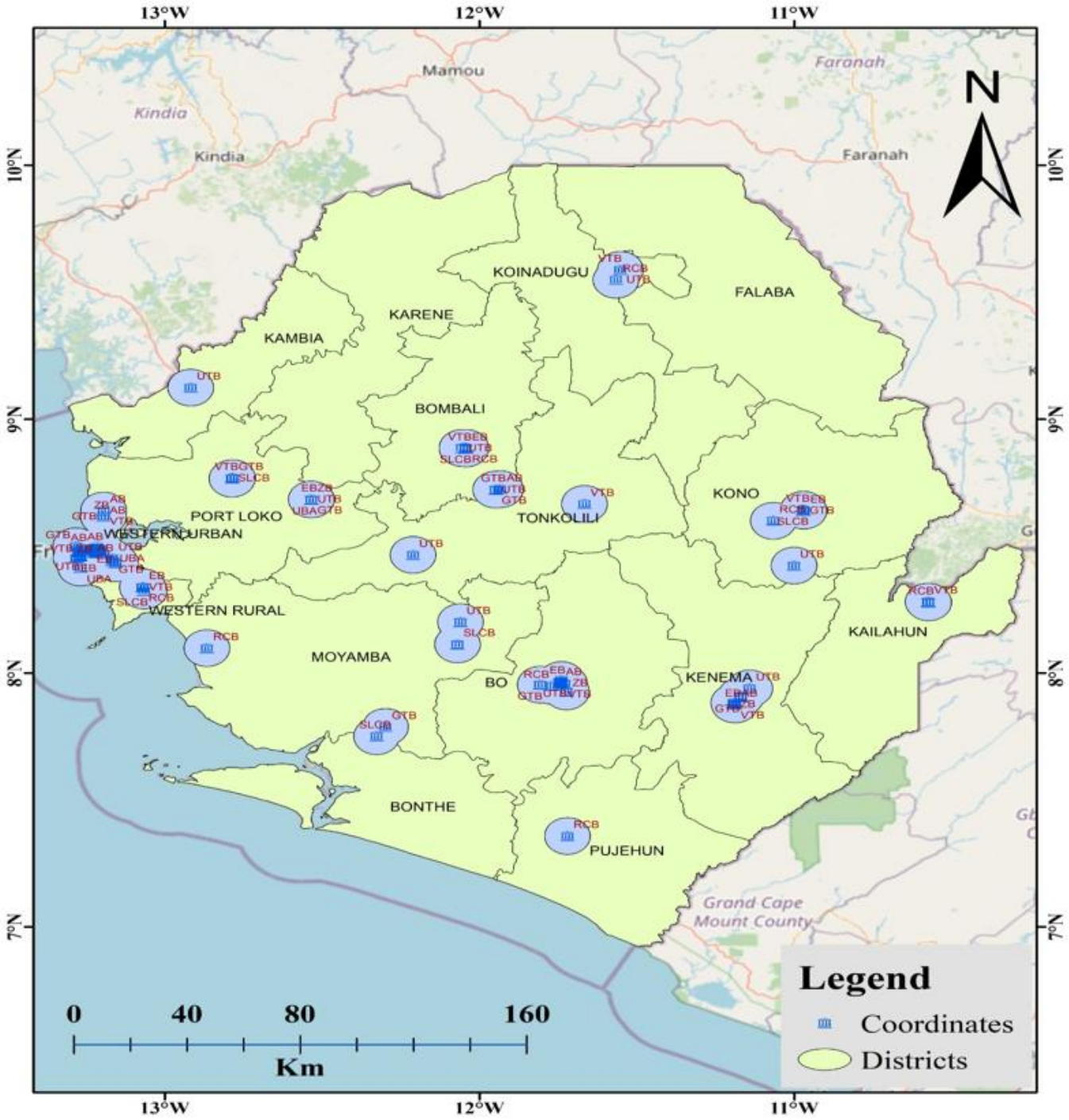
This study addresses these limitations by employing the Autoregressive Distributed Lag (ARDL) approach to estimate both the long-run equilibrium and short-run dynamics linking commercial bank credit and agricultural development in Sierra Leone over the period 2000-2024. Unlike previous studies, the analysis combines commercial bank agricultural credit with lending rates, exchange rates, and international commodity prices to provide a more comprehensive understanding of the determinants of agricultural value added. By generating updated country-specific evidence, the study contributes to the growing literature on agricultural finance in Sub-Saharan Africa while providing practical policy recommendations for strengthening commercial bank participation in agricultural transformation in Sierra Leone.

4. Methods and data sources

1.1 Study Area

This study examines the relationship between commercial bank credit and agricultural sector development in Sierra Leone over the period 2000-2024. Sierra Leone is a low-income, agriculture-dependent economy in West Africa, where agriculture remains the largest source of rural employment and an important contributor to national income, food security, and poverty reduction. The sector is dominated by smallholder farmers who primarily engage in the production of rice, cassava, cocoa, coffee, oil palm, vegetables, and livestock.

Despite agriculture's strategic contribution to economic development, access to formal financial services remains limited. Commercial banks continue to allocate only a small proportion of their lending portfolios to agriculture because of high production risks, weak collateral systems, climate variability, and information asymmetries. Consequently, Sierra Leone provides an appropriate case for investigating whether commercial bank credit contributes to agricultural sector development under conditions of financial market imperfections and institutional constraints.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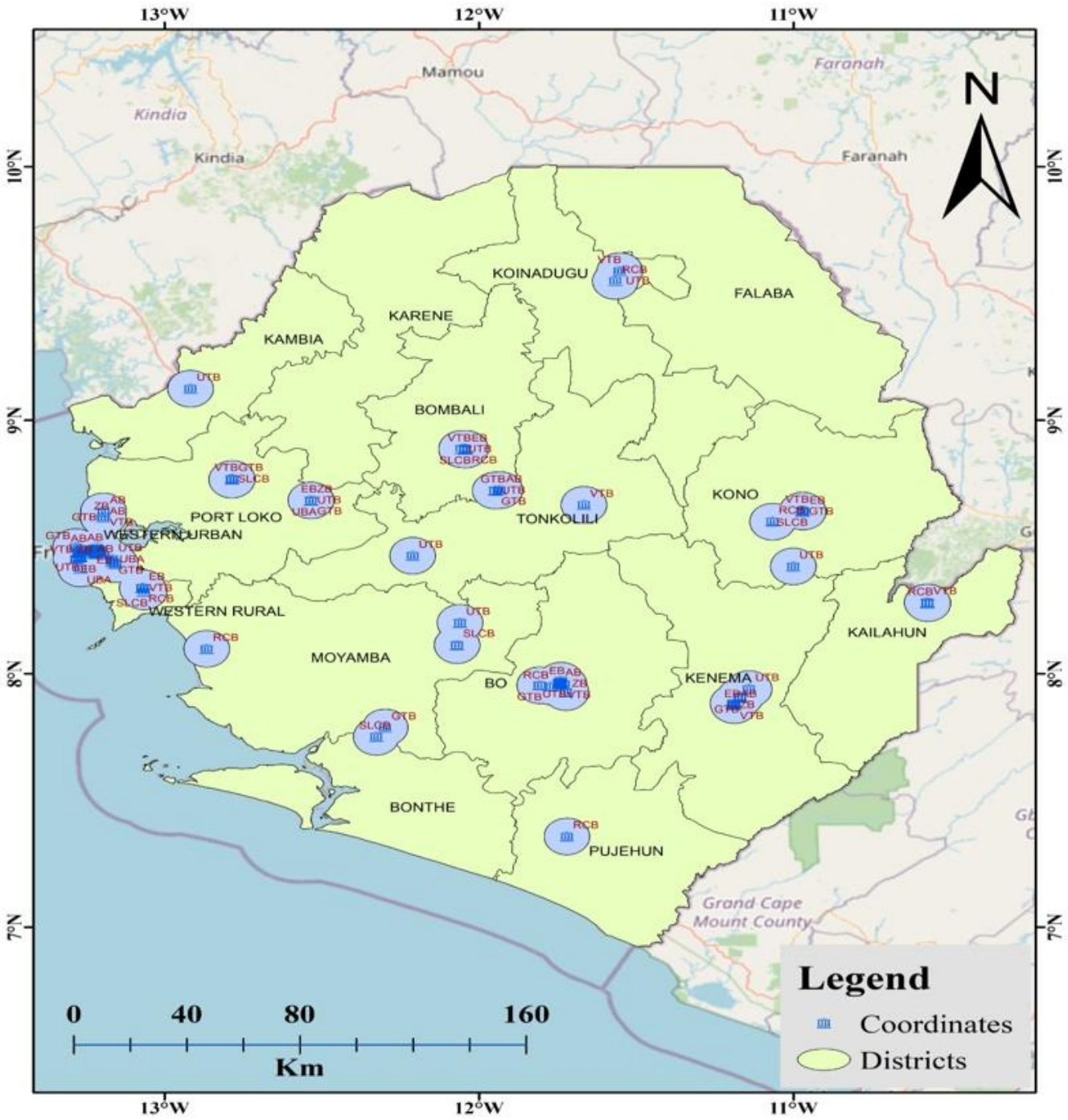
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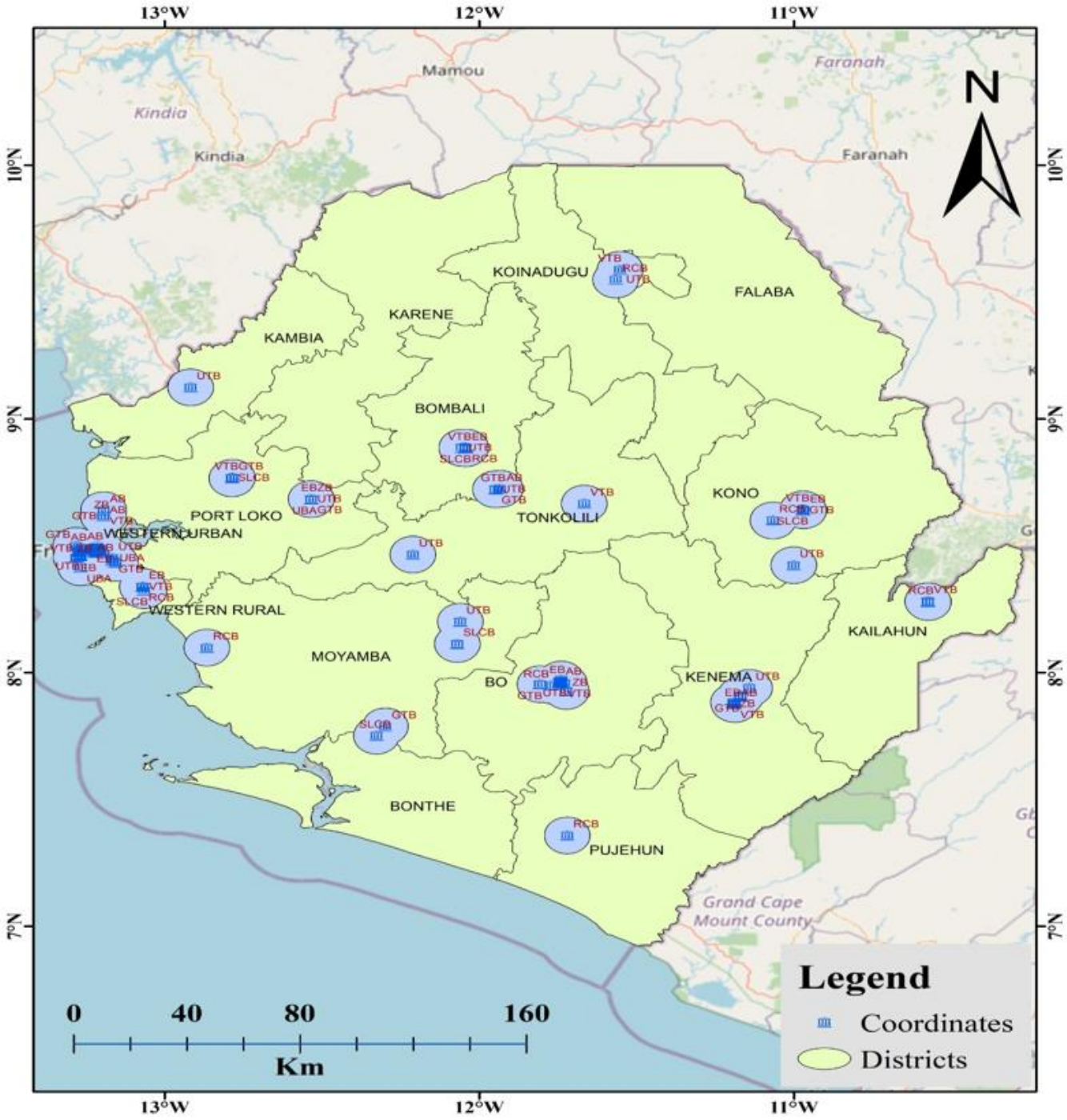
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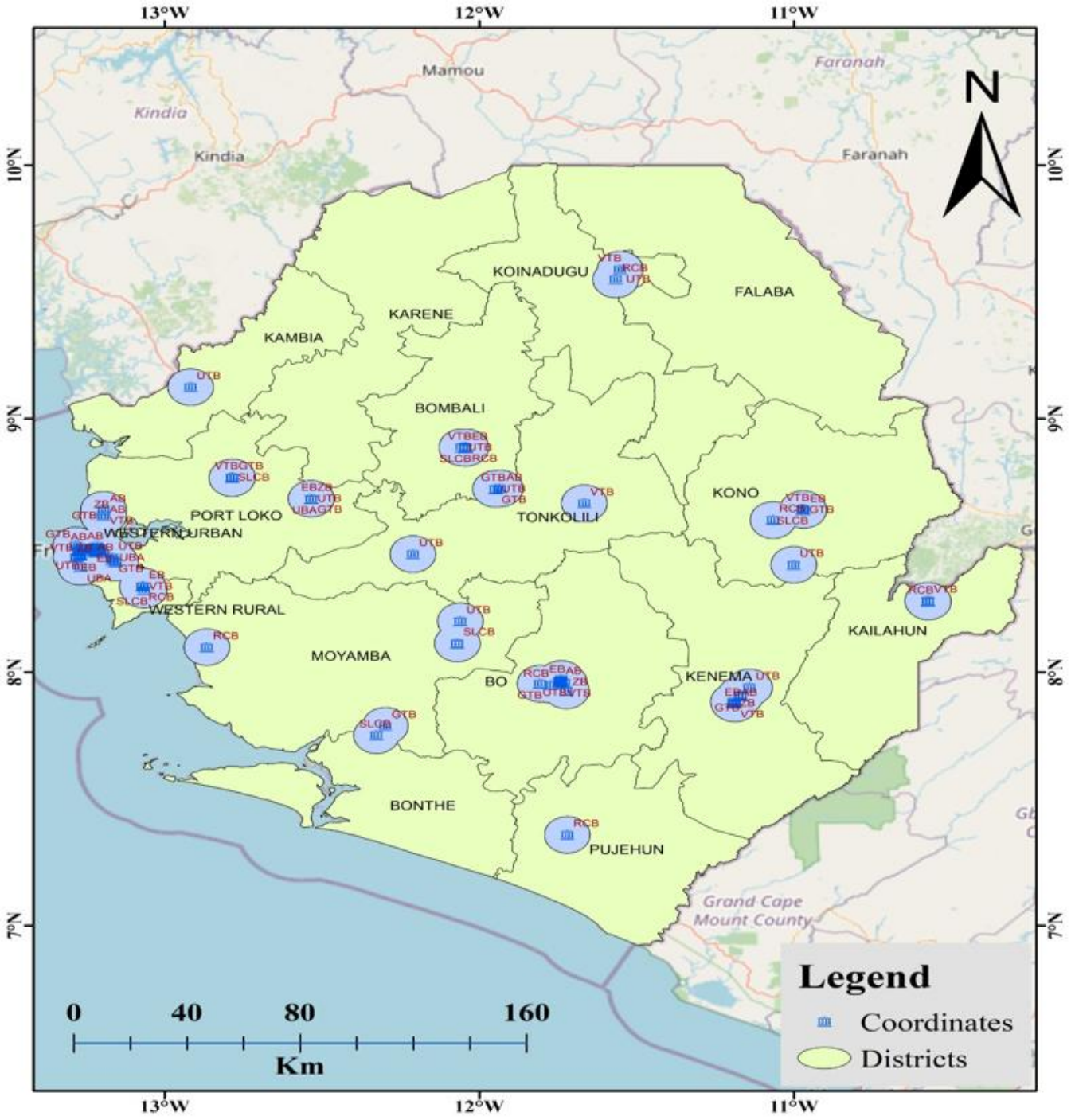

Figure 1: Map showing Commercial Banks' Branches in Sierra Leone

5. Research Design

The study adopts a mixed-methods research design combining quantitative time-series econometric analysis with complementary survey evidence. The quantitative component constitutes the principal analytical framework and examines the long-run and short-run relationship between commercial bank credit and agricultural development using annual macroeconomic data covering the period 2000-2024. The qualitative and survey evidence is used to complement and interpret the econometric findings by providing institutional perspectives on agricultural lending practices, credit accessibility, government interventions, and risk management strategies.

The mixed-methods approach provides a more comprehensive understanding of agricultural finance than reliance on either quantitative or qualitative methods alone. Whereas the econometric analysis identifies the statistical relationship between financial variables and agricultural performance, the survey evidence explains institutional factors influencing observed outcomes.

Data Sources

The study relies primarily on annual secondary data obtained from internationally recognized and nationally authoritative sources. Agricultural Value Added (AVA), exchange rate data, and commercial bank lending rates were obtained from the World Bank's World Development Indicators (WDI). Data on commercial bank credit to agriculture were obtained from the

Bank of Sierra Leone's Banking Supervision Department database, while international commodity price indices were sourced from the World Bank Pink Sheet commodity price database.

To complement the macroeconomic analysis, primary data were collected through structured questionnaires administered to farmers and commercial banking institutions involved in agricultural financing. The survey generated information on farmers' access to agricultural loans, utilization of credit, repayment experiences, institutional lending practices, government agricultural finance programmes, and commercial banks' risk management mechanisms. These survey findings are employed primarily to support the interpretation of the econometric results rather than as the principal basis for statistical inference.

Variable Description and Measurement

Agricultural development is measured using Agricultural Value Added (AVA), which represents the net output of the agricultural sector after deducting intermediate production costs. AVA is widely recognised in the agricultural economics literature as an appropriate indicator of sectoral performance because it reflects the actual economic contribution of agriculture to national output rather than gross production alone.

Commercial bank credit to agriculture constitutes the principal independent variable and is measured by the annual volume of commercial bank loans extended to the agricultural sector. Increased agricultural lending is expected to enhance farmers' investment capacity, facilitate technology adoption, improve productivity, and stimulate agricultural growth.

Three macroeconomic control variables are incorporated into the empirical model. Commercial bank lending rate represents the cost of borrowing faced by agricultural investors. Higher lending rates are expected to discourage investment and reduce agricultural productivity. Exchange rate captures macroeconomic conditions affecting agricultural competitiveness through imported production inputs and export opportunities. International commodity prices are included to account for changes in agricultural market incentives that may influence agricultural production and value addition.

Table 1: Summarises the variables employed in the empirical analysis

Table 1: Variable Description and Expected Relationships

Variable	Measurement	Expected Relationship
Agricultural Value Added (AVA)	Percentage contribution to GDP	Dependent Variable
Commercial Bank Credit to Agriculture (CBCA)	Annual lending to agriculture	Positive (+)
Lending Rate (LR)	Commercial bank lending rate (%)	Negative (-)
Exchange Rate (EXR)	Annual exchange rate	Negative (-)
International Commodity Prices (ICP)	Commodity price index	Positive (+)

Model Specification

The empirical analysis is anchored on the agricultural production framework in which agricultural performance depends upon financial capital alongside macroeconomic conditions. Following previous agricultural finance studies, Agricultural Value Added is modelled as a function of commercial bank agricultural credit and selected macroeconomic control variables.

The functional relationship is expressed as:
$AVAt = f(CBCAt, LRt, EXRt, ICPt)$

The estimable econometric model is specified as:
$AVAt = \beta 0 + \beta 1 CBCAt + \beta 2 LRt + \beta 3 EXRt + \beta 4 ICPt + Ut$

where:

- (AVA) denotes Agricultural Value Added;
- (CBCA) represents Commercial Bank Credit to Agriculture;
- (LR) denotes Commercial Lending Rate;
- (EXR) represents Exchange Rate;
- (ICP) denotes International Commodity Prices;
- (Ut) is the stochastic error term.

The coefficients estimate the marginal effect of each explanatory variable on agricultural sector performance while holding other variables constant.

Estimation Technique

The study employs the Autoregressive Distributed Lag (ARDL) modelling framework developed by Pesaran, Shin, and Smith (2001). The ARDL approach is particularly appropriate because it can estimate both long-run equilibrium relationships and short-run dynamic adjustments using relatively small samples. Furthermore, the technique accommodates variables integrated of order zero, I(0), and order one, I(1), provided none is integrated of order two.

The ARDL procedure follows four sequential stages.

First, Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests are conducted to determine the order of integration of each variable.

Second, the ARDL Bounds Testing procedure is employed to examine whether a long-run equilibrium relationship exists among the variables.

Third, conditional upon evidence of cointegration, long-run coefficients are estimated to evaluate the permanent effects of commercial bank credit and macroeconomic variables on agricultural development.

Finally, an Error Correction Model (ECM) is estimated to examine short-run dynamics and the speed with which deviations from long-run equilibrium are corrected following short-term shocks.

The ARDL approach is preferred over alternative cointegration techniques because of its robustness, efficiency under small samples, and ability to estimate variables integrated at mixed orders.

Diagnostic and Stability Tests

To ensure the reliability of the estimated model, several post-estimation diagnostic tests are performed.

Serial correlation is examined using the Breusch-Godfrey Lagrange Multiplier test. Heteroskedasticity is evaluated using the Breusch-Pagan-Godfrey test. Residual normality is assessed using the Jarque-Bera statistic, while model functional form is examined through the Ramsey RESET specification test.

Model stability is evaluated using the Cumulative Sum (CUSUM) and Cumulative Sum of Squares (CUSUMSQ) tests. These procedures determine whether estimated coefficients remain stable throughout the study period. A stable model provides greater confidence that the estimated relationships are reliable for policy interpretation.

Ethical Considerations

The study adhered to established ethical principles governing social science research. Participation in the survey component was voluntary, and informed consent was obtained from all respondents prior to data collection. Respondents were assured that information collected would be used exclusively for academic purposes and that confidentiality and anonymity would be maintained throughout the research process. Institutional data obtained from the Bank of Sierra Leone and other official agencies were utilised solely for scholarly analysis and appropriately acknowledged.

Methodological Contribution

The methodological approach adopted in this study provides several important contributions. First, it combines macroeconomic time-series econometric analysis with institutional survey evidence, thereby generating a more comprehensive understanding of agricultural finance than either approach independently. Second, the application of the ARDL framework permits simultaneous estimation of long-run equilibrium relationships and short-run adjustments, allowing the study to distinguish temporary effects from permanent structural relationships. Finally, the inclusion of key macroeconomic control variables strengthens the robustness of the empirical findings and provides a more reliable basis for policy recommendations concerning agricultural finance and commercial banking in Sierra Leone.

6. Results and Discussion

6.1 Descriptive Statistics

Table 2 presents the descriptive statistics for Agricultural Value Added (AGVA), Commercial Bank Lending to Agriculture (AGCR), Exchange Rate (LEXCH), International Commodity Prices (LICP), and Lending Rate (LR) over the period 2000-2024. The descriptive statistics provide an overview of the distributional characteristics of the variables before the econometric analysis.

Table 2: Descriptive Statistics of Study Variables

Statistic	AGVA	BLA	LEXCH	LICP	LR
Mean	52.9093	3.8969	8.6348	4.4787	19.9900
Median	55.6175	4.5799	8.3952	4.4757	20.0000
Maximum	64.3542	8.0918	10.0742	4.7958	25.0000
Minimum	32.1130	0.8787	7.7250	3.9245	15.6600
Std. Dev.	7.7981	2.2667	0.7023	0.2512	2.7225
Jarque-Bera	3.4915	1.8085	2.2895	2.3407	1.0212
Probability	0.1745	0.4049	0.3183	0.3103	0.6001

Source: Author's computation based on secondary data from BSL Annual Reports and Statistical Bulletins (2000-2024), World Bank World Development Indicators, and World Bank Pink Sheet.

Agricultural Value Added (AGVA), the proxy for agricultural development, recorded an average value of 52.91%, with values ranging from 32.11% to 64.35%. The relatively high mean confirms the central role of agriculture in Sierra Leone's economy throughout the study period. However, the standard deviation of 7.80 indicates considerable fluctuations in agricultural performance, reflecting the sector's vulnerability to climatic variability, changing commodity prices, and macroeconomic instability.

Commercial Bank Credit to Agriculture averaged only 3.90% of total bank lending, despite agriculture contributing more than half of economic output during much of the study period. Agricultural lending ranged from 0.88% to 8.09%, demonstrating that commercial banks consistently allocated a relatively small share of their credit portfolios to agriculture. This substantial disparity between agriculture's economic contribution and formal financial support suggests persistent structural constraints within Sierra Leone's agricultural credit market.

The exchange rate exhibited moderate variation over the study period, with a mean logarithmic value of 8.63, reflecting continued depreciation of the Leone against major foreign currencies. Similarly, international commodity prices recorded a mean value of 4.48, indicating moderate fluctuations in global agricultural commodity markets. Commercial bank lending rates averaged 19.99%, ranging from 15.66% to 25.00%, implying that agricultural borrowers consistently faced relatively high borrowing costs throughout the study period. High lending rates may discourage long-term agricultural investment and reduce farmers' willingness to utilise formal credit facilities.

The Jarque-Bera statistics indicate that all variables are approximately normally distributed since the associated probability values exceed the conventional 5% significance level. This suggests that the data satisfy one of the important assumptions underlying time-series econometric estimation and therefore provide a reliable basis for subsequent ARDL analysis.

The descriptive evidence reveals an important structural feature of Sierra Leone's financial system. While agriculture contributes substantially to national output, commercial banks allocate only a limited proportion of total credit to the sector. This finding supports Agricultural Credit Market Failure Theory, which argues that information asymmetry, production uncertainty, and collateral constraints lead

financial institutions to ration agricultural credit despite the sector's economic importance.

Unit Root Analysis

Prior to estimating the ARDL model, the stationarity properties of the variables were examined using both the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests. Applying both procedures enhances the robustness of the stationarity analysis because the Phillips-Perron test adjusts for serial correlation and heteroskedasticity without requiring explicit lag selection.

The ADF results indicate that Agricultural Value Added, Commercial Bank Credit to Agriculture, Exchange Rate, International Commodity Prices, and Lending Rate are non-stationary at their levels but become stationary after first differencing, implying integration of order one, I(1). The probability values for all variables after first differencing are statistically significant at the 5% level, confirming rejection of the null hypothesis of a unit root.

The Phillips-Perron test provides consistent evidence. Similar to the ADF results, each variable becomes stationary after first differencing, with statistically significant probability values. The consistency between the two independent stationarity tests strengthens confidence in the time-series properties of the data and confirms that none of the variables is integrated beyond order one.

These findings justify the application of the ARDL methodology proposed by Pesaran, Shin, and Smith (2001), which is specifically designed for variables integrated of order zero and order one. Since all variables satisfy this condition, the ARDL framework provides an appropriate econometric technique for estimating both the long-run equilibrium relationship and short-run dynamic adjustments.

The stationarity results further suggest that movements in commercial bank agricultural lending are characterised by long-term structural behaviour rather than temporary cyclical fluctuations. Consequently, improvements in agricultural financing are likely to require sustained institutional reforms rather than short-term policy interventions.

ARDL Bounds Test for Cointegration

Having established that the variables are integrated of order one, the next stage involved testing for the existence of a long-run equilibrium relationship using the ARDL Bounds Testing approach.

The estimated F-statistic of 5.986 exceeds the upper critical bound value of 5.840 at the 1% significance level. Consequently, the null hypothesis of no long-run relationship is rejected, confirming the existence of a stable long-run equilibrium relationship among Agricultural Value Added, Commercial Bank Credit to Agriculture, Exchange Rate, International Commodity Prices, and Lending Rate.

The existence of cointegration implies that although short-run fluctuations occur, the variables move together over time and eventually converge towards a common equilibrium path. This finding indicates that agricultural development in Sierra Leone is systematically linked to financial and macroeconomic conditions rather than being driven solely by temporary shocks.

The presence of a long-run equilibrium relationship is consistent with findings reported in Pakistan (Chandio et al., 2019), Uganda (Nakazi et al., 2020), Nepal (Lamsal et al., 2025), and Nigeria (Abubakar et al., 2023), all of which documented long-run cointegration between agricultural finance and agricultural performance. The Sierra Leone evidence therefore contributes to the growing empirical literature demonstrating that financial variables exert persistent influences on agricultural development despite differences in institutional contexts.

Long-Run ARDL Estimates

Table 3 reports the estimated long-run coefficients obtained from the ARDL model. The results reveal that Commercial Bank Credit to Agriculture has a negative and statistically significant coefficient (β = -0.0799, p = 0.0356), indicating that increases in commercial bank lending were associated with reductions in Agricultural Value Added over the study period.

Table 3: Long-Run ARDL Estimates

Variable	Coefficient	Std. Error	t-Statistic	Prob.
AGCR_TC	-0.079896	0.034813	-2.295007	0.0356
LEXC	-0.558894	0.317081	-1.762622	0.0971
LICP	1.150862	0.513423	2.241545	0.0395
LR	-0.052392	0.031691	-1.653216	0.1178
C	4.715899	1.822901	2.587030	0.0199

Source: Author's computation based on secondary data from BSL Annual Reports and Statistical Bulletins (2000-2024), World Bank World Development Indicators, and World Bank Pink Sheet.

This result appears counterintuitive because agricultural credit is generally expected to stimulate productivity and output growth. However, the finding suggests that the effectiveness of agricultural lending in Sierra Leone depends not merely on the volume of credit but also on how efficiently credit is allocated and utilised. Weak monitoring systems, diversion of agricultural loans to non-agricultural activities, high transaction costs, and inadequate complementary investments may have reduced the productivity of formal agricultural finance.

Exchange Rate also exhibits a negative coefficient (β = -0.5589), although it is only marginally significant (p = 0.0971). This result implies that currency depreciation increases production costs by raising the prices of imported agricultural inputs such as machinery, fertilisers, agrochemicals, and improved seeds, thereby reducing agricultural productivity.

Conversely, International Commodity Prices exert a positive and statistically significant influence on Agricultural Value Added (β = 1.1509, p = 0.0395). Higher international prices improve incentives for agricultural production by increasing expected returns to farmers and agricultural exporters. This finding highlights the importance of favourable international market conditions in supporting agricultural growth within Sierra Leone.

Although Lending Rate displays the expected negative sign (β = -0.0524), its coefficient is statistically insignificant (p = 0.1178). Nevertheless, the negative sign suggests that high borrowing costs discourage agricultural investment, limiting farmers' ability to finance productive activities. The lack of statistical significance indicates that other structural constraints—such as collateral requirements, credit rationing, and institutional inefficiencies—may exert greater influence on agricultural performance than interest rates alone.

Overall, the long-run results suggest that improving agricultural development in Sierra Leone requires more than expanding commercial bank lending. Greater emphasis should be placed on improving credit quality, strengthening loan monitoring, supporting agricultural value chains, and implementing complementary institutional reforms capable of translating financial resources into sustainable productivity growth.

Policy Implications

The findings of this study have important implications for policymakers, commercial banks, development partners, and agricultural stakeholders seeking to strengthen agricultural finance and accelerate agricultural transformation in Sierra Leone.

First, the negative relationship between commercial bank credit and agricultural value added indicates that increasing the volume of agricultural lending alone is unlikely to improve sectoral performance. Policymakers should therefore shift attention from the quantity of credit supplied to the quality, targeting, and monitoring of agricultural loans. Financial institutions should strengthen post-disbursement supervision to ensure that agricultural loans are invested in productive farming activities rather than diverted to non-agricultural purposes. Improved monitoring systems would enhance loan effectiveness, reduce default risk, and increase the developmental impact of agricultural finance.

Second, the relatively small proportion of commercial bank lending allocated to agriculture suggests the need for stronger incentives to encourage financial institutions to expand agricultural lending. The Government of Sierra Leone, in collaboration with the Bank of Sierra Leone, should strengthen agricultural credit guarantee schemes that share lending risks between government and commercial banks. Such schemes would reduce perceived lending risks and encourage greater participation of private financial institutions in agricultural financing.

Third, the consistently high commercial lending rates observed during the study period highlight the importance of improving the affordability of agricultural credit. While lending rates were not statistically significant in explaining agricultural performance, high borrowing costs remain an important barrier to credit access for many smallholder farmers. Policymakers should therefore consider targeted interest rate subsidies for priority agricultural investments, particularly those supporting mechanisation, irrigation, climate-smart agriculture, and agro-processing. Such interventions should be carefully designed to minimise market distortions while expanding productive investment.

Fourth, the positive influence of international commodity prices demonstrates that market incentives play an important role in agricultural development. Government policies should therefore focus on improving farmers' access to domestic and international markets through investments in rural roads, storage facilities, market information systems, and agricultural value-chain development. Strengthening market integration would enable producers to respond more effectively to favourable price movements and improve agricultural profitability.

Fifth, financial inclusion strategies should be expanded to reduce information asymmetry between lenders and borrowers. Digital financial services, mobile banking, electronic farm records, and digital credit assessment systems can improve loan appraisal, reduce transaction costs, and expand financial access for rural farmers. Commercial banks should increasingly adopt technology-driven lending models capable of reaching underserved agricultural communities.

Sixth, agricultural insurance should become an integral component of agricultural finance policy. Weather-related risks remain one of the principal reasons why commercial banks perceive agriculture as a high-risk sector. Expanding crop insurance, livestock insurance, and climate-risk financing would reduce uncertainty for both lenders and borrowers, thereby encouraging greater investment in agricultural production.

Finally, agricultural finance should be integrated within broader rural development strategies. Commercial bank credit is unlikely to generate substantial productivity improvements in the absence of complementary investments in agricultural extension services, research, irrigation, rural infrastructure, mechanisation, and farmer training. A coordinated policy framework involving government agencies, commercial banks, farmer organisations, and development partners is therefore essential for achieving sustainable agricultural transformation.

7. Conclusion

This study examined the long-run and short-run effects of commercial bank credit on agricultural development in Sierra Leone using annual data covering the period 2000-2024. Agricultural Value Added (AGVA) was employed as the indicator of agricultural development, while commercial bank credit to agriculture, lending rates, exchange rates, and international commodity prices were incorporated as explanatory variables. The Autoregressive Distributed Lag (ARDL) modelling approach was employed to estimate both long-run equilibrium relationships and short-run dynamic adjustments.

The empirical findings confirmed the existence of a stable long-run relationship among agricultural value added, commercial bank credit, exchange rates, lending rates, and international commodity prices. This indicates that agricultural performance in Sierra Leone is systematically influenced by financial and macroeconomic conditions over time.

Contrary to conventional expectations, commercial bank credit exhibited a negative and statistically significant long-run relationship with agricultural value added, while the short-run effect was also negative. These findings suggest that expanding agricultural credit alone does not automatically improve agricultural productivity. Rather, the developmental effectiveness of agricultural finance depends on the quality of credit allocation, institutional efficiency, effective loan monitoring, and complementary investments that enable farmers to use borrowed resources productively.

The study also found that international commodity prices exerted a positive and statistically significant influence on agricultural performance, highlighting the importance of favourable market conditions in stimulating agricultural production. Exchange rate movements produced mixed effects across the short and long run, reflecting the complex interaction between export competitiveness and imported production costs. Although lending rates displayed the expected negative relationship with agricultural value added, their statistical insignificance suggests that structural financial constraints may have greater influence than borrowing costs alone.

One of the most important findings is the highly significant error correction mechanism, indicating that approximately 88.5% of short-run disequilibrium is corrected within one year. This demonstrates that the agricultural sector possesses a relatively strong capacity to adjust towards long-run equilibrium following temporary disturbances.

Overall, the study contributes to the growing literature on agricultural finance in Sub-Saharan Africa by providing updated evidence from Sierra Leone using a robust ARDL modelling framework. Unlike many previous studies that focused solely on agricultural production or rural finance, this research simultaneously examines long-run and short-run dynamics while incorporating key macroeconomic variables that influence agricultural development.

8. Contributions of the Study

This study makes several important contributions to both academic research and public policy.

From a theoretical perspective, it demonstrates that Financial Intermediation Theory alone is insufficient to explain agricultural finance outcomes in developing countries. Instead, the findings suggest that institutional quality, information asymmetry, and agricultural risk management jointly influence the effectiveness of commercial bank lending.

Methodologically, the study contributes by applying the ARDL modelling framework to recent data spanning 2000-2024, enabling simultaneous estimation of both long-run equilibrium relationships and short-run adjustment processes.

Empirically, the study provides updated evidence on agricultural finance in Sierra Leone, where relatively limited econometric research has been undertaken on commercial bank agricultural lending.

Finally, the study offers practical policy recommendations capable of improving agricultural finance through strengthened credit guarantees, enhanced monitoring systems, agricultural insurance, digital financial services, and integrated value-chain financing.

9. Limitations of the Study

Despite its contributions, several limitations should be acknowledged.

First, the study relies on annual macroeconomic data, which limits the number of observations available for econometric estimation. Future research using quarterly or monthly data may provide greater insight into short-term dynamics.

Second, the analysis focuses primarily on commercial bank credit and selected macroeconomic variables. Other important determinants of agricultural performance- including climate variability, infrastructure quality, technological adoption, land tenure security, and government expenditure on agriculture- were not explicitly incorporated because of data limitations.

Third, although survey evidence was used to complement the econometric analysis, the primary empirical findings remain based on aggregate national data. Micro-level farm household data may provide additional insights into how agricultural credit influences productivity across different farming systems.

10. Suggestions for Future Research

Future research should examine the effectiveness of agricultural credit across different agricultural value chains, including rice, cocoa, coffee, oil palm, livestock, and fisheries.

Comparative studies involving Sierra Leone and other ECOWAS countries would improve understanding of regional differences in agricultural finance systems.

Further research should also investigate the role of digital financial services, agricultural insurance, climate finance, and public-private partnerships in expanding agricultural credit access and improving productivity.

Finally, future studies should employ farm-level panel data to examine how credit utilisation, repayment behaviour, and farm management practices influence agricultural productivity over time.

References

[1] Abafita, J. (2020). Impact of agricultural credit on smallholder farmers' productivity in Ethiopia. Journal of Development Studies, 56(4), 789-805.
[2] Abubakar, B., Musa, A., & Ibrahim, S. (2023). Impact of commercial bank agricultural financing on agricultural output in Nigeria. African Journal of Agricultural Economics, 18(2), 45-62.

[3] Abubakar, M. M., & Muhammad, M. Y. (2023). Impact of agricultural financing on agricultural output: The role of commercial banks. Journal of Global Social Sciences, 4(14), 103-117. https://doi.org/10.58934/jgss.v4i14.155.
[4] Abubakarr, F., Kamara, L., & Conteh, M. (2023). Agricultural financing by commercial banks and agricultural output in Nigeria. International Journal of Finance and Agricultural Economics, 9(1), 1-18.
[5] Akerlof (1970). The Market for "Lemons": Quality Uncertainty and the Market Mechanism [personal. u. dallas.edu], [ideas.repec.org]. The Quarterly Journal of Economics, Volume 84, Issue 3, pages 488-500.
[6] Anofe, S., Eze, C., & Okoro, P. (2024). Commercial banks' credit and agricultural sector output in Nigeria. Journal of Agricultural Finance and Development, 11(1), 33-49.
[7] Bada, O., Afolabi, L., & Ogunleye, T. (2017). Bank credit and agricultural output in Nigeria. Journal of Economic Development, 22(1), 65-82.
[8] Caleb, Lawal and Ahmed (2023). "Bank Credit Nexus Agricultural Output Growth of Nigeria Using ARDL Approach. Journal of Arid Zone Economy (JAZE), Vol. 1, No. 2 (2023).
[9] Chandio, A. A., Jiang, Y., & Rehman, A. (2019). Agricultural credit and agricultural output in Pakistan. Agricultural Finance Review, 79(4), 545-561.
[10] Chuba, M., Nwankwo, E., & Okafor, C. (2022). Commercial bank credit and agricultural growth in Nigeria. International Journal of Economic Studies, 14(2), 89-104.
[11] Climate Policy Initiative (CPI). (2024). Landscape of climate finance in Africa 2024. Climate Policy Initiative, South Africa/Africa Region. [climatepol...iative.org], [climatepol...iative.org]
[12] Diamond, D. W. (1984). Financial intermediation and delegated monitoring. Review of Economic Studies, 51(3), 393-414.
[13] Hoff, Karla & Stiglitz, Joseph E. (1990)."Imperfect Information and Rural Credit Markets: Puzzles and Policy Perspectives." The World Bank Economic Review, 4(3), 235-250. [econpapers.repec.org], [ideas.repec.org]
[14] Jayne, T. S., Muyanga, M., Wineman, A., Ghebru, H., Stevens, C., Stickler, M., Chapoto, A., Anseeuw, W., van der Westhuizen, D., & Nyange, D. (2019). Are medium-scale farms driving agricultural transformation in sub-Saharan Africa? Agricultural Economics, 50(Supplement 1), 75-95. https://doi.org/10.1111/agec.12535 [researchgate.net], [scirp.org]
[15] Khandker, S. R., & Koolwal, G. (2016). Agricultural credit and productivity in Bangladesh. World Bank Economic Review, 30(1), 1-23.
[16] Lamsal, R., Sharma, P., & Thapa, S. (2025). Commercial bank lending and agricultural growth in Nepal. Journal of Asian Agricultural Economics, 12(1), 1-20.
[17] Mwaitete, E., et al. (2022). Financial institution credit and agricultural development in Tanzania. Tanzania Journal of Economics, 10(1), 33-48.
[18] Nakazi, F., et al. (2020). Commercial bank credit and agricultural growth in Uganda. Uganda
[19] Ngong, C., et al. (2022). Bank credit and agricultural productivity in CEMAC. African Economic
[20] Okafor (2020), Commercial Banks Credit and Agricultural Development in Nigeria (1987-2019). International Journal of Business & Law Research, Volume 8(3), published by SEAHI Publications. [seahipubli...ations.org]
[21] Oyedepo, E. O., Owuru, J. E., Rasaki, M. G., & Louis-Okereke, B. (2022). Commercial bank credit and agricultural growth outcomes in Nigeria: An empirical analysis. Journal of Economics and Financial Analysis, 6(2), 1-19. https://doi.org/10.1991/jefa.v6i2.a52
[22] Oyedepo, J., et al. (2022). Commercial bank credit and agricultural growth in Nigeria. Journal of Agricultural Economics, 11(3), 78-95.
[23] Pesaran, M.H., Shin, Y., & Smith, R.J. (2001). Bounds testing approaches to the analysis of level relationships. Journal of Applied Econometrics, 16(3), 289-326. https://doi.org/10.1002/jae616
[24] R. Saumia, et al. (2022). Agricultural finance in India. Indian Journal of Agricultural Finance, 8(1), 10-25.
[25] Rehman, S., Gora, A. H., Ahmad, I., & Rasool, S. I. (2017). Stress in aquaculture hatcheries: Source, impact and mitigation. International Journal of Current Microbiology and Applied Sciences, 6(10), 3030-3045. https://doi.org/10.20546/ijcmas.2017.610.357
[26] Stiglitz, J. E., & Weiss, A. (1981). Credit rationing in markets with imperfect information. American Economic Review, 71(3), 393-410.
[27] Wagao et al, (2025): Profiling and characterizing Trends and Patterns of Agricultural Credit in Tanzania.
[28] Wagao, J., et al. (2025). Agricultural credit and agricultural GDP in Tanzania. Journal of African Economic Studies, 15(1), 1-19.