AGRICULTURAL CREDIT AND PRODUCTIVITY OF COMMERCIAL BANKS IN NEPAL

A Dissertation Submitted to the Office of the Dean, Faculty of Management in partial fulfillment of requirements for the Master's Degree

By

TANKA PRASAD ARYAL

Campus Roll No.: 3246/077

Exam Symbol No.: 36309/21

T.U. Regd. No: 7-3-39-2189-2020

Shanker Dev Campus

Group: Finance

Kathmandu, Nepal

August, 2024

Certification of Authorship

I hereby corroborate that I have researched and submitted the final draft of dissertation entitled **"Agricultural Credit and Productivity of Commercial Banks in Nepal"**. The work of this dissertation has not been submitted previously for the purpose of conferral of any degrees nor has it been proposed and presented as part of requirements for any other academic purposes. The assistance and cooperation that I have received during this research work has been acknowledged. In addition, I declare that all information sources and literature used are cited in the reference section of the dissertation.

………………….

Tanka Prasad Aryal

August, 2024

Report of Research Committee

Mr. Tanka Prasad Aryal has defended the proposal entitled **"Agricultural Credit and Productivity of Commercial Banks in Nepal"** successfully. The research committee has registered the dissertation for further progress. It is recommended to carry out the work as per suggestion and guidelines of supervisor Dr. Pitri Raj Adhikari and submit the thesis for evaluation and vice-voce examination.

Dissertation Proposal Defended Date: ……………………………………….

………………………

Dr. Pitri Raj Adhikari

Supervisor

Dissertation Submitted Date: ……………………………………….

Dissertation Viva-voce Date: ……………………………………….

…………………..

Asso. Prof. Dr. Sajeeb Kumar Shrestha

Chairperson, Research Committee

APPROVAL SHEET

We, the undersigned, have examined the thesis entitled **"Agricultural Credit and Productivity of Commercial Banks in Nepal"** presented by Mr. Tanka Prasad Aryal a candidate for the degree of Master of Business Studies (MBS Semester) and conducted the Viva voce examination of the candidate. We hereby certify that the dissertation is worthy of acceptance.

……………………

Dr. Pitri Raj Adhikari

Dissertation Supervisor

…………………….

Internal Examiner

……………………..

Internal Expert

……………………..

External Examiner

……………………….

Asso. Prof. Dr. Sajeeb Kumar Shrestha

Chairperson, Research Committee

………………….

Asso. Prof. Dr. Krishna Prasad Acharya

Campus Chief

August, 2024

ACKNOWLEDGEMENT

The dissertation on "Agricultural Credit and Productivity of Commercial Banks in Nepal" has been prepared with the immense support, continuous supervision, and motivation of distinguished personalities. Foremost, I would like to express my sincere gratitude to my supervisor Dr. Pitri Raj Adhikari for his continuous support and guidance for completing this dissertation. It is my utmost pleasure to carry out this study under his supervision.

I further extend special thanks to the Shanker Dev Research Department Team for providing me useful resources during my research tenure and special thanks to my colleagues for their statistical assistance during the study. Moreover, I would like to acknowledge all the sources who provided data and materials to complete this study. I am also thankful to all the seniors and friends who contributed directly and indirectly for the completion of this study.

Last but not the least, I would also like to extend my special regards and thanks to all my friends and family for the unconditional support they gave me for completion of this research from the beginning to the last.

Thank You.

Tanka Prasad Aryal

Shanker Dev Campus

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABBREVIATIONS

Abbreviations	**Full Form**
ADBL	Agricultural Development Bank Limited
ADF Test	Augmented Dicky Fuller Test
GDPA	Agricultural Gross Domestic Product
AIC	Akaike Information Criterion
ARDL	Autoregressive Distributive Lag
BFIs	Bank and Financial Institutions
CBS	Central Bureau of Statistics
CBs	Commercial Banks
CUSUM	Cumulative Sums
CUSUMSQ	Cumulative Sum of Squares
ECM	Error Correction Model
F.Y.	Fiscal Year
FAO	Food and Agriculture Organization of the United States
FERT	Fertilizer Use and Supply
GDP	Gross Domestic Product
IRI	Irrigation Supply
CBLA	Lending Distribution by Commercial Banks
LM Test	Lagrange Multiplier Test
MA	Moving Average
MoF	Ministry of Finance
NRB	Nepal Rastra Bank
OLS	Ordinary Least Square
SBC	Schwarz Bayesian Criterion
SD	Standard Deviation
SED	Seed Use and Supply

ABSTRACT

The World Bank has highlighted that in the least developed countries, the agriculture sector can contribute over 25% of GDP and is vital for economic progress. In Nepal, a national shift towards prioritizing industrial and service sectors has led to a relative underdevelopment in agriculture. However, global trends indicate that agricultural development can spur overall economic growth. Therefore, it is crucial to investigate whether the agricultural sector in Nepal is benefiting from commercial bank loans.

This study analyzes the short-term and long-term effects of agricultural credit on agricultural growth in Nepal from 1988 to 2022 using time series data. The variables analyzed include agricultural growth (GDPA), commercial bank lending to agriculture (CBLA), fertilizer supply (FERT), seed supply (SED), and irrigation supply (IRI). The ARDL cointegration test results show a significant and positive long-term relationship between lending and GDPA, while the ECM indicates that CBLA is insignificant in the short term. The findings suggest that credit has facilitated the increased use of purchased inputs and changes in the input mix, supporting long-term agricultural evolution, but it has not contributed to short-term agricultural GDP growth. Thus, based on the results and existing research in Nepal's context, it can be concluded that lending to the agriculture sector is beneficial. Thoughtful plans, programs, and actions are needed to transform the agriculture sector. It is recommended that both the government and the Nepal Rastra Bank (NRB) reconsider current policies, increase credit flow to the agriculture sector, and invest more in actual farmers to ensure they have access to the necessary services and facilities to drive agricultural transformation.

Keywords: Agricultural Productivity, Agricultural Credit, Commercial Bank, Agricultural GDP, Credit Utilization.

CHAPTER I

INTRODUCTION

1.1 Background of the study

Agriculture plays a vital role in driving economic growth, contributing significantly to the GDP of many nations, particularly in the least developed countries where it can represent over a quarter of the GDP (World Bank, 2022). Beyond simply generating employment and income, agriculture also fosters economic advancement by bolstering food output, enhancing food security, and stimulating exports of agricultural goods. The establishment of robust, sustainable, and inclusive food systems is imperative for tackling global developmental hurdles like poverty, malnutrition, and environmental deterioration (Praburaj, 2018). A well-functioning food system ensures that people have access to affordable, nutritious, and culturally suitable food options, while simultaneously guaranteeing that the production and distribution processes are environmentally and socially responsible. Agricultural progress plays a pivotal role in realizing these objectives, as it stands as one of the most potent means to alleviate extreme poverty, given its proven ability to uplift the incomes of the most impoverished segments of society more effectively than growth in other sectors (Briones & Felipe, 2013).

Agriculture holds significant importance for many impoverished nations, serving as a primary source of employment and income for a considerable portion of the populace. When the agricultural sector flourishes, it translates into augmented earnings for those reliant on it for their livelihoods, particularly benefiting small-scale farmers and rural communities vulnerable to economic instability (Hegde & Reddy, 2008). Furthermore, agricultural growth yields broader economic advantages for a nation. It fosters heightened food production, thereby enhancing food security and mitigating malnutrition. Additionally, it spurs an uptick in the exportation of agricultural goods, generating essential foreign currency inflows and fostering economic expansion. In Nepal, agriculture stands as a pivotal contributor to income and employment, with approximately 60.4% of the population engaged in the sector in 2022

(Ministry of Finance, 2023). Beyond providing livelihoods, this sector serves as a catalyst for growth and stability across the wider Nepalese economy.

Agricultural reform is vital for the advancement of developing nations towards attaining higher income levels and fulfilling key developmental objectives. Numerous countries have successfully elevated themselves from poverty to prosperity by initiating an economic evolution rooted in agriculture, which subsequently fosters growth across various sectors. A notable example is China, where the GDP per capita surged from $155 to $8,123 in current US dollars between 1978 and 2016, largely owing to this transformative process (Lin, 2018).

During the fiscal year 2011/12, the combined contribution of agriculture, forestry, and fisheries to the GDP stood at 32.7 percent. However, this figure has exhibited a steady decline in recent years, projected to reach 25.8 percent by the fiscal year 2020/21 (Ministry of Finance, 2021). By the mid-2010s, Nepal's economic landscape entered a phase of structural transformation characterized by the expansion of the service sector alongside a diminishing agriculture sector. Enhancing the modernization and commercialization of agriculture through increased production and productivity entails a complex endeavor, necessitating the effective provision of agricultural inputs such as improved seeds, fertilizers, irrigation, credit facilities, technology, and skilled labor (Ikenna, 2012). Despite its challenges, this endeavor promises substantial rewards as it can propel the nation towards a trajectory of high growth. Correspondingly, the proportion of the population reliant on the agricultural sector has progressively declined, influenced by both the modernization and commercialization of agriculture and the burgeoning non-agricultural service sectors. According to the Nepal Labor Force Survey of 2008 (FNCCI, 2021), 73.9 percent of the population was engaged in the agricultural sector, a figure that dwindled to 60.4 percent by 2018.

Many Nepalese inhabitants reside in rural regions, relying primarily on agriculture for their livelihoods. Given that a significant portion of Nepalese industries are agriculture-oriented and agricultural commodities dominate the export sector, the growth and progress of the Nepalese economy hinge greatly on the advancement of the agriculture sector. However, agriculture in Nepal remains predominantly subsistence-based, resulting in limited productivity and output of agricultural goods (Thapaliya, 2023). Extensive literature reviews suggest that credit stands out as a pivotal factor influencing the growth of the agriculture sector. Access to credit facilitates the commercialization of farming, adoption of advanced technology, training of farmers, and improvement of farming techniques, consequently elevating living standards, enhancing the agriculture sector, and fostering overall economic growth.

Enabling more farmers to access credit at reasonable rates and providing them with viable markets for their produce establishes an ecosystem where sufficient funds are available to invest in enhanced agricultural practices and boost farmers' efficiency (Baffoe et al., 2014). This leads to increased yields and decreased losses, fostering a self-reinforcing cycle of progress that bolsters the agricultural sector in the long term. To fully unlock the potential of the agricultural sector, initiatives are underway to ramp up production and productivity, enhance food security, and generate employment opportunities through modern and commercial farming methods. These efforts aim to optimize agricultural land utilization through effective land use policies and scientific land reforms (Ministry of Finance, 2021).

In Nepal, primary formal institutions extending agricultural credit include Nepal Rastra Bank (NRB) licensed entities such as commercial banks, microfinance institutions, cooperatives (Pandey, 2022), along with microcredit banks and rural development banks (Bhatta, 2014). The Agriculture Development Bank has been the key financial provider to Nepal's agriculture sector since its establishment in 1968 (Shrestha, 2022). As per directives from Nepal Rastra Bank and monetary policy (2023), commercial banks are mandated to allocate a minimum of 12% of their total lending to the agriculture sector by mid-July 2023. In the third quarter of the current fiscal year 2022-23, commercial banks disbursed a total of Rs. 490.15 billion (approximately $4.1 billion) to the agriculture sector, constituting 12.28% of their overall credit portfolio (Ministry of Finance, 2023).

According to the economic survey for the fiscal year 2021/22, the agriculture, forestry, and fisheries sectors collectively contributed 2.23 percent to the annual GDP growth rate in FY 2019/20 at constant prices of FY 2010/11. By mid-March of the fiscal year 2020/21, investments in livestock and vegetable farming had surged by 27.9% to Rs. 20.31 billion compared to the same period in the preceding fiscal year. During this timeframe, banks and financial institutions disbursed Rs. 290.75 billion in agricultural credit, with 36.7% allocated to livestock farming and services, 17.1% to agriculture farming services, and 43.9% to other agriculture-related services. Savings and reserve funds of small farmers' groups witnessed a 27.7% increase in 2022. Investments through the Small Farmers Development Program rose by 5.2% to Rs. 12.880 billion compared to the previous fiscal year, while debt recovery saw a 9.3% increase. Overall, various aspects of credit mobilization within the agriculture sector exhibited improvement.

Farmer-level transformation entails enhancing crop yields, minimizing post-harvest losses, facilitating market access, and improving profit margins. In Nepal, a significant portion of smallholder farmers remains unaccounted for in official records. These farmers, often lacking literacy and bargaining power, require guidance and training in agricultural methods and business acumen (Sapkota, 2023). For them, access to agricultural credit and guidance from banks, financial institutions, or lenders can be pivotal in acquiring inputs and technologies that enhance crop yields and overall farm productivity. However, the availability of agricultural credit in Nepal is currently limited, predominantly allocated for financing capital items like tractors and threshers rather than essential inputs such as irrigation systems, fertilizers, pesticides, and improved seeds (Bhatta, 2014). Consequently, farmers encounter difficulties in securing the necessary credit to fund inputs for agricultural production, resorting to high-interest rates from microcredit banks and rural development banks. To tackle this challenge, there is a pressing need to expand financial intermediation services and offer more accessible credit to farmers. This could involve measures like interest rate reduction, broader outreach of financial services, and providing farmers with technical expertise on leveraging credit to enhance farm productivity through superior inputs and practices. In this context, measuring the impact of lending by commercial banks on agricultural sector is relevant through the subject of impact of agricultural credit provided by commercial banks on agricultural productivity in Nepal.

1.2 Problem statement

The agriculture sector plays a pivotal role in economic advancement, as evidenced by its significant contributions to the prosperity of developed nations. Historical examples from countries such as England, the United States, China, the Republic of Korea, Taipei, and Japan underscore the importance of agricultural development either preceding or driving industrial growth (Praburaj, 2018; Briones & Felipe, 2013). For developing nations like Nepal, it is essential not to perceive agricultural and industrial progress as mutually exclusive endeavors; rather, a robust agriculture sector can stimulate higher income levels and increased investment, subsequently fueling growth across industrial, service, and external sectors (Narayanan, 2015). In essence, the agriculture sector serves as the backbone of the economic framework for developing economies and warrants significant attention from policymakers. However, a notable obstacle hindering agricultural transformation is the inadequate provision of credit for farmers (Bhatta, 2014), preventing them from making crucial investments in agricultural inputs and consequently hampering farm productivity. This study is based on following research questions:

(i) What are the characteristics and patterns of growth within the agriculture sector and the distribution of agricultural lending by commercial banks in Nepal?
(ii) Is there any significant relationship between agricultural output growth and agricultural credit?
(iii) Do seed, fertilizer and irrigation impact agricultural output in Nepal?

Moreover, the literature review highlights diverse findings regarding the linkages between credit allocation in the agriculture sector and its growth. While some studies have identified a positive correlation, others have yielded inconclusive or conflicting results. Additionally, there are disparities in the findings concerning the duration of the relationship, with some indicating a long-term connection and others suggesting both short-term and long-term dynamics (Ngong et al, 2022). Limited literature exists that demonstrates a positive association between these variables in Nepal across various timeframes and methodologies. Therefore, further investigation is warranted to ascertain the co-integration between credit disbursement and agricultural sector growth in the Nepalese context, with an extended sample period (Sagbo and Yoko, 2021). This study aims to explore the relationship between agricultural sector expansion and lending by commercial banks to the agriculture sector, as the magnitude and direction of this relationship serve as critical indicators of Nepal's agricultural evolution and, ultimately, national development.

1.3 Objectives of the study

The major objective of this study is to investigate the correlation between the growth of the agriculture sector (GDPA) and lending distribution by commercial banks to the agriculture sector (CBLA). The specific objectives of this study are as follows:

- To assess the characteristics and patterns of growth within the agriculture sector and the distribution of agricultural lending by commercial banks in Nepal.
- To examine the relationship between agricultural output growth and agricultural credit.
- To analyze variables impacting agricultural output such as fertilizer supply, seed supply, and irrigation availability in Nepal.

1.4 Rationale of study

Prioritizing the advancement of Nepal's agricultural sector is crucial for fostering prosperity in the country. The success of industries and services hinges greatly upon the robustness of agriculture. Various facets of agricultural development require attention, ranging from fundamental issues like input accessibility to governmental policies and strategies. Particularly, ensuring adequate credit availability stands out as a pivotal area necessitating government and financial institution investment. Research by Bhatta (2014) highlights the challenges in accessing and obtaining sufficient credit, indicating a gap between demand and supply. Assessing whether formal lending effectively contributes to agricultural sector growth is imperative to ascertain its efficacy. Insights gleaned from such evaluations can guide policy formulation, aiding in directing resources towards areas requiring targeted investment and support within the agricultural domain. Therefore, the findings of this study hold significant relevance for Nepalese policymaking bodies concerned with agricultural lending and sector development.

1.5 Limitations of the study

This study aims to evaluate the influence of formal credit extended by commercial banks on agriculture in Nepal. It is essential to emphasize that the study's focus is solely on the credit offered by commercial banks and excludes contributions from other financial entities, government schemes, personal investments, or informal sector credit to the agricultural domain. Consequently, the analysis does not encompass the entirety of lending to agriculture, whether from formal or informal sectors or government initiatives. Additionally, there is a possibility of multicollinearity among independent variables, as the capital allocated by commercial banks to agricultural lending in the regression equation can also be allocated to procure inputs like fertilizer, seeds, and irrigation.

CHAPTER II

LITERATURE REVIEW

2.1 Introduction

This chapter includes four sections. In the first one, introduction and background of literature review are discussed, while, in the second one, theoretical review is conducted. In chapter third and four, empirical review and research gaps are discussed. The literature presents varying perspectives on the influence of bank credit on agricultural productivity. Some studies propose a favorable correlation between bank credit and agricultural productivity (Das et al, 2009; Hegde & Reddy, 2008; Khan et al, 2017; Misra et al, 2016), whereas others argue for a negative impact (Dhrifi, 2014; Ikenna, 2012). Moreover, certain research indicates a mutual relationship between bank credit and agricultural productivity (Tamga, 2017), while others suggest a non-linear effect, described as an inverted U-shaped relationship (Zakaria et al, 2019). Thus, this study aims to explore the association between bank credit and agricultural productivity in Nepal from 1988 to 2022 AD.

2.2 Theoretical review

Keynesian Theory on Public Economics

This concept is derived from Keynes's economic theory, which was formulated to address the economic challenges of the Great Depression in 1929. According to Keynesian theory, rural financial policy models depend heavily on government intervention. This approach highlights the importance of providing rural credit to groups that lack collateral or cannot afford high-interest rates. The theory examines rural and agricultural underdevelopment because of poor farmers' inability to save, invest, and provide collateral required for credit access. Therefore, Keynesian theory advocates for public financing to stimulate technical advancements, fund innovations, and enhance agricultural production, particularly when aimed at rural populations. It suggests that government-supported agricultural credit can mitigate the limitations of conventional financial systems, thereby improving rural access to credit. However, the challenges of insufficient collateral, high interest rates, lack of water management, and inadequate production and marketing infrastructure continue to hinder the financing of agricultural production by banks and microfinance institutions (MFIs).

Neo Classical Economic Theories

The concept is based in the theory of private-sector financing of the economy. In this framework, three key groups are involved in financing agricultural production: banking and non-banking institutions, NGOs, and associations. In the context of the Congo, non-banking financial institutions, NGOs, associations, and some international organizations are the primary sources of funding for agricultural production. This approach is underpinned by neoclassical economic theories, which suggest that long-term capital accumulation depends on the ratio of profit to wages and land rent. As this ratio increases, capital accumulation speeds up, fostering economic development. Lewis's thesis posits that employing surplus agricultural labor leads to higher profits. His analysis is based on the dualistic nature of developing economies, where a traditional, subsistence agricultural sector with excess labor coexists with a burgeoning modern capitalist sector. The agricultural transition hinges on structural factors affecting demand. Enhanced agricultural productivity reduces production costs, leading to lower relative agricultural prices. The labor surplus theory rests on two key assumptions: that the surplus keeps wages stable if it remains, and that marginal labor productivity is zero in the traditional sector (Seven & Tumen, 2020).

Theories of Money Supply and Credit Demand

The flow of credit in any sector depends on available loanable funds with formal banking channels. Generally, primary sectors are considered as low return generating sectors as compared to service and industry sector. Central bank makes policies regarding directed lending to enhance primary sector of an economy particularly the agriculture and household's sector. Development assistance of various international organizations and entities are distributed through agricultural financing of commercial banks. Interest rate, liquidity, policy rates of central bank, capital expenditure patterns of government, regulatory tightening and other directions shape the credit amount flowed to agricultural sector. Reward like provisions are promoted for focusing on productive lending on the real sector of an economy (Nzomo & Muturi, 2014).

2.2.1 Concept of Agricultural Credit

Agricultural credit encompasses various financial instruments designed to support agricultural activities. These instruments include loans, notes, bills of exchange, and banker's acceptances. This form of financing is tailored to meet the unique financial requirements of farmers, enabling them to obtain equipment, plant and harvest crops, market their produce, and perform other essential tasks to maintain their farming operations (Narayanan, 2016).

When individuals require credit, they frequently approach banks for loans or other financing options. Certain industries, such as agribusiness, have dedicated financial facilities provided by specific institutions. Agribusiness involves all activities related to farming and the commercial processes needed to bring agricultural products to market, including production, processing, and distribution. This specialized form of financing is known as agricultural credit and is available in numerous countries.

2.2.2 Concept of Commercial Banks

Nepal Rastra Bank, the regulator of banks and financial institutions in Nepal allows, supervises and directs the financial institutions. As specified by Banks and Financial institutions Act, 2073, commercial banks are A category banks. They have maximum scope of operations including deposit, lending, remittance, bank guarantee, foreign exchange, government transactions, gold/silver related transactions and many more.

The central bank urges the banks and financial institutions for directed lending and lending to productive sectors. Agriculture, tourism, poultry, hydropower, rural areas, entrepreneurship etc. are the major areas that Nepal Rastra Banks focuses for lending. Central bank imposes micro and macro prudential regulations to implement these directions. Unified directives, banking offense and punishment act, clean note policy, IT guidelines, CSR directives, financial literacy and or inclusion provisions are to be implemented by commercial banks.

2.2.3 Agricultural Productivity

In economics, productivity measures the amount of output generated from a specific set of inputs. Productivity rises when either more output is produced using the same inputs or the same output is achieved with fewer inputs. Agriculture lies in the primary sector of an economy concerned with crops, vegetables, fruits, farm and other production. The term productivity refers to the increase and efficiency with regards to input or investments on the respective sector. Generally, contribution of agricultural sector in national economy is considered as the level of agricultural productivity. More qualitative and quantitative tools and methods are in use to measure the productivity i.e. farm productivity, income level of farmers, production units, import substitution, etc.

2.3 Empirical review

In this section, the research papers conducted on the impact and satisfaction towards agricultural credit focusing on developing countries are reviewed systematically. Researchers from India, Pakistan, Bangladesh, Nigeria, Nepal and other countries conducted their study, latest and most relevant to this research among them have been included in systematic literature review process. The summary of the review is presented on below table following detailed explanation of each study.

Table 1

Empirical Review

SN	Author(s)	Variables	Methodology	Major Findings
1.	Madhulagna and Mishrna (2024)	Education, cost of cultivation, Access to credit, off farm income, Days to get credit, **Utilization of credit.**	Multistage, simple random sampling, structured schedule. (Primary survey)	A significant part of agricultural credit is used for consumption rather than investment.
2.	Yeasmin et al. (2024)	Farm size, interest , training, earning member, credit procedure, non-farm income,	Multistage, simple random sampling, logit model, multiple linear regression.	Farmers in Bangladesh struggle with interest rates and credit application procedures, while banks are concerned on credit targets, workforce, non-performing loans, and natural disasters.

		farmers demand for credit.		
3.	Kapoor & H. (2024)	Credit Amount, Family Income, Family, Education, Age, loan, Livestock, **Agricultural productivity.**	Logistic regression model.	The agricultural financing positively influences output levels, with factors such as household size, income, education, and loan terms significantly impacting agricultural productivity.
4.	Gebeyehu and Bedemo (2024)	Credit, subsidy, cultivation, fertilizer, employment in agriculture, pesticide, inflation rate, FDI, **agricultural productivity.**	Autoregressive distributed lag, descriptive and time series, ADF test, coefficients.	Agricultural credit initially had a negative impact on productivity but showed positive effects in the long run, while subsidies had a positive effect in the short run but a negative effect in the long run.
5.	Rahman et al. (2024)	Cost of chemical fertilizer, Cost of irrigation, Bank credit, **mustard production.**	Regression analysis.	The borrowings are utilized for mustard production, with credit acting as a catalyst, positively influencing both mustard production and household calorie intake.
6.	Akpan et al. (2024)	Loan, interest rate, credit to private sector, **Poultry production.**	Time series data from 1991 to 2022.	Bank loans strengthened poultry production, whereas loans from agricultural credit guarantee schemes exhibited a negative correlation.
7.	Rayhan et al. (2024)	Family, Earning members, Literacy, experience, Farm size, **Productivity.**	Sampling.	The farmers who received credit were more productive than farmers who did not. The likelihood of credit accessibility increased with education.

8.	Dirir and Aden (2024)	Development Flows to Agriculture, **GDP growth,** assistance, rural population, External public debt.	Unit root test, Granger causality, Bi-wavelet approach, ARDL model, wavelet coherence analysis.	The influence of official development assistance emphasizes the pivotal role of external financial support in promoting sustainable agricultural growth, highlighting the importance of transparent governance structures and robust regulatory frameworks.
9.	Dulal (2023)	Agricultural Credit, Cultivation, **Food Production.**	Unit Root test, Augmented Dicky-Fuller test, Autoregressive Distributed Lags.	The growth of the financial sector promotes higher food production, contributing positively to the country's economy despite the declining GDP share of agriculture in Nepal.
10.	Thapaliya (2023)	Lending to agriculture, **Agricultural growth,** Lending Distribution, Fertilizer Use, Seed Use, Irrigation.	Descriptive and empirical research design, unit root, Augmented Dickey-Fuller, Cointegration test, Error correction model.	The lending behavior of commercial banks to the agricultural sector indicate positive long-run effects on agricultural GDP.
11.	Makinde et al. (2023)	**Agricultural output**, Funds, Anchors Borrowers Program.	Unit root analysis, Analysis of Estimation.	Finance and credit facilities helped to grow agricultural sector for study period.
12.	Sapkota (2023)	**Farmers' Satisfaction,** Interest Rate, Processing, EMI, Collateral, Responsiveness,	Descriptive, Correlation, Regression analysis.	Processing and responsiveness are identified as the most influential factors affecting farmers' satisfaction with agricultural credit.

		Reliability, Accessibility.		
13.	Louyindoula et al. (2023)	Age, Gender, Education, fields owned, Beneficiaries of services and advice, Access to credit, Labour, membership.	Descriptive Statistics, dispersion, mean, median, ESR model.	The findings confirm the hypothesis that access to agricultural credit enhances productivity.
14.	Chaiya et al. (2023)	Agricultural Credit and Socio-Economic Characteristics of Farmers, **Agricultural Credit Utilization.**	Study area, sampling.	Agricultural productivity in Pakistan remains low due to factors such as smallholdings, traditional farming practices, and inadequate irrigation infrastructure, with the misuse of agricultural credit being more prevalent among farmers.
15.	Keerthikumara and Kumari (2022)	**Agricultural output,** credit to the agriculture, Government expenditure on Agriculture.	Time series data, secondary data, descriptive and analytical methods, OLS, SPSS.	Despite increased efforts to enhance access to agricultural credit through formal institutions, agricultural output growth remains stagnant.
16.	Dhakal (2022)	Agricultural Goods and its Price, Crops Production, Livestock and Poultry.	Dispersion, mean, median, ESR model.	Decreasing GDP contribution, limited access for marginalized communities, declining crop production, insufficient irrigation, inadequate market support, high costs, and a lack of branding are major challenges for Nepali agricultural products.
17.	Afolabi et al. (2021)	Credit to Agriculture, Credit Guarantee	E-views 9 test, unit root test, ARDL technique.	Adequate funding, efficient disbursement, and monitoring of agricultural credit by the Central Bank of Nigeria, alongside collaborative

		Scheme, Interest, Inflation, Rate of Exchange, **GDP.**		efforts with the government, are crucial for enhancing the agrarian sector's development.
18.	Seven and Tumen (2020)	**Agricultural productivity,** agricultural credits.	Estimation, OLS, GMM estimates.	Better agricultural credit system contribute with higher agricultural productivity, with agricultural credit continuing to positively impact productivity.
19.	Gulati and Juneja (2019)	Agri Credit policies, credit institutions, impact & innovations in agri credit institutions.	Historic analysis, trend analysis.	Lending institutions prioritize mitigating credit risks while adhering to RBI's Priority Sector Lending guidelines and ensuring transparency through individual farmer-level tracking for interest subvention schemes aimed at small and marginal farmers' financial inclusion.
20	Rizwan et al. (2019)	**Demand for credit,** Age, income, education, farm size, family size, dependent childrens, credit receipts.	Ordinary Least Squares Regression, Multivariate Probit Regression, Descriptive statistics, MPR Estimates.	Farmers prefer for informal credit sources despite higher interest rates, often failing to use formal agricultural credit for its intended purpose, with agricultural credit demand positively influenced by factors such as education, family size, risk factors.
21.	Awotide et al. (2015)	Credit access, Landpress, Dependants, age, livestocks, education, farm size, household size, **farm value.**	Dispersion and central tendency, Tobit model, regression coefficients.	Male-headed households benefited higher credit amounts, yet not all farmers who requested credit received it, and those who did tend to exhibit higher productivity levels compared to the sample average.
22.	Rahman et al. (2014)	**Agricultural productivity,** Size, Income, education, age, credit borrowed,	Regression, Probit, Logit model.	Household size, income, education level of the farmer, credit amount, and the availability of short-term and long-term loans significantly enhance agricultural productivity.

		livestock, times of borrowing.		
23.	Nepal Rastra Bank (2014)	Seed, fertilizer, Irrigation cost, capital, labor including the farmer's own labor time, **Yield of food crops and vegetables.**	Cobb-Douglas Function, Stochastic Frontier Analysis (SFA), One-sided Generalized Likelihood Ratio.	Agricultural credit distribution is predominantly through microcredit banks and rural development institutions, with reluctance from mainstream banks mainly for buying tractors.
24.	Nzomo and Muturi (2014)	Social- economic characteristics, **Credit impact on productivity,** Effect of credit in farming.	SPSS, Primary Data, quota sampling, descriptive statistics and cross tabulations.	Seasonal credit positively impacts farmers' productivity and incomes in the short term, while development loans yield greater and long-lasting benefits.
25.	Aggelopoulos et al. (2009)	**Satisfaction components,** credit, human aspect, equipment, personal service, lending terms.	Sampling, mean, standard deviation.	A typology of farmers in Greece revealed with older farmers expressing overall disappointment linked to low income, while younger, more educated farmers showed higher satisfaction, emphasizing not only lending terms but also the quality of banking services provided.

Source: Author's Creation

Madhulagna and Mishra (2024) from their study found that in general 75 percent of the farmers are credit constrained and therefore 25 percent are credit non-constrained, this reveals that most of the farmers in the study area face problems in access to agricultural credit from formal sources.

Yeasmin et al. (2024) concluded farmers react negatively to interest rates and the ambiguity of the credit application procedure. Farm size and occupational experience might be considered by bank officials when selecting households for credit disbursement. On the other hand, supply of agricultural credit depends on credit disbursement targets, workforce, NPLs, and natural disasters in the country.

Through their study, Kapoor and H. (2024) found the availability of formal agricultural financing significantly and positively impacts output levels, playing a crucial role in increasing agricultural productivity. Variables such as household size, household income, farmer education, credit amount, and loan terms, whether short-term or long-term, have a significant influence on agricultural productivity. While variables like farmer's age, borrowing history with the bank, and livestock show expected signals, they have minimal impact on farm production.

Gebeyehu and Bedemo (2024) found agricultural credit initially had a negative impact on productivity but showed positive effects in the long run, while subsidies had a positive effect in the short run but a negative effect in the long run. These imply the need for the government to create better access to agricultural financing and offer subsidies only during short-run periods, gradually reducing them in the long run to avoid retarding productivity.

Rahman et al. (2024) concluded that borrowed money has been used to a productive purpose by the loanee farmers. Credit works like a catalyst for mustard production. It affects mustard production via input demand and is positively influenced by credit. Elasticity of production with respect to credit is positive for mustard production, though it is not so high. Credit also has a positive impact on the calorie intake of the respondents. It was found that about 51.67% of households are not poor. As bank credit has a positive relationship with mustard production, the government and other non-government organizations should come forward to provide financial support to the mustard-producing farmers in the study area.

Akpan et al. (2024) summarized the commercial bank loans to the agricultural sector are positively linked to the poultry production index in the long and short run periods. On the contrary, the agricultural credit guarantee scheme loans allocated to the poultry subunit were negatively correlated with poultry production index in the short and long run periods. In the short-run model, the result was mixed as lags 1 and 2 of the loan guarantee for the poultry unit showed a positive association with poultry production index. The relationship between the total domestic credit to the private sector and the poultry production index in the long run was positive, but it was negative in the short run.

Rayhan et al. (2024) wrote that farmers who received credit were more productive than farmers who did not. The likelihood of credit accessibility increased with education. Both formal and semiformal sources were important and had a positive effect on rice productivity.

Dirir and Aden (2024) concluded the positive impact of official development assistance stands out, highlighting the crucial role of external financial support in mitigating these challenges and fostering sustainable agricultural development, and the recognized influence of institutional quality on credit and subsequent agricultural development highlights the imperative for transparent governance structures, anti-corruption measures, and robust regulatory frameworks.

Dulal (2023) found that existence of cointegration between agricultural loans and food production, which was the study's explicit goal, it can be concluded that financing to the agricultural sector benefits Nepal and increases food productivity and food production and agricultural loans have a minor but positive influence in Nepal.

Thapaliya (2023) revealed the trend of agricultural growth shows that it is increasing over the years whereas contribution of agriculture sector to GDP is decreasing. Annual growth rate of GDPA over the study period is between 5 to 10 percent and the trend of lending behavior of commercial banks to agriculture sector shows an exponential growth in recent years.

Makinde et al. (2023) found that finance and credit facilities provided by the CBN are important tools for the growth of the agricultural sector. Hence, such funds must be maximally utilized for the purpose which it is set out for, since the interest drawback and the Anchors Borrowers Program are positively related to agricultural output.

Sapkota (2023) found that processing as the loan related factor is the most significant factor that affects farmers' satisfaction with agriculture credit. When individuals seek agricultural loans, they are more likely to choose a specific bank or financial institution with simple, hassle free and less costly processing. It signifies that there is significant impact of these independent variable on farmer satisfaction towards agriculture credit provided by BFIs.

Louyindoula et al. (2023) found using an ESR model estimated by the maximum likelihood method to take account of selectivity and endogeneity problems, the results obtained show that, on average, the effect of agricultural credit on agricultural productivity is 92.2%; in other words, most farmers who have obtained agricultural credit have a high probability of improving their productivity. These results also show that literacy rate, group membership and age influence access to agricultural credit. These results confirm the hypothesis formulated in this work, insofar as they support the view that access to agricultural credit increases productivity.

Chaiya et al. (2023) revealed due to smallholdings, traditional farming practices, inadequate irrigation infrastructure and other factors, agricultural productivity is low in developing nations, particularly in Pakistan. It is pertinent to note that large and medium farmers misused agricultural credit more than small farmers.

Keerthikumara and Kumari (2022) concluded Despite an increase in efforts by the Government of India to increase access to agricultural credit through the formal institutions' disbursements, the growth in agriculture output continues to be stagnant. Timely and sufficiently available agricultural credit makes all activities in the farm possible and leads to an increase in agricultural production. Corresponding to the perception, the study aims to ascertain the impact of institutional credit on the agricultural output in India. The study found that institutional production credit and MT/LT credit have a positive role in agricultural output performance. The study's outcomes exhibited that the institutional production credit has a higher impact than MT/LT credit, as it has the lion's share in the total institutional credit. The model results of the positive effect of institutional credit, but statistical insignificance demands more allocation of formal sector credit to agriculture in India; simultaneously, the lending institutions must follow up on whether the given credits are being used for agriculture purposes only. This can be achieved through the active involvement of formal financial institutions in India. Further investigation revealed that government expenditure on agriculture through the various schemes have a positive and significant effect on agricultural output in India. Therefore, it is suggested to come up with new schemes which can revamp the agriculture sector in India.

Dhakal (2022) found the situation of livestock production is in increasing trend whereas crops production is in decreasing trend. Big farmhouse and dairy industries are increasing and the contribution of livestock in national GDP is increasing. Situation of cash crops is not so good in Nepal. Contribution of cash crops is nominal; however, government claimed that cash crops are one of the main sources of foreign currency. Irrigation is the main problem of Agriculture sector which is going to solve through huge irrigation project like Babai-Veri diversion, however, the problem of market, labor, chemical fertilizer and support price of the government also create problem on agriculture sector. Ongoing programs cannot bring positive impacts on crops production because farmers annually face the problems of fertilizer and irrigation.

AFOLABI et al. (2021) concluded Credit is essential for the revival and development of Nigeria's agrarian sector however, also pertinent are other development factors from which finance cannot be isolated if it is to be efficient and effective. To allow the agrarian sector get access to complete benefit of the multiple incentives and face challenges head on, credit to the agricultural sector must be adequately funded, disbursed and monitored by the CBN to avoid mismanagement of funds as this will enable the funds to be easily accessible to the farmers.

Seven and Tumen (2020) found countries with better agricultural credit systems tend to have more productive agricultural sectors, Agricultural credits still positively affect agricultural productivity in a meaningful way even after correcting for the upward bias. There is no reverse causality operating from agricultural productivity toward agricultural credits. The effect of agricultural credits on agricultural productivity operates mostly through the agricultural component of GDP in developing countries, while it operates through agricultural labor productivity in developed ones.

Gulati and Juneja (2019) summarized that in agricultural credit, one of the major concerns of the lending institutions is to cover credit risks involved in extending loans to the farmers. To ensure financial inclusion of small and marginal farmers, the banking system also needs to adhere to the Priority Sector Lending (PSL) guidelines issued by the RBI, the interest subvention scheme should focus on small and marginal farmers only and transactions should be tracked at the individual farmer level for transparency.

Rizwan et al. (2019) found most farmers prefer to take credit from informal sources, rather than formal ones, although they end up paying more interest, Farmers getting agricultural credit are not using it for the intended purpose, the regression results demonstrate that education, family size, dependent children, high input price risk, flood risk, disease risk, and temperature have positive and significant impacts on agricultural credit demand in the research area. Income and farm size are negatively significant to agricultural credit demand.

Awotide et al. (2015) found majority of the farmers are still in their productive age, cultivating an average of 2.59 ha of farmland, most of which is on rented farmland. Credit is obtained mostly for agricultural and non-agricultural purposes. The male-headed households obtained higher credit than the female counterparts, not all the farmers that demanded for credit got the credit. The result shows than farmers who choose to obtain credit have higher productivity levels than a random farmer from the sample.

Rahman et al. (2014) found Household size, income of the household, education of the farmer, amount of credit, short term loans and long-term loans have significant positive impact on agricultural productivity. The age of the famer, number of times farmer has borrowed from the bank and Livestock have expected signs but insignificant impact on agricultural productivity. The borrowing from bank is very much helpful for both the small and large farmers enabling them to buy inputs such as the high yield variety seeds, fertilizers and pesticides and agricultural productivity rises because of such timely and adequate inputs.

Nepal Rastra Bank (2014) found farmers in the study area have not benefited much from using the credit facility in the production of food crops and vegetables because of high interest rate charged and low productivity of agricultural sector. One reason for such low productivity is the subsistence farming practices being used by the farmers. Banks and financial institutions are skeptic about the repayment of loan disbursed to agricultural sector. So, they demand a lot of mortgage and annual income of farmers. Small farmers have, thus, little access to agricultural credit.

Nzomo and Muturi (2014) revealed seasonal credit has a positive effect on productivity and subsequently incomes of the farmers, but the benefits are short-lived, development loan is highly productive and the benefits long lasting. Development credit had the greatest impact on productivity and had long term effects compared to the other types of credit.

Aggelopoulos et al. (2009) concluded the farmers in all three clusters express displeasure as regards the characteristics of the agricultural credit provided. It can be observed that the older farmers with a low educational level, present an overall disappointment and dissatisfaction with Agricultural Credit, a fact that can be linked to their low income gained and possibly to their reduced capacity to invest in their agricultural holdings. On the contrary, the level of satisfaction with agricultural credit is higher among the younger farmers who have a higher educational level.

2.4. Research gap

The agriculture sector holds a crucial position in the economic advancement of developing nations, with agricultural credit serving as a pivotal determinant directly influencing agricultural production in Nepal (Bhatta, 2014). Nevertheless, there exists a dearth of literature on this subject matter. The trend and status of growth in Nepal's agriculture sector, as well as the correlation between agricultural lending and agricultural expansion, remain largely unexplored. An analysis of the volume of credit allocated to the agriculture sector could offer insights into the ramifications of lending on this domain within Nepal. Investigating the nexus between agricultural lending and agricultural sector growth could provide clarity on the efficacy of lending practices in Nepal.

Limited scholarly articles have addressed agricultural credit in Nepal. Dhakal's (2019) work research into the status and hurdles of agricultural credit in Nepal, emphasizing its potential to bolster growth and development in the agriculture sector. Rimal's (2014) study scrutinizes the impact of commercial banks' agricultural credit on agricultural output in Nepal over a decade (2002-2012) using time series data and the Cobb-Douglas production function. Bhatta's (2014) research delves into the acquisition and utilization of agricultural credit, scrutinizing lending determinants and assessing its influence on farm productivity in Kailali district from 2010 to 2014.

In contrast to Rimal's investigation, this study employs long-term data spanning 35 years from 1988 to 2022, employing the ARDL methodology to ascertain cointegration between Nepal's agricultural output and credit dispersal. Apart from these studies, there is a noticeable scarcity of academic inquiries focusing on the impact of agricultural credit on Nepal's economy, despite its pivotal role as a significant influencing factor for the agriculture sector and broader economic progress. This signifies a noteworthy research gap.

CHAPTER III

RESEARCH METHODOLOGY

Research methodology refers to the structured approach and scientific techniques employed in carrying out a study. It serves as a systematic means of addressing research inquiries (Dhrifi, 2014). This methodology delineates the procedures and approaches applied throughout the study, elucidating the sequential actions taken by researchers in exploring a research problem and the rationale guiding each action.

3.1 Research design

This research adopts both descriptive and cause and effect research designs. In the descriptive analysis, the study provides summary statistics for all variables, encompassing measures like mean, median, standard deviation, skewness, kurtosis, and the Jarque-Bera test. Additionally, it examines the patterns and directions of agricultural GDP and lending by commercial banks to the agricultural sector, utilizing tables, charts, and percentages.

Furthermore, various econometric tools and techniques such as the Augmented Dickey-Fuller test for assessing unit roots, the Autoregressive Distributed Lag bounds testing approach for cointegration testing to identify long-term relationships between variables, and the Error Correction Model to estimate short-term relationship tests are employed.

3.2 Population and sample

The financial system of Nepal has been comprised with banking and finance, cooperatives, insurance, capital market, non-bank and financial institutions, etc. All these sectors contribute for the productivity of agricultural sector. The lending only by commercial banks has been studied during this research study. As all statistics are extracted from macroeconomic indicators and national outlook, lending by individual commercial banks has not been analyzed where lending has been taken as a whole. Besides, among many dimensions of agricultural productivity, its share and contribution in the national production has been considered for analysis. The publications of Ministry of Finance, Nepal Rastra Bank, Ministry of Agriculture and Cooperatives, and Agricultural Development Bank Limited are taken as the major source and data ranging from 1988 to 2022 has been analyzed due to their availability.

3.3 Nature and sources of data

The agricultural GDP (GDPA) data used in this study originally came from the Ministry of Finance and was initially reported in units of 10 million. The author adjusted this data to be expressed in million rupees. Data on lending to the agricultural sector (CBLA) were sourced from two main references: the Economic Survey 2022 covering the period from 1988 to 2022 by the Ministry of Finance, and the "Loan to the BFIs (Sector-wise)" report provided by Nepal Rastra Bank spanning from 2003 to 2022. Both sources reported data in million rupees, with data collection conducted around mid-July. Information on irrigation, fertilizer, and seed inputs was gathered from the "Agricultural inputs" report issued by Nepal Rastra Bank, where irrigation is measured in hectares and fertilizer and seed quantities are measured in metric tons.

The analysis incorporates two main variables: GDPA (agricultural GDP) and CBLA (lending to the agricultural sector), along with three control variables: FERT (fertilizer), SED (seed), and IRI (irrigation). The study utilizes annual time series data covering a span of 35 years, from fiscal year 1987/88 to fiscal year 2021/22. This time was chosen due to constraints in data availability extending beyond this timeframe for all variables.

Table 2

Information Related to Variables

Variables	Abbreviation	Unit	Data Sources
Agricultural GDP	GDPA	In Million Rupees	MoF
Lending by commercial banks	CBLA	In Million Rupees	Economic Survey and NRB
Fertilizer	FERT	In metric ton	NRB
Seed	SED	In metric ton	NRB
Irrigation	IRI	In hectares	NRB

Source: Author's Compilation.

Data and information were sourced from secondary sources, primarily extracted from Nepal Rastra Bank, the Economic Survey, and the Ministry of Finance. Additional statistical data and information were gathered from various publications including the Economic Survey, Banking and Financial Statistics, Agriculture Census 2078, Central Bureau of Statistics, Ministry of

Agriculture and Livestock Development, Statistical Information on Nepalese Agriculture, National Accounts, Monetary Policy documents from the Ministry of Finance, and information from the Ministry of Agricultural Development, Government of Nepal.

3.4 Methods of analysis

This study employs various statistical tools such as mean, standard deviation, median, minimum, maximum, skewness, kurtosis, and the Jarque-Bera test to analyze descriptive statistics of the variables. Tables, bar graphs, and line charts are utilized to examine the patterns and trends in lending by commercial banks in the agriculture sector and agricultural growth. For empirical analysis, the study utilizes the Augmented Dickey-Fuller (ADF) test, the Autoregressive Distributed Lag (ARDL) bounds testing approach for cointegration, and Error Correction Model (ECM). Additionally, CUSUM and CUSUMSQ statistics are employed to assess the stability of the model. Diagnostic tests include the Breusch-Godfrey LM test for serial autocorrelation, Ramsey's RESET test, normality tests, and the KB test for heteroscedasticity. Software tools used for data analysis include Eviews-10, Microfit-5.0, and Microsoft Excel for basic statistical computations.

The data and information collected are structured and processed to facilitate the achievement of study objectives and the testing of hypotheses. The primary variables, GDPA and CBLA, are pivotal. To adjust for inflation, these variables are converted into real terms as RGDPA and RCBLA, using constant 2010/11 base year prices. This involves calculating the GDP deflator, derived from dividing nominal GDP by real GDP in Nepal. The nominal data is then divided by the deflator to derive the real data series. Furthermore, the real series are logarithmically transformed into LRGDPA and LRCBLA. Variables FERT, SED, and IRI, which are not price-dependent, are also transformed into natural logarithm form to normalize them for analysis.

3.4.1 Stationary (Unit Root) test

This empirical study focuses on annual time series analysis, where a stationary time series maintains a consistent variance and consistently reverts to its long-term mean. Initially, it is essential to verify whether the data series exhibit stationarity, a fundamental property in time series econometrics that indicates the series' capacity to convey both long-term and short-term information reliably.

Typically, it is assumed that statistical properties remain unchanged over time; however, many macroeconomic time series are non-stationary. Applying regression models to non-stationary data can yield spurious relationships, undermining the reliability of hypothesis testing results (Gujarati, 2021). Therefore, accurately determining the stationarity or non-stationarity of time series is critical to avoid spurious relationships among variables.

Various methods are commonly employed to test the stationarity of variables, including graphical analysis, correlogram tests, Augmented Dickey-Fuller (ADF) tests, and Phillip-Peron tests. In this study, the Augmented Dickey-Fuller test was chosen to assess the stationarity of the variables.

3.4.2 Augmented Dicky-Fuller (ADF) test

The ADF test is widely recognized as the primary method for evaluating the stationarity (unit root) of a single time series. Dickey and Fuller (1981) introduced the tau statistics, commonly referred to as T - statistics, for this purpose. Initially, in the Dickey-Fuller test (1979), it was assumed that the error term (Ut) was uncorrelated. However, if Ut is found to be correlated, Dickey and Fuller developed an alternative test known as the Augmented Dickey-Fuller test (1981). There are three potential forms of the ADF test, which are as follows:

Equation for no intercept and no trend is:

$$\Delta Y_t = \gamma Y_{t-1} + \sum_{i=1}^{k} c_i \Delta Y_{t-i} + U_t \qquad (4)$$

Equation for the intercept with no trend is:

$$\Delta Y_t = \alpha_1 + \gamma Y_{t-1} + \sum_{i=1}^{k} c_i \Delta Y_{t-i} + U_t \qquad (5)$$

Equation for both intercept and trend is:

$$\Delta Y_t = \alpha_1 + \varphi_t + \gamma Y_{t-1} + \sum_{i=1}^{k} \delta_i \Delta Y_{t-i} + U_t \qquad (6)$$

Where,

ΔY_t = first difference.

The null hypothesis of the ADF test states $\gamma = 0$, while the alternative hypothesis states $\gamma < 0$. Failure to reject the null hypothesis indicates that the series is non-stationary, whereas rejecting it suggests that the series is stationary. A series is considered integrated of order 0 (I(0)) if it is stationary without requiring any differencing. Conversely, if the series becomes stationary only after a first difference, it is classified as integrated of order 1 (I (1)).

3.4.3 Cointegration test

After conducting unit root tests, the subsequent step involves examining whether there is cointegration among the variables. Cointegration, a statistical concept, pertains to the enduring relationship between two or more time series variables. In econometric modeling, it is crucial to ascertain cointegration as it can significantly influence result interpretation and model accuracy. Several established methods in econometrics are employed for cointegration testing, such as the Johansen Cointegration Test, Engle-Granger Cointegration Test, and the Auto-Regressive Distributed Lag (ARDL) bounds testing approach. The ARDL bounds testing approach is particularly advantageous when dealing with variables that exhibit different integration levels, such as purely I(0) or purely I(1). This method enables assessment of whether a long-term relationship exists between variables, even in cases where the direction of such a relationship is not immediately apparent. In this study, the ARDL bounds testing approach is utilized to investigate the long-term relationship between agricultural GDP and lending to agriculture by commercial banks. A positive outcome from this test would suggest the presence of a durable connection between these two variables.

3.4.4 ARDL approach to Cointegration

Engle and Granger (1987) pioneered a residual-based approach to cointegration, introducing tests and estimation methods to assess long-term relationships among non-stationary variables within a dynamic framework. However, this approach had limitations. Subsequently, Johansen (1988) and Johansen and Juselius (1990) proposed a new procedure based on maximum likelihood, suitable only for time series with the same order of integration. A more advanced technique, the autoregressive distributed lag (ARDL) model, was developed later by Pesaran Shin (1999) and Pesaran et al. (2001). This model uses ordinary least squares and can accommodate time series with different orders of integration, including I(0), I(1), or mutually integrated series. However, it is not applicable when variables are integrated of order two, specifically I (2).

Another method, called Error Correction Model (ECM), can be employed to identify cointegrating relationships in limited sample sizes. This technique incorporates a linear adjustment that combines short-term dynamics with long-term equilibrium, preserving essential long-term information and mitigating issues like spurious relationships arising from non-stationary time series. It is crucial to utilize level data instead of first differences when conducting cointegration tests among variables.

Following the ARDL approach proposed by Pesaran and Shin (1999), the long-run relationship between the four variables of interest could be tested using equation (7) as follows:

$$\Delta LRAGDP_t = \alpha 0 + \sum^{p}{}_{j=1}\ b_j\,\Delta LRAGDP_{t-j} + \sum^{q1}{}_{j=0}\ c_j\,\Delta LR\mathrm{CBLA}_{t-j}$$

$$+\sum^{q2}{}_{j=2}\ d_j\,\Delta \mathrm{LFERT}_{t-j} + \sum^{q3}{}_{j=0}\ e_j\,\Delta L\mathrm{SED}_{t-j}$$

$$+\sum^{q4}{}_{j=0}\ f_j\,\Delta \mathrm{LIRI}_{t-j} + y_1\,\mathrm{LRGDPA}_{t-1} + y_2\,\mathrm{LRDCBS}_{t-1}$$

$$+y_3\,\mathrm{LFERT}_{t-1} + y_4\,\mathrm{LSED}_{t-1} + y_5\,\mathrm{LIRI}_{t-1} + U_t$$

In this context, all variables retain their previously defined meanings. $\alpha 0$ represents the intercepts $\gamma 1$, $\gamma 2$, $\gamma 3$, $\gamma 4$, and $\gamma 5$ denote the respective coefficients for the long-term relationship, while b_j, c_j, d_j, e_j, and f_j signify the short-term dynamics. Ut is random disturbance term. To determine whether a long-term equilibrium exists among GDPA, CBLA, FERT, SED, and IRI, a bounds test for cointegration (F-version) is conducted as proposed by Pesaran and Shin (1999). The hypotheses for the bounds test are formulated to assess the long-term level relationship between these variables. Which includes following tests:

Null Hypothesis (Ho): y1 = y2 = y3 = y4 = y5 = 0; No cointegration exists.

Alternative Hypothesis (H1): y1 ≠ y2 ≠ y3 ≠ y4 ≠ y5 ≠ 0; Cointegration exists.

If the computed F-statistic exceeds the upper critical value specified by Pesaran et al. (2001), the null hypothesis is rejected that no cointegration exists. Conversely, if the F-statistic is lower than the lower critical value, it is failed to reject the null hypothesis. When the F-statistic falls between the lower and upper critical values, the findings are inconclusive regarding the presence of cointegration.

After computing the F-statistic, the subsequent step involves estimating the long-term relationship using appropriate criteria to select the lag length. Various techniques exist for determining lag length, including adjusted R2, likelihood ratio test statistic (LR), final prediction error (FPE), Akaike information criterion (AIC), Schwarz Bayesian criterion (SBC), and Hannan–Quinn information criterion (HQ) (Ozcicek & Mcmillin, 1999). In this study, the AIC criterion is employed for lag length selection because it minimizes the number of lags used, thereby preserving degrees of freedom and yielding the smallest residual value for the model compared to other criteria.

3.4.5 Error Correction Model (ECM)

Using the long-run coefficients derived from the ARDL model, it will be proceeded with estimating the dynamic error correction using an equation that illustrates how short-term adjustments move towards long-term equilibrium.

$$\Delta LRAGDP_t = \delta_0 + \Delta LRAGDP_{t-j} + \sum^{q1}{}_{j=0}\ \delta_{2j}\ \Delta LR\mathrm{CBLA}_{t-j}$$

$$+\sum^{q2}{}_{j=2}\ d\delta_{3j}\ \Delta \mathrm{LFERT}_{t-j} + \sum^{q3}{}_{j=0}\ \delta_{4j}\ \Delta L\mathrm{SED}_{t-j}$$

$$+\sum^{q4}{}_{j=0}\ \delta_{5j}\ \Delta \mathrm{LIRI}_{t-j} + \delta_6\ \mathrm{ECM}_{t-1} + V_t$$

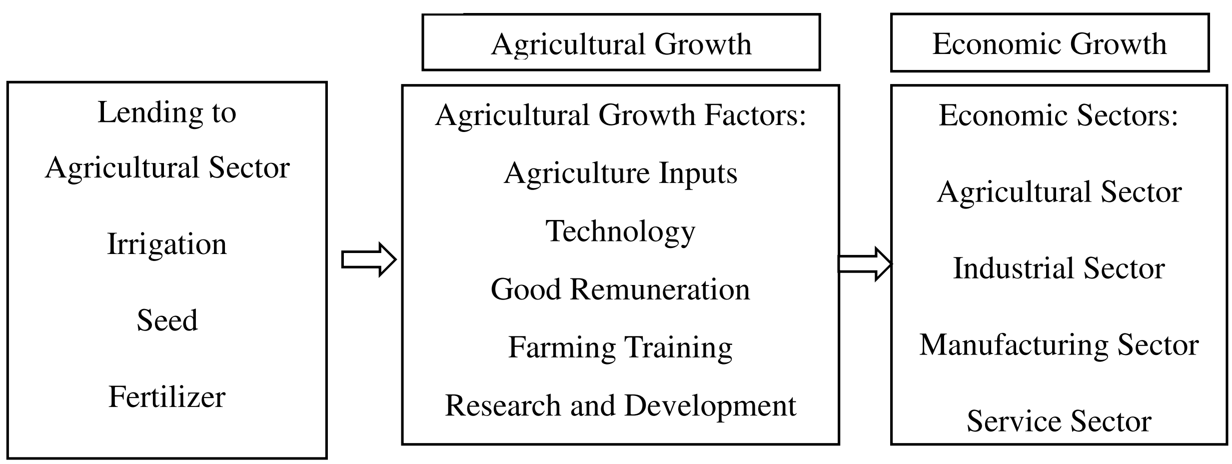
The coefficients δ_{1j} , δ_{2j} , δ_{3j} , δ_{4j} and δ_{5j} show the respective short-run dynamics of the mentioned model and δ_6 indicates the pace of adjustment towards the long-run equilibriums. The error term must exhibit characteristics of white noise, meaning it should be independently and identically distributed. A positive coefficient indicates divergence, while a negative coefficient indicates convergence towards equilibrium. The term ECM (Error Correction Model) is derived from the error term of the corresponding long-run model equation (7), and ECM represents the lagged residual of ECM over one period. V represents the lagged white noise error term, and $\delta 0$ denotes the constant term.

To assess the model's diagnostic properties, various formal tests are conducted, including the Lagrange Multiplier (LM) test for serial correlation, Ramsey RESET test for potential functional form misspecification, Jarque-Bera test for normality, and KB test for heteroscedasticity. Similarly, for evaluating the stability of the model, CUSUM and CUSUMSQ tests are performed.

3.5 Research framework

The conceptual framework of this study is developed based on the empirical literature review and researcher's own intuition. It is outlined in Figure 1.

Figure 1: Conceptual Framework



Source: Thapaliya, (2023).

Figure 1 depicts the central concept explored in this research study. The role of CBLA emerges as pivotal in driving agricultural growth, which in turn fosters economic development. Nepal faces a significant challenge in development due to capital inadequacy. Addressing this issue by enhancing capital availability would enhance various aspects of the agricultural sector, thereby contributing to overall sectoral growth. Appendix-3 illustrates how agricultural growth impacts other economic sectors, culminating in comprehensive economic growth across all sectors. Economic transformation involves shifting a country's GDP contributions from traditional to modern technologies, transitioning from agriculture to industry and manufacturing, and advancing towards a high-income service-based economy. This evolution ultimately promotes overall economic growth and national development. Focusing exclusively on industrial and service sectors while neglecting agriculture may hinder this vision, as the development of other sectors hinges on agricultural sector growth. Therefore, modernizing the agricultural sector represents the initial stride towards economic advancement and prosperity. Consequently, the growth of the agricultural sector and the factors influencing it are crucial in the context of a developing nation like Nepal. Hence, this study aims to ascertain the significance of agricultural GDP growth facilitated by lending.

The study employs econometric methods such as unit root and cointegration tests to analyze the data. Data for the research is primarily sourced from Nepal Rastra Bank, the country's central bank known for its reliability. The research will utilize the autoregressive distributed lag (ARDL) bounds testing approach for cointegration and an error correction model to investigate the long-term and short-term relationships between agricultural growth (GDPA) and lending to the agricultural sector by commercial banks (CBLA). Although other factors may influence the studied relationship, the variables included in the model are considered adequate for testing the hypothesis.

In the contemporary context, governments are increasingly tasked with prioritizing enhanced productivity to cater to expanding populations, compete globally, and optimize scarce resources effectively. Productivity stands as a crucial determinant of national success and advancement. By systematically analyzing and measuring productivity, pinpoint areas can be put for enhancement, thereby striving towards increased output and sustained economic growth over the long term. According to production and supply theories, there are primarily two avenues to bolster output within a sector: augmenting production factors and integrating advanced technologies. However, in Nepal and analogous developing nations, challenges such as insufficient irrigation, limited accessibility and affordability of agricultural inputs, and inadequate agricultural infrastructure pose enduring barriers to scaling up production capabilities. Addressing these obstacles is imperative for enhancing productivity and catalyzing economic growth.

This section presents the possible variables that are considered in the context of Nepal's economic growth, as determined by existing empirical and theoretical studies. To select the most relevant determinants of GDPA for Nepal, a variety of variables were collected from various published papers and articles. The final selection of variables was based on the availability of data to find the best fit variables that can explain GDPA in Nepal.

Generally, factors influencing agricultural performance and thereby impacting GDPA include: access to capital for farmers, government interventions such as subsidies, agricultural commodity prices, irrigation infrastructure, climate factors (temperature, rainfall, and wind patterns), availability of labor, agricultural wages, affordability of inputs (machinery, fertilizers, seeds, feeds, and pesticides), accessibility and utilization of agricultural inputs, soil characteristics, land topography, biotic factors (pests, diseases, and soil microorganisms), socio-economic factors (market demand for agricultural products), and government support programs. Timely availability of credit is particularly crucial for small and marginalized farmers (Golait, 2007).

Sriram (2007) acknowledges the difficulty in establishing a direct causal relationship between credit and agricultural productivity, primarily due to numerous intervening variables. Therefore, to simplify the model and address data limitations, a production function approach is adopted. Here, GDPA represents agricultural growth in million rupees, CBLA denotes commercial banks' lending to the agricultural sector in million rupees, FERT represents fertilizer supply in metric tons, SED indicates seed supply in metric tons, and IRI refers to irrigation supply measured in hectares.

The model is carried out by using time series data of 35 years ranging from 1987/88 to 2021/22. GDPA is the dependent variable and CBLA, FERT, SED, IRI are independent variables.

$$GDPAt = f(CBLA_t, FERT_t, SED_t, IRI_t) \quad (1)$$

Where,

GDPA = Agricultural Growth,

CBLA = Lending to Agricultural Sector by Commercial Banks,

FERT = Fertilizer Supply,

SED = Seed Supply,

IRI = Irrigation Supply.

GDPA and CBLA variables are transformed into real terms, referred to as RGDPA and RCBLA. Additionally, RGDPA, RCBLA, FERT, SED, and IRI are further transformed into logarithmic form, denoted as LRGDPA, LRCBLA, LFERT, LSED, and LIRI respectively.

LRGDPAt=f(LRCBLAt, LFERTt, LSEDt, LIRIt) (2)

The specific formulation of the model (2) reveals the direct linear relationship between the dependent and explanatory variables, represented explicitly by equation (3) as:

$LRAGDP = \beta + \beta\ LR\text{CBLA} + \beta\ LFER + \beta\ LSED\ t01t2t3t + \beta\ LIRI + U\ 4tt$ (3)

Where, $LRAGDP$ is dependent variable and $LRLDCB$, $LFER$, $LSED$, $LIRI$ are independent variables, and U is error term for a time t. Where $LRGDP$A is log of RGDPA, $LRLDCBS$ is log of CBLA, $LFER$ is log of FERT, $LSED$ is log of SED, $LIRI$ is log of IRI, and t represents the period. Here, $\beta 0$ is intercept, $\beta 1$, $\beta 2$, $\beta 3$ and $\beta 4$ is regression coefficients. All the $\beta 1$, $\beta 2$, $\beta 3$ and $\beta 4$ are expected to get positive influence on dependent variable because they contribute to increased efficiency and agricultural activities.

3.6 Definitions of the variables

Here, the variables that are used for descriptive as well as empirical analysis are discussed while conducting the study. These variables are discussed as below:

a. **Agricultural growth (GDPA)**

   GDPA, which stands for agriculture gross domestic product, signifies the annual output from agriculture and related sectors nationwide. It signifies the growth in agricultural production and efficiency in Nepal, serving as a crucial indicator of production volume growth. The dependent variable in this research is GDPA, measured in millions of rupees. To account for inflation's impact, agricultural performance is assessed using real agricultural growth (RGDPA).

b. Lending by commercial banks (CBLA)

CBLA, which stands for lending by commercial banks to the agriculture sector, represents the financial input in the fundamental agricultural production process. This variable offers insights into the funding provided by commercial banks to the agriculture industry. The objective of this study is to investigate the influence of commercial banks' lending practices on the growth of the agriculture sector. Therefore, in this research, CBLA serves as the primary independent variable and is measured in millions of rupees. It is anticipated to have a positive correlation with GDPA. To adjust for inflation's impact, the nominal value of CBLA is converted into real terms, denoted as RCBLA.

c. Fertilizer use and supply (FERT)

Fertilizer, measured in metric tons, represents the total amount of fertilizer utilized by the Nepalese economy annually. It functions as a control variable in the regression analysis. It is anticipated that there will be a positive relationship between FERT and the dependent variable.

d. Seed use and supply (SED)

Seed, measured in metric tons, denotes the total quantity of seeds consumed by the Nepalese economy annually. It serves as a control variable in the regression analysis. Theoretically, it is expected to exhibit a positive relationship with the dependent variable.

e. Irrigation supply (IRI)

Irrigation supply plays a crucial role in influencing agricultural production. The productivity of land can be assessed by the amount of irrigation provided, which serves as a proxy variable for land input in the fundamental agricultural production function (typically considered stable). Irrigation supply is quantified in hectares. Theoretically, there should be a positive relationship between irrigation supply and agricultural production.

CHAPTER IV

RESULTS AND DISCUSSION

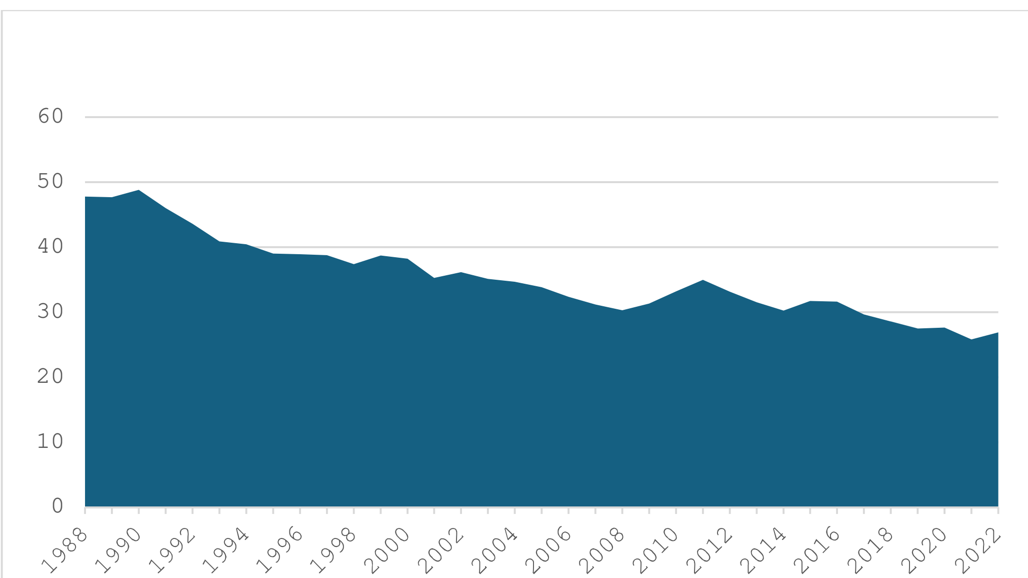
This section provides an examination of the agricultural production trend in Nepal, alongside descriptive statistics for all variables under investigation. Graphs and tables are employed to analyze the trends in GDPA and CBLA. Descriptive statistics include measures such as mean, standard deviation, median, skewness, kurtosis, and the Jarque-Bera test. The empirical analysis of hypotheses is carried out using econometric methods such as stationary tests, cointegration tests, and diagnostic tests. These analyses are executed using EViews-10 and Microfit-5.0 software platforms.

4.1 Trends and patterns of agricultural lending and growth

In this section, the trends and patterns of key variables are discussed which includes contribution of GDPA in total GDP, growth rate of GDPA, five years moving average of growth rate of GDPA and CBLA.

a. Contribution of GDPA in total GDP

Figure 2: Contribution of GDPA in total GDP



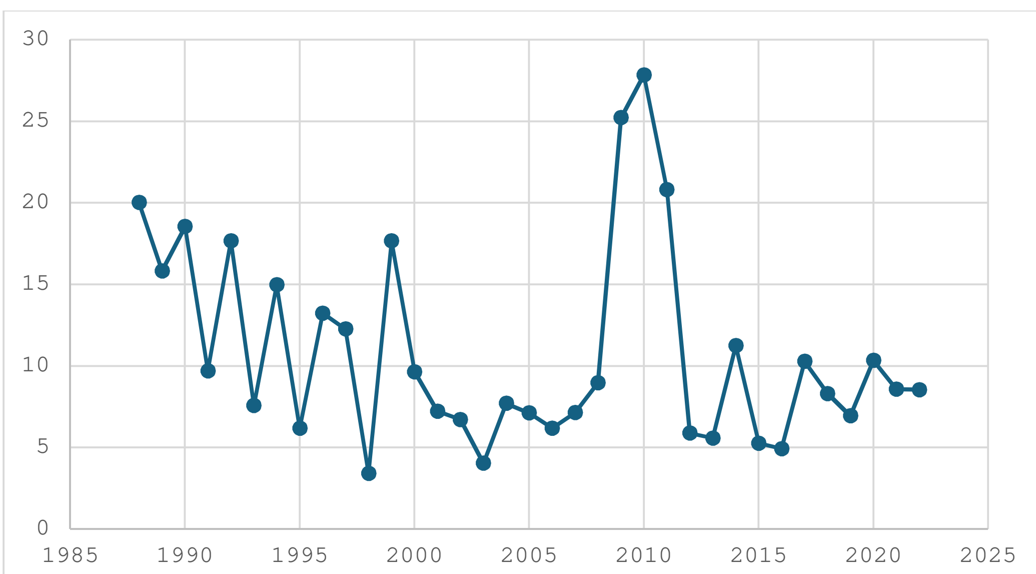
Source: Auther's Derivation based on Appendix-2

The data presented in Figure 2 illustrates a consistent decline in the annual contribution of agriculture to Nepal's total GDP. In the fiscal year 1987/88, agriculture accounted for 47.95 percent of the total GDP. By the fiscal year 2021/22, this figure had decreased to 26.9 percent. Over the period from fiscal year 1974/75 to fiscal year 2019/20, the agriculture sector's contribution to total GDP decreased by approximately 41 percent, dropping from 68.88 percent to 26.9 percent. Furthermore, the share of agriculture in real GDP decreased from 36.6 percent in fiscal year 2000/01 to 33.1 percent in fiscal year 2015/16, indicating an ongoing trend of declining agricultural contribution to GDP.

b. Growth rate of GDPA

The figure below shows the fluctuating growth rate of agriculture GDP (GDPA) over a period of 35 years from FY 1988 to 2022. The data presented indicates varying annual growth rates for GDPA. According to the data, GDPA grew by 12.85 percent in fiscal year 1987/88 and by 8.54 percent in fiscal year 2021/22. The agriculture sector achieved its highest growth rate of 27.85% in fiscal year 2009/10 and its lowest growth rate of 0.85% in fiscal year 1984/85. Fiscal year 2008/09 saw significant growth in GDPA.

Figure 3: Growth Rate of GDPA



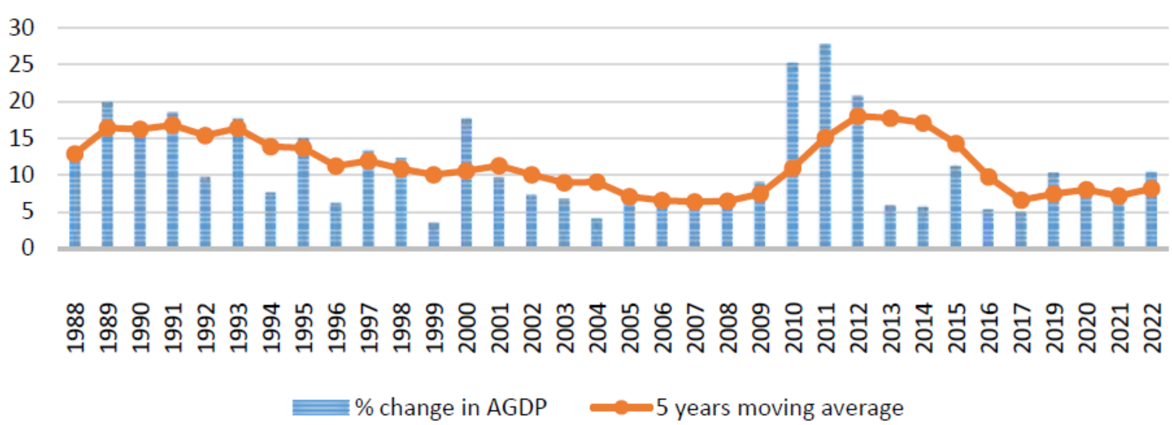
Source: Auther's Derivation based on Appendix-2

This growth can be attributed to the adoption of several policies and initiatives, including the Agriculture Business Promotion Policy 2063 (2006), the One Village, One Product Program, the Bird-flu Control Program 2064 (2007), the Cooperative Farming Program 2065 (2008), and the Cooperative Stores Operation Rules 2065 (2009). These measures were designed to bolster the national economy and had a beneficial effect on agricultural growth in subsequent years.

c. Five years moving average of growth rate of GDPA

Figure 4 depicts a five-year moving average of the GDPA growth rate, which smooths out short-term fluctuations and visually presents the long-term trend in the percentage change of GDPA. The average growth of GDPA shows a decline from FY 1992, followed by an increase starting in FY 2007/08. It peaks in FY 2012 with an average of 18%. Subsequently, the growth rate declines again, reaching its lowest point in FY 2015/16 with an average of 7%.

Figure 4: Five Years Moving Average of Growth Rate of GDPA

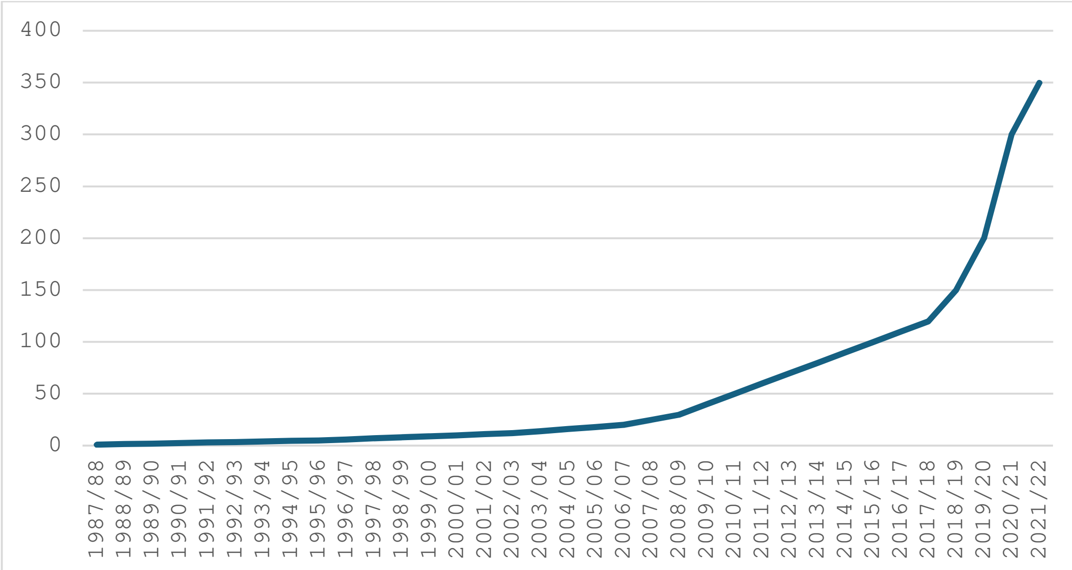


Source: Auther's Derivation based on Appendix-2

d. Agricultural lending by commercial banks

Figure 5 illustrates a steady increase in annual agricultural credit from commercial banks in Nepal, with slower growth observed until FY 2012/013. From that point onward, there is a notable acceleration in the growth rate. This change may be attributed to the fact that prior to FY 2012/013, the data did not encompass agricultural credit provided by the ADBL, primarily due to unavailable data.

Figure 5: Agricultural Lending by Commercial Banks



Source: Author's Derivation Based on Appendix-1

Note: The credit figures pertain specifically to credit extended by commercial banks, encompassing credit from the Agricultural Development Bank Limited before its transformation into a commercial bank as well.

4.2 Descriptive statistics of variables

Table 3 provides the descriptive statistics for the dataset, summarizing its key features. The statistics fall into three main categories: measures of central tendency, variability, and frequency distribution. Each dataset contains 35 observations. The mean and median represent the central values of the data series. The maximum values, excluding outliers, are 911,911 for GDPA and 290,976 for CBLA, while the minimum values, excluding outliers, are 31,623 for GDPA and 151 for CBLA. The average values are 314961 for GDPA and 35427 for CBLA. Standard deviation (SD) measures the variability of the dataset relative to its mean. In this case, the SD values suggest that the data points are generally close to the mean, indicating consistency, except for the CBLA and IRI variables.

Similarly, the skewness and kurtosis of the variables illustrate the degree of asymmetry in the distribution. Skewness measures how symmetrical a variable's distribution is. A normal distribution has zero skewness, indicating a bell-shaped curve. In this dataset, all distributions appear to be positively skewed, meaning they are not normally distributed. This is indicated by the fact that the mean for all variables is greater than the median, or the skewness value is greater than zero, resulting in right-tailed distributions. Positively skewed distributions have a long tail extending toward higher values and a shorter tail toward lower values.

Kurtosis measures the frequency of outliers in the distribution, relative to a normal distribution. A normal distribution has a kurtosis value of 3, indicating that outliers are neither overly frequent nor overly infrequent. In this dataset, FERT is mesokurtic with a kurtosis value of approximately 3. IRI and GDPA have kurtosis values less than 3, indicating platykurtic distributions with infrequent outliers. Conversely, CBLA and SED have kurtosis values greater than 3, indicating leptokurtic distributions with many outliers.

Table 3

Descriptive Statistics of Variables

Variables	**GDPA**	**CBLA**	**FERT**	**SED**	**IRI**
Mean	314961	35427	113060	5558	458977
Median	186127	10152	56834	3370	33893
SD	277734	64191	124478	7640	648324
Jarque - Bera	4.97	106.2	9.0	202.8	6.4
Probability	0.07	0	0.02	0	0.04
Skewness	0.85	2.57	1.34	3.18	0.82
Kurtosis	2.31	9.56	2.99	12.84	1.67
Maximum	911911	290976	400541	34614	1509427
Minimal	31623	151	3147	1784	11426
Compliances	35	35	35	35	35

Source: Author's computation using Eviews-10.

The Jarque-Bera test is a goodness-of-fit test that assesses whether a dataset's skewness and kurtosis match those of a normal distribution. For a normal distribution, the Jarque-Bera statistic is positive and close to zero, and the p-value is larger than the 5% significance level. The p-value of the Jarque-Bera statistic tests the null hypothesis that the data follows a normal distribution. If the test statistic is large and the p-value is less than 5%, the data does not follow a normal distribution.

In this context, the GDPA dataset has a Jarque-Bera statistic that is positive and close to zero, and its p-value is greater than 5%, indicating that the null hypothesis of normal distribution is accepted. Conversely, the CBLA, FERT, SED, and IRI datasets do not follow a normal distribution, as their p-values are less than 5% and their Jarque-Bera statistics are far from zero.

4.3 Correlation Matrix

The correlation matrix elucidates the direction and strength of relationships between variables in the model. Table 4 presents the correlation matrix for the variables in log form at both levels and first differences. A strong significant correlation is indicated by a correlation value greater than 5 percent. The table reveals a strong and significant positive correlation between LRGDPA, LRCBLA, and LIRI at the level form. Specifically, the correlation between LRGDPA and LRCBLA is positive and strong in the level form but becomes negative and uncorrelated in the first difference form.

Table 4

Correlation Matrix

	LRGDPA	**LRCBLA**	**LFERT**	**LSED**	**LIRI**
LRGDPA	1				
LRCBLA	0.82	1			
LFERT	-0.27	-0.09	1		
LSED	-0.49	-0.34	0.49	1	
LIRI	0.78	0.64	0.28	-0.15	1
	LRGDPA	**LRCBLA**	**LFERT**	**LSED**	**LIRI**
LRGDPA	1				
LRCBLA	-0.01	1			
LFERT	0.14	0.09	1		
LSED	0.08	0.07	-0.03	1	
LIRI	0.32	-0.17	-0.08	-0.05	1

Source: Author's computation using Eviews-10.

4.4 Stationarity of variables

The Augmented Dickey-Fuller (ADF) test is a widely used statistical test for assessing the stationarity of a given time series. It is crucial to confirm that all variables in the model are integrated of order zero or one, i.e., I(0) or I(1), or mutually integrated. If the variables are integrated of an order higher than one, the ARDL approach to cointegration is not suitable for time series econometrics.

To detect unit roots in the dependent and explanatory time series variables in this study, the ADF test is conducted at both level and first difference forms, with intercept as well as trend and intercept. Table 5 presents the ADF test results for the data at both levels and first differences, testing the null hypothesis (H0) that there is a unit root (non-stationarity) against the alternative hypothesis (H1) that there is no unit root (stationarity).

Table 5

Unit Test ADF

Variables		Level		First Difference		Decision
		Intercept	Intercept and Trend	Intercept	Intercept and Trend	
LRGDPA	t-statistics	-1.336	-2.997	-4.659*	-4.623*	I (1)
	p-value	0.602	0.147	0.0007	0.0051	
LRCBLA	t-statistics	-1.336	-2.898	-4.659*	-4.613*	I (1)
	p-value	0.600	0.147	0.0007	0.0041	
LFERT	t-statistics	-1.635	-1.406	-6.978*	-7.120*	I (1)
	p-value	0.453	0.830	0	0	
LSED	t-statistics	-2.516	-2.166	-13.024*	-13.165*	I (1)
	p-value	0.120	0.492	0	0	
LIRI	t-statistics	-0.646	-1.811	-5.736*	-5.821*	I (1)
	p-value	0.846	0.675	0	0	

Source: Author's computation using Eviews-10.

Note: * denotes rejection of H_0 at 5 % level of significance.

The p-values are based on Mackinnon (1996) one sided p values.
To detect a unit root, the p-value is checked and compare the ADF statistics (t-statistic) with the critical values for each variable. If the p-value is less than 5% ($p < 0.05$), reject the null hypothesis. Similarly, if the absolute value of the ADF statistic is greater than the absolute critical value, the variable is considered to have no unit root, meaning it is stationary.

As shown in Table 5, since the p-value is not less than 5 percent, all variables are non-stationary at the level with both intercept and intercept plus trend, but they become stationary at the first difference. This means that all variables are integrated of order one, or I(1). Therefore, the null hypothesis of a unit root is rejected at the first difference, as the absolute values of the ADF t-statistics are greater than the critical values at a 5 percent level of significance for each variable. Hence, it can be concluded that all variables are non-stationary at levels but become stationary after being transformed into their first differences. Thus, the research can be proceeded with the ARDL bounds testing approach to cointegration.

4.5 Lag length selection

Selecting the appropriate lag order for the ARDL model is crucial for identifying cointegration among the variables. The optimal lags chosen by various criteria based on the VAR lag selection approach are shown in the given table. Table 6 reveals that the LR, FPE, AIC, and HQ statistics for lag 2 are significant at the 5 percent level, while the SBC statistics for lag 1 are significant at the same level of significance.

Table 6

VAR lag order selection criteria

Endogenous variables: LRGDPA LRCBLA LFERT LSED LIRI Included Observations: 35 Exogenous variables: C						
Lag	**LogL**	**LR**	**FPE**	**AIC**	**SBC**	**HQ**
0	-12.92	NA	2.24E-06	1.39	1.32	1.16
1	169.24	297.9	1.53E-10	-8.43	-7.07*	-7.99
2	202.08	43.92*	1.26E-10*	-8.41*	-6.47	-8.47*

Source: Author's computation using Eviews-10.

Note: * indicates criterion lag order selection

LR: sequential modified LR test statistics (each test at 5 percent level)

FPE: Final Prediction Error

AIC: Akaike information criterion

SBC: Schwarz Bayesian criterion

HQ: Hannan-Quinn information criterion

The order of lags can be chosen using either the Akaike Information Criterion (AIC) or the Schwarz Bayesian Criterion (SBC), as these are commonly employed in most research papers involving time-series data. When selecting the lag order, it should be opted for the regression that provides the smallest residual value, considering the negative sign of the number provided by different lag selection criteria. Additionally, it can be considered the lag selection criterion that produces the highest adjusted R-squared value. Among these criteria, the AIC typically has the smallest value.

The order of lags can be selected using either the Akaike Information Criterion (AIC) or the Schwarz Bayesian Criterion (SBC), as these are frequently used in most time-series research papers. When selecting the lag order, the regression should be chosen that results in the smallest residual value, considering the negative sign given by different lag selection criteria. Additionally, it can be considered the lag selection criterion that provides the highest adjusted R-squared value. Among these, the AIC has the smallest value, specifically -8.91, which is a concern since the premise is that a smaller residual value indicates a better model.

According to the VAR Lag Order Selection Criteria in the table, lag 2 is selected based on the AIC criterion for each variable in their autoregressive distributed lag structures, while lag 1 is chosen based on the SBC criterion. The AIC criterion with lag 2 is employed because it uses the minimum acceptable lag, compared to the SBC criterion, to avoid unnecessary loss of degrees of freedom.

4.6 Cointegration Results

Following the Auto Regressive Distributed Lag (ARDL) modeling proposed by Pesaran and Shin (1999), the bounds tests (F-statistics) have been applied to determine the existence of cointegration or a long-run relationship among the variables in the system. The F-statistics are compared with the upper and lower critical values, and if the F-statistics are found to be greater than the upper bound, it indicates that there is a cointegrating relationship among the variables.

Table 7

Bounds Test (F-version) Results

Variables	**F-statistics**	**Critical Values Finite Samples (n=35)**			**Lag Option**
F (LRGDPA	4.24		I (0)	I (1)	
| LRCBLA,		10%	2.47	3.46	(1,0,2,0,0)
LIRI, LLBR)		5%	2.95	4.07	
		1%	4.08	5.43	

Source: Author's computation using Eviews-10.

Table 7 shows an F-statistic of 4.24, which exceeds the upper bound critical value of 4.08 at the standard 5 percent significance level. This leads to the rejection of the null hypothesis of no cointegration. Therefore, it can be concluded that there is a long-run relationship between the variables in the system. This finding is further supported by the statistically significant negative coefficient obtained from ECM(t-1), which is regarded as a more efficient method for testing cointegration.

4.7 ARDL Regression results

After establishing cointegration among the underlying variables, the next step is to estimate the long-run and short-run coefficients using the ARDL model. ARDL models are typically estimated using standard least squares techniques. Table 8 presents the autoregressive distributed lag regression estimates along with the overall significance of the model. Based on the AIC lag selection criteria, the maximum lag for the dependent variable is 1, and for the independent variables, it is 2. The AIC selected the appropriate lag length for each variable as ARDL (1, 0, 2, 0, 0). As shown in the table, LRGDPA (-1) is significant, with a p-value of less than 0.05, indicating that the GDPA from the previous year has a positive and significant relationship with the current GDPA. All the independent variables are insignificant, as indicated by their p-values. Alternatively, if the t-statistic value is 2 or more in absolute value, the model is considered significant. On this basis, LRGDPA (-1) is significant.

Table 8

Autoregressive distributed lag estimates

ARDL (1,0,2,0,0) selected based on A I C Dependent variables: LRGDPA Included 35 observations implied for estimation from 1988 to 2022				
Regressor	**Coefficient**	**Standard Error**	**T-Ratio**	**Probability**
LRGDPA (-1)	0.747	0.114	6.559	0.00
LRCBLA	0.026	0.021	1.294	0.20
LFERT	0.005	0.010	0.487	0.63
LFERT (-1)	-0.014	0.016	-1.072	0.29
LFERT (-2)	-0.022	0.012	-1.828	0.08
LSED	0.011	0.013	0.867	0.39
LIRI	0.016	0.009	1.796	0.07
C	1.716	1.343	2.264	0.32
R-squared = 0.98		D-W stat = 1.75	F-statistic F (7,25) = 263.29	
Adjusted R-squared= 0.98			Probability (F-statistic) = 0	

Diagnostic tests		
Test Statistics	**LM-Version**	**F-Version**
A. Serial Correlation	CHSQ (1) = 0.509 (0.425)	0.376 (0.545)
B. Functional Form	CHSQ (1) = 0.876 (0.349)	0.655 (0.446)
C. Normality	CHSQ (2) = 1.962 (0.345)	Not applicable
D. Heteroscedasticity	CHSQ (1) = 1.471 (0.235)	1.447 (0.238)

Source: Author's computation using Eviews-10.

Note:

A: Lagrange multiplier test for residual serial correlation.

B: Ramsey's RESET test using the square of fitted values.

C: Test based on the skewness and kurtosis of residuals.

D: Test based on the regression of squared residuals on squared fitted values.

An R-squared value of 0.98 indicates that the independent variables used in the model explain 98 percent of the variance in GDPA. However, a value this high (0.9 or above) suggests potential issues with the model, such as a small sample size, many predictor variables, time series or aggregated data, or the omission of important independent variables. Additionally, it is generally perceived that the Durbin-Watson (DW) statistic should be greater than the R-squared value and close to 2. In this study, the DW statistic is found to be 1.75, indicating no autocorrelation in the model, which is also confirmed by the Lagrange Multiplier (LM) test for serial correlation. Microfit uses the LM test to assess serial correlation using chi-square and F-statistics. The null hypothesis for serial correlation, which states there is no correlation, is accepted because the p-values for both statistics are greater than 0.05.

The F-test for overall significance in regression determines if the linear regression model fits the dataset better than a model with no predictor variables. The null hypothesis is that the model with no independent variables fits the data as well as your model, while the alternative hypothesis is that the model fits the data better than the intercept-only model. The overall F-statistic is significant, with a p-value less than 0.05, indicating that the R-squared is not zero and the correlation between the model and the dependent variable is statistically significant.

The diagnostic tests indicate that the model passes all the tests. The null hypotheses of no serial correlation, no misspecification of functional form, normality of residuals, and no heteroscedasticity are all accepted. The null hypothesis for the Ramsey RESET test is that the model has no omitted variables, while the alternative hypothesis is that the model has omitted variables. The p-values for the LM test and F-test statistics are greater than 0.05, so the null hypothesis cannot be rejected, indicating the model has omitted variables. The normality test checks if the residuals are normally distributed. The null hypothesis is that the residuals are normally distributed, against the alternative hypothesis that they are not. The p-value for the LM test statistics is greater than 0.05, so the null hypothesis cannot be rejected, proving that the residuals are normally distributed. Similarly, the results of the heteroscedasticity test suggest that the null hypothesis cannot be rejected, indicating that the data is likely homoscedastic.

4.8 Long run Coefficients

The ARDL-based regression model is used to estimate the long-run coefficients. The long-run relationship between GDPA and CBLA, as well as FERT + 0.044 * LSED + 0.064 * LIRI

(1)

Table 9

Estimated long run coefficients using the ARDL model

ARDL (1, 0, 2, 0, 0) selected based on AIC Dependent Variable: LRGDPA 33 observations used for estimation from 1989 to 2021				
Regressors	Coefficients	Standard Error	T-Ratio	Probability
LRCBLA	0.113*	0.054	2.085	0.036
LFERT	-0.134*	0.033	-3.747	0.002
LSED	0.045	0.071	0.721	0.473
LIRI	0.064*	0.023	2.731	0.013
C	12.032	0.519	24.2219	0

Source: Author’s computation using Eviews-10.

Note: * shows the significance of coefficient at 5% significant level.

In Table 9, the correlation of LRCBLA and LIRI with LRGDPA is positive and statistically significant, whereas the correlation with LFERT is negative and statistically significant. The long-run coefficient of LRCBLA, at 0.11, indicates that a 1 percent increase in CBLA leads to a 0.11 percent increase in GDPA in the long run, assuming other variables remain constant.

Similarly, the coefficients of LSED and LIRI are 0.04 and 0.06 respectively, indicating positive effects on GDPA. However, the correlation between LSED and LRGDPA is not statistically significant in the long run.

The mechanism suggests that increased lending enhances consumption capacity through higher income, thereby stimulating economic activities in the agriculture sector. These findings lead to the conclusion that GDPA and CBLA are cointegrated, with CBLA exerting positive and significant long-run effects on GDPA.

4.9 Error Detection Model

The error correction model (ECM) is a short-term model that includes a mechanism for returning a variable to its long-term equilibrium from a disequilibrium position. Therefore, to examine the short-term relationship between GDPA and other explanatory variables, the error correction version of the ARDL model is utilized, and the resulting outcome is presented in the table below. The estimated error correction model corresponding to ARDL (1, 0, 2, 0, 0) is:

$$\Delta LRGDPA = 0.028*\Delta LRCBLA + 0.005*\Delta LFERT + 0.011*\Delta LSED + 0.016*\Delta LIRI - 0.252 * ECM_{t-1.} \qquad (2)$$

As shown in Table 10, the short-run coefficients demonstrate the dynamic adjustment of the respective variables, and all the coefficients are insignificant. Specifically, the short-run coefficient of ΔLRCBLA is insignificant at the 5 percent significance level. While the variable may appear insignificant, this does not necessarily mean it has no effect on the dependent variable, GDPA.

There are several reasons why a variable might appear insignificant in the data. For instance, the sample size may be too small, or the random variation might be too large to detect a significant effect on GDPA. Additionally, the variable could be correlated with other variables, making it challenging to determine each variable's individual contribution to the overall effect.

It is important to note that insignificant data does not necessarily indicate the absence of an effect; it simply means that the data do not provide evidence of the effect.

Table 10

Error Correction Representation for selected ARDL Model

ARDL (1, 0, 2, 0, 0) selected based on AIC Dependent Variable: LRGDPA 33 observations used for estimation from 1989 to 2021				
Regressor	**Coefficient**	**Standard Error**	**T-Ratio**	**Probability**
D(LRCBLA)	0.027	0.021	1.291	0.207
D(LFERT)	0.005	0.011	0.488	0.630
D(LFERT1)	0.022	0.012	1.828	0.080
D(LSED)	0.011	0.017	0.837	0.394
D(LIRI)	0.016	0.009	1.796	0.024
ECM (-1)	-0.252*	0.134	-2.212	0.036
$R^2 = 0.360$	$\bar{R}^2 = 0.182$	D-W stat = 1.65	F-stat (6,26) = 2.342 Prob (F-Statistic) = 0.063	

Source: Author's computation using Microfit-5.0

Note: * shows the significance of coefficient at 5 % significant level,

Where,

dLFERT = LFERT – LFERT (-1)

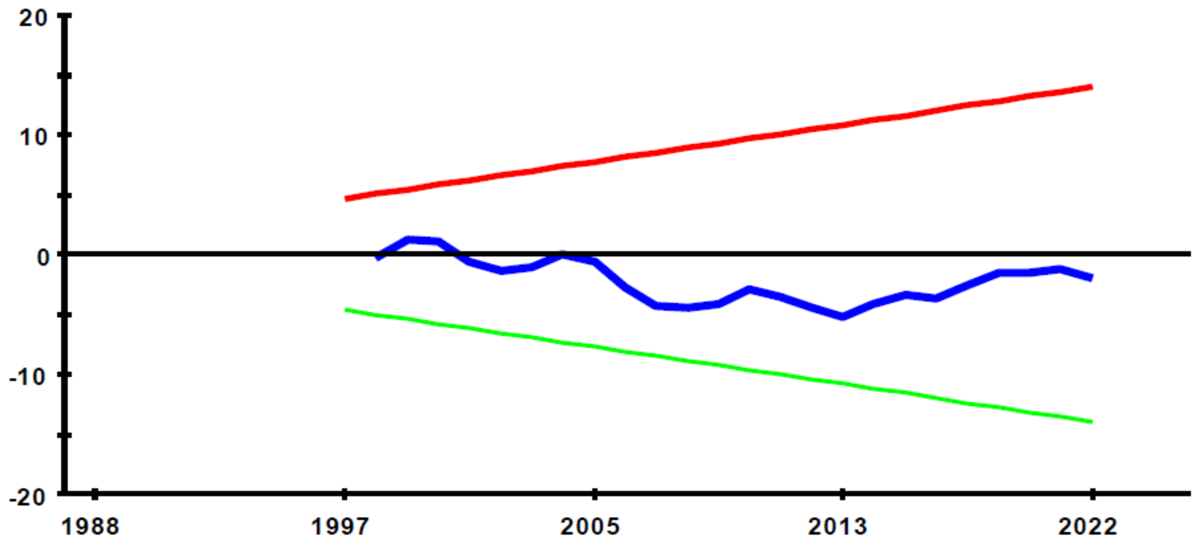
dLFERT1 = LFERT (-1) – LFERT (-2)

The error correction term ECM_{t-1} represents the speed at which the model adjusts to restore equilibrium, reflecting a one-period lag in the Error Correction Model, i.e. $ECM_{t-1} = ECM_t - ECM_{t-1}$. The term ECM has been generated using long run coefficients of the model, ECM = LRGDPA – 0.111*LRCBLA + 0.121 *LFERT – 0.044 *LSED – 0.04*LIRI – 12.033.

The error correction coefficient is negative and highly significant (p-value < 0.05), as indicated by the probability value being zero. This supports the existence of cointegration, as demonstrated by the F-test. Specifically, the estimated value of ECM (-1) is -0.252 and is statistically significant at the 5 percent level. The absolute value indicates the speed of adjustment towards long-run equilibrium through a series of partial short-run adjustments. Thus, it shows that short-run disequilibrium in the system converges to equilibrium at a rate of 25.2 percent per annum. The main variable, CBLA, is insignificant in the short run. Additionally, the R-squared value is 0.36, meaning that approximately 36 percent of the total variation in agricultural growth is explained by the independent variables, with the remaining 64 percent due to error.

4.10 Stability Test

Figure 6: Plot of CUSUM Statistics

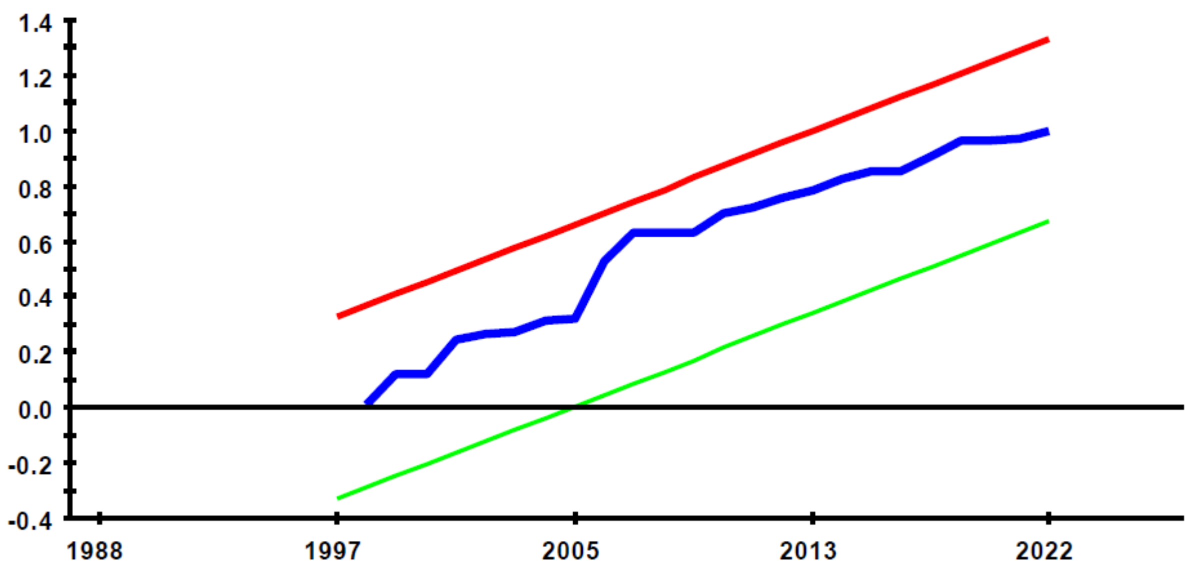


Source: Author's computation using Eviews-10.

The stability diagnostics assess whether the parameters of the estimated model remain consistent over time. To evaluate this, the CUSUM and CUSUMSQ tests, introduced by Brown, Durbin, and Evans (1975), are employed. The CUSUM test uses the cumulative sum of recursive residuals from the initial set of n observations, which are updated recursively and plotted against breakpoints. The red and green lines denote the critical bounds at a 5 percent significance level. If the CUSUM plot stays within these bounds, the null hypothesis that all coefficients in the error correction model are stable cannot be rejected.

Figure 6 displays the plot of the CUSUM of the recursive residuals, indicating no instability in the coefficients throughout the study period, thus suggesting the parameters in the model are stable. If either line is crossed, the null hypothesis of coefficient stability can be rejected at the 5 percent significance level. The same method is applied to the CUSUMSQ test, which is based on the squared recursive residuals. Figure 7 shows the CUSUMSQ plot of the recursive residuals, also indicating no instability in the coefficients over the period from 1988 to 2022.

Figure 7: Plot of CUSUMSQ Statistics



Source: Author's computation using Eviews-10.

4.11 Discussion

This study finds a significant positive relationship between agricultural growth and commercial bank lending to the agriculture sector in Nepal which matches with the results of Rimal's (2014) study. However, it does not identify a short-term relationship. The main difference between the studies is their methodologies: Rimal (2014) used a Cobb-Douglas Production Function and analyzed data from 2002 to 2012, while this study examines a broader 35-year period starting from FY 1987/88. The literature review suggests that the correlation between agricultural sector growth and commercial bank lending can vary in both the short and long term, influenced by factors such as the effectiveness of credit utilization, the availability and accessibility of bank credit, the economic climate, the efficiency and oversight of financial institutions, the availability of agricultural inputs, the effectiveness of agriculture-related organizations, the level of government priority for the agriculture sector, and the availability of non-agricultural resources like training and information.

The findings on this research study can be correlated with the study conducted by Dirir and Aden (2024) which mentions the positive impact of formal development support emphasizing the role of credit support by financial system for mitigating economic hurdles in farming and agriculture. Financing for importing latest technology, newly developed pesticides and hybrid seeds for better agricultural output is highly fund assistance from formal channel. Automation in production process, use of artificial intelligence and smart allocation of electronic instruments to ease the cultivating process is possible only after official and formal investment. Any other informal or retail investments are merely useful in big innovation and process re-engineering.

CHAPTER V

SUMMARY AND CONCLUSIONS

5.1 Summary

This study aims to explore the correlation between GDPA and CBLA within the Nepalese economy. Utilizing a dataset spanning 35 years, from fiscal year 1987/88 to 2021/22 (2045 to 2079 B.S.), the analysis employs graphs, tables, and trend lines to examine agricultural growth trends. To assess the stationarity of the time-series data, the ADF test is applied. Additionally, ECM methods are used to identify both long-term and short-term relationships between the variables.

The trend of agricultural growth indicates an upward line over the years, whereas the agriculture sector's contribution to GDP is declining. The annual growth rate of GDPA during the study period ranges from 5 to 10 percent. Commercial banks' lending behavior towards the agriculture sector has shown exponential growth in recent years. Both GDPA and CBLA trends appear to be rising. However, while lending has increased exponentially over the past five years, agricultural growth has not kept pace. The ADF test results indicate that all variables exhibit a unit root in their level form but become stationary after first differencing, signifying that all variables are integrated of order one. Analysis of the lag length structure reveals that optimal results are achieved with a lag of 2. The ARDL (1, 0, 2, 0, 0) model is selected as the best model based on the AIC lag selection criteria.

The ARDL bounds testing approach to cointegration shows that all independent variables are insignificant, though the F-statistics exceed the upper critical bounds at the 5 percent significance level. The long-run model using ARDL regression confirms that CBLA and IRI have significant and positive effects on GDPA, while FERT has a significant negative relationship with GDPA in the long run. SED is found to be insignificant. The ECM results indicate that CBLA is insignificant in the short run. The coefficient of ECMt-1 is negative and statistically significant at the 5 percent level, suggesting that short-run disequilibrium converges to equilibrium at a rate of 25.2 percent per year. The CUSUM and CUSUMSQ tests conclude that the coefficients are stable.

5.2 Conclusions

The findings reveal a decreasing contribution of the agriculture sector to GDP despite the increasing trend of GDPA over the study period. This decline is attributed to the expansion of non-agriculture sectors, with national priorities shifting towards industrial and service sectors. However, data shows a significant increase in lending to the agriculture sector, particularly when credit from the ADBL is included in the total lending by commercial banks. This rise in lending can be linked to changes in national priorities emphasizing the agriculture sector through priority sector lending, as well as financial sector development, making credit more accessible.

The analysis confirms the existence of cointegration between GDPA and CBLA, as per the specific objectives of this study. The long-run model indicates a significant and positive relationship between these variables over the study period, while the short-run relationship is not significant. Based on these results and a few existing studies in the context of Nepal, it can be concluded that lending to the agriculture sector is beneficial in Nepal. These findings suggest that while credit has facilitated the increased use of purchased inputs and changes in the input mix, supporting long-term agricultural evolution, it has not contributed to short-term growth in agricultural GDP.

The relationship between agricultural lending and agriculture sector growth in Nepal appears to be positive but minimal. This may be due to several factors, including a potentially small sample size and issues with credit distribution and expenditure in the country. Many real farmers in Nepal may lack access to credit due to illiteracy and perceived risks of debt repayment (Bhatta, 2014). Additionally, credit investments may not be utilized as intended, possibly due to weak monitoring of banks and financial institutions. These factors could contribute to the low observed relationship between agricultural lending and agriculture sector growth in Nepal.

Furthermore, the credit flow considered in this study does not accurately reflect the total credit flow to the agriculture sector in Nepal, as it only includes credit from commercial banks. Other sources of credit, such as microfinance institutions or government programs, are not considered in the analysis. This exclusion could potentially affect the relationship between agricultural lending and agriculture sector growth, as these additional sources of credit may have different impacts on the sector.

5.3 Implications

The study's findings endorse the Nepalese government and NRB's initiatives to increase credit availability for farmers. The negative short-term result may be due to insufficient credit for seeds, technology, and training to make an immediate impact. Data from 2006 to 2009 shows that efforts to develop the agriculture sector, through plans and programs like the Promotion of Agriculture Business Policy 2063, One Product per Village Program, Bird-flu Minimizing Program 2064, Cooperative Program for Farming 2065, and Stores Operation Rules of Cooperatives 2065, were effective. Such thoughtful plans and actions are essential for transforming the agriculture sector. However, the positive long-term results suggest that credit has significantly transformed agriculture in Nepal. Therefore, the government and NRB should consider updating current policies, such as priority sector lending, by identifying genuine farmers and increasing the credit available for agricultural transformation. This could be achieved by directly providing credit to real farmers when purchasing farm inputs. Additionally, publicly available data does not present a complete picture of lending and agricultural sector growth. Therefore, it is crucial for the relevant authorities to prioritize the collection, organization, and dissemination of comprehensive data.

REFERENCES

Afolabi, Mosinmileoluwa, Ikpefan, O. A., Osuma, G. O., & Evbuomwan, G. (2021). Impact of agricultural credit on economic growth in Nigeria. *WSEAS Transactions on Business and Economics, 18*(52), 511-523.

Aggelopoulos, S., Mamalis, S., & Soutsas, K. (2011). Farmers' satisfaction with agricultural credit: the case of Greece. *Food Economics-Acta Agriculturae Scandinavica, Section C, 8*(4), 233-242.

Akpan, S., Essien, C., Nkanta, V. S., & Patrick, İ. M. (2024). The impact of credit policy environment on poultry production in Nigeria. *Muş Alparslan University Journal of Agriculture and Nature, 4*(1), 30-41.

Awotide, B. A., Abdoulaye, T., Alene, A., & Manyong, V. M. (2015). Impact of access to credit on agricultural productivity: Evidence from smallholder cassava farmers in Nigeria. *A Contributed paper Prepared for Oral Presentation at the International Conference of Agricultural Economists (ICAE)*

Baffoe, G., Akiyama, T., Matsuda, H., & Masafumi, N. (2014). The dynamics of rural credit and its impact on agricultural productivity: an empirical study in rural Ghana. *OIDA International Journal of Sustainable Development*, *7*(5), 19-34. Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2495848

Bhatta, G. (2014). Agricultural credit and its impact on farm productivity: case study of Kailali district. *Nepal Rastra Bank, Banking Development and Research Unit, Dhangadhi Office, Nepal*, 24-26. Retrieved from https://www.nrb.org.np/red/agricultural credit_and_its_impact_on_farm_prod uctivity_a_case_study_of_kailali_district/

Briones, R., & Felipe, J. (2013). Agriculture and structural transformation in developing Asia: review and outlook. *Asian Development Bank Economics Working Paper Series, (363)*. Retrieved from https://www.adb.org/sites/default/files/publication/30380/ewp-363.pdf

Brown, R., Durbin, J., & Evans, J. (1975). Techniques for testing the constancy of regression relationships over time. *Journal of the Royal Statistical Society: Series B (Methodological), 37(*2*)*, 149-163. Retrieved from https://rss.onlinelibrary.wiley.com/doi/abs/10.1111/j.2517- 6161.1975.tb01532.x

Chaiya, C., Sikandar, S., Pinthong, P., Saqib, S. E., & Ali, N. (2023). The impact of formal agricultural credit on farm productivity and its utilization in Khyber Pakhtunkhwa, Pakistan. *Sustainability, 15*(2), 1217.

Das, A., Senapati, M., & John, J. (2009). Impact of agricultural credit on agriculture production: An empirical analysis in India. *Reserve Bank of India Occasional Papers 30(*2*)*, 75-107. Retrieved from https://rbidocs.rbi.org.in/rdocs/content/PDFs/3ABDMS060810.pdf

Dhakal, N. H. (2022). Agricultural credit and insurance in Nepal: coverage, issues, and opportunities. *Agricultural Transformation in Nepal*, 529-572. Retrieved from https://link.springer.com/chapter/10.1007/978-981-32-9648-0_18

Dhrifi, A. (2014). Agricultural productivity and poverty alleviation: what role for technological innovation. *Journal of Economic and Social Studies, 4*(1), 139- 158. Retrieved from https://omeka.ibu.edu.ba/files/original/4b20eeda644f846690cf8e25e1c71c33.pdf

Dirir, S. A., & Aden, K. (2024). Credit Cultivation: A deep dive into the harmonies and dissonances of macroeconomics impact on agricultural financing practices in Djibouti. *Journal of the Saudi Society of Agricultural Sciences.*

Dulal, A., (2023). Impact of agricultural credit finance on food production in Nepal. *Department of Economics, Patan Multiple Campus, Faculty of Humanities and Social Sciences, Tribhuvan University.*

Engle, R. F., & Granger, C. (1987). Co-integration and error correction: representation, estimation, and testing. *Engle, R. F., & Granger, C. W. (1987). Co-integration*

Econometrica: journal of the Econometric Society, 251- 276. Retrieved from https://www.jstor.org/stable/1913236

FNCCI. (2021). *Agriculture*. Retrieved from https://www.fncci.org/agriculture- 308.html

Gebeyehu, L., & Bedemo, A. (2024). How agricultural credit and subsidies impact agricultural productivity in Ethiopia: empirical evidence using ARDL model. *Cogent Food & Agriculture, 10*(1), 2329118.

Golait, R. (2007). Current issues in agriculture credit in India: an assessment. *Reserve Bank of India.* Retrieved from https://rbidocs.rbi.org.in/rdocs/Publications/PDFs/82933.pdf

Gujarati, D. N. (2021). Essentials of econometrics. *Sage Publications.*

Gulati, A., & Juneja, R. (2019). Agricultural credit system in India: evolution, effectiveness and innovations.

Hegde, V. L., & Reddy, D. (2008). Impact of agricultural credit on agriculture production: an empirical analysis in India. *Emperor International Journal of Finance and Management Research*. Retrieved from http://www.eijfmr.com/2018/sep_2018/Sep-2018-8.pdf

Ikenna, O. D. (2012). Financial deregulation bounding to credit mobilization in Nigeria: a case for the real sectors and SMEs. *IOSR Journal of Humanities and Social Science, 5*(5), 40-59. Retrieved from https://www.academia.edu/download/31067713/Financial_Deregulation_Boun ding_to_Credit_Mobilization_in_real_sector....pdf

Johansen, S. (1988). Statistical analysis of cointegration vectors. *Journal of economic dynamics and control, 12*(2-3), 231-254. doi:https://doi.org/10.1016/0165-1889(88) 90041-3

Johansen, S., & Juselius, K. (1990). Maximum likelihood estimation and inference on cointegration--with applications to the demand for money. *Oxford Bulletin of*

Economics and statistics, 52(2), 169-210. Retrieved from https://ideas.repec.org/a/bla/obuest/v52y1990i2p169-210.html

Kapoor, S., & Shushma, H. Measuring the effectiveness of agricultural credit in increasing farm productivity: an empirical analysis.

Keerthikumara, S. M., & Kumari, D. S. S. Effects of institutional agricultural credit on growth of agriculture in India. *GAU Research Journal, 47*(3), 172-179.

Khan, W., Fatima, S., & Jamshed, M. (2017). Agricultural credit-led agricultural growth: a VECM approach. *Asian Journal of Agricultural Extension, Economics & Sociology, 19*(1), 1-16. Retrieved from https://www.researchgate.net/profile/Waseem-Khan-4/publication/319103254_Agricultural_Credit_led_Agricultural_Growth_A_VECM_Approach/links/626226c0bca601538b5d eec7/Agricultural-Credit-led-Agricultural-Growth-A-VECM-Approach.pdf

Lin, J. Y. (2018). Agriculture is the key for economic transformation, food security, and nutrition. *Retrieved from International Food Policy Research Institute: https://www.ifpri.org/blog/agriculture-key-economic-transformation-food- security-and-nutrition*

Louyindoula Zabatantou, H., Bouity, C. A., & Owonda, F. (2023). Impact of agricultural credit on productivity. *Theoretical Economics Letters, 13*(06), 1434-1462.

Madhulagna, S., & Mishra, S. (2024). Constraint analysis of accessibility and utilization of agricultural credit and associated socio-economic traits in Puri district of Odisha, India. *Asian Journal of Advances in Agricultural Research, 24*(5), 21-33.

Makinde, D. A., Omankhanlen, A. E., & Isibor, A. A. The effect of anchor borrower's programme on agricultural output in Nigeria.

Ministry of Agriculture & Livestock Development. (2021). *Nepalese Agriculture Pocket Book.* Retrieved from https://moald.gov.np/wp- content/uploads/2022/04/Selected-Indicators-of-Nepalese-Agriculture-pocket- book-2021.pdf

Ministry of Agriculture & Livestock Development. (2021). *Statistical Information on Nepalese Agriculture 2077/78.* Retrieved from https://moald.gov.np/wpcontent/uploads/2022/07/STATISTICAL-INFORMATION-ON-NEPALESE-AGRICULTURE-2077/78.pdf

Ministry of Finance. (2002). Economic survey. Retrieved from https://www.mof.gov.np/uploads/document/file/Economic%20Survey%202002_20201125044815.pdf

Ministry of Finance. (2023). Economic survey. Retrieved from https://www.mof.gov.np/site/publication-detail/3105

Misra, R., Chavan, P., & Verma, R. (2016). Agricultural credit in India in the 2000s: growth, distribution and linkages with productivity. *Margin: The Journal of Applied Economic Research, 10*(2), 169-197. Retrieved from https://journals.sagepub.com/doi/pdf/10.1177/0973801015625378

Narayanan, S. (2016). The productivity of agricultural credit in India. *Agricultural Economics, 47*(4), 399-409. Retrieved from https://onlinelibrary.wiley.com/doi/abs/10.1111/agec.12239

National Planning Commission. (2019/20). *The Fifteenth Plan.* Retrieved from https://npc.gov.np/images/category/15th_plan_English_Version.pdf

Nepal Rastra Bank. (2014). Agricultural credit and its impact on farm productivity: a case study of Kailali district. Retrieved from https://www.nrb.org.np/contents/uploads/2019/12/Monetary_Policy_in_Englis h-2009-10_Report.pdf

Nepal Rastra Bank. (2012/13). National accounts of Nepal. Retrieved from https://www.nrb.org.np/contents/uploads/2022/09/National-Accounts-1.xlsx

Nepal Rastra Bank. (2023). Loan to the BFIs (Sector-wise). Retrieved from https://www.nrb.org.np/database-on-nepalese-economy/financial-sector/

Ngong, C. A., Onyejiaku, C., Fonchamnyo, D. C., & Onwumere, J. U. (2022). Has bank credit really impacted agricultural productivity in the central African economic and monetary community? *Asian Journal of Economics and Banking*. Retrieved from https://www.emerald.com/insight/content/doi/10.1108/AJEB-12-2021- 0133/full/html

Nzomo, M., & Muturi, W. (2014). The effect of types of agricultural credit programmes on productivity of small-scale farming businesses in Kenya: A survey of Kimilili Bungoma Sub County. *Journal of economics and sustainable development, 5*(23), 150-161.

Ozcicek, O., & Mcmillin, W. D. (1999). Lag length selection in vector autoregressive models: symmetric and asymmetric lags. *Applied Economics, 31*(4), 517-524. Retrieved from https://www.tandfonline.com/doi/abs/10.1080/000368499324237

Pandey, A. (2022). Credit and financial access in Nepalese agriculture: prospects and challenges. *Journal of Agriculture and Environment*, 56-70. Retrieved from https://www.nepjol.info/index.php/AEJ/article/view/46868

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. Retrieved from https://onlinelibrary.wiley.com/doi/abs/10.1002/jae.616

Pesaran, M. H., Shin, Y., & Smith, R. P. (1999). Pooled mean group estimation of dynamic heterogeneous panels. *Journal of the American statistical Association, 94*(446), 621-634. doi:https://doi.org/10.2307/2670182

Praburaj, L. (2018). Role of agriculture in the economic development of a country. *Shanlax International Journal of Commerce, 6*(3), 1-5. Retrieved from https://shanlax.com/wp-content/uploads/SIJ_Commerce_V6_N3_001.pdf

Rahman, M. A., Saha, I., & Roy, A. C. (2024). Role of credit on mustard production and food security in a selected area of Sirajganj District in Bangladesh. *Archives of Agriculture and Environmental Science, 9*(1), 49-57.

Rahman, S. A., & Taqi, M. (2014). Impact of agricultural credit on agricultural productivity in Pakistan: an empirical analysis. *International journal of advanced research in management and social sciences, 3*(4), 125-139.

Rayhan, S. J., RAHMAN, S., & Lyu, K. (2024). Increasing Boro rice productivity through credit: evidence from Bangladesh. *Agricultural Economics/Zemědělská Ekonomika, 70*(2).

Rimal, N. (2014). Agricultural credit flow of commercial banks and impact on agricultural production in Nepal. *Scholars Journal of Arts, Humanities and Social Sciences, 2*(2), 372-376. doi:10.1007/978-981-32-9648-0_18

Rizwan, M., Ping, Q., Iram, S., Nazir, A., & Wang, Q. (2019). Why and for what? An evidence of agriculture credit demand among rice farmers in Pakistan. *Asian Development Bank Institute*. Retrieved from https://www.think- asia.org/handle/11540/11125

Sagbo, N. S., & Yoko, K. (2021). Does experience with agricultural loans improve farmers' well-being? Evidence from Benin. *Agricultural Finance Review*, 503- 519.

Sapkota, Dipendra. (2023). Farmer's satisfaction towards agricultural credit provided by bank and financial institutions: a study on Bhaktapur district. *Ace Institute of Management, Pokhara University.*

Seven, U., & Tumen, S. (2020). Agricultural credits and agricultural productivity: Cross-country evidence. *The Singapore Economic Review, 65*(supp01), 161-183.

Shrestha, P. M. (2022). Confusion engulfs budget plan to set up Rs500 billion fund for farm financing. Retrieved from The Kathmandu Post: https://kathmandupost.com/national/2022/06/10/confusion-engulfs-budget- plan-to-set-up-rs500-billion-fund-for-farm-financing

Sriram, M. (2007). Productivity of rural credit: A review of issues and some recent literature. *International Journal of Rural Management, 3*(2), 245-268. Retrieved from https://journals.sagepub.com/doi/pdf/10.1177/097300520800300204

Tamga, M. R. (2017). The impact of the banking sector development on agricultural development: the case of Cameroon. *Master's thesis, Eastern Mediterranean University (EMU)-Doğu Akdeniz Üniversitesi (DAÜ)*. Retrieved from http://i-rep.emu.edu.tr:8080/jspui/handle/11129/3832

Thapaliya, Suprabha (2023). Relationship between agricultural growth and commercial bank lending in agriculture sector in Nepalese context. *Central Department of Economics, faculty of Humanities and Social Sciences, Tribhuvan University.* Retrieved from https://tulibrary.edu.np/Thesis_and_Dissertations

World Bank. (2022, September). Agriculture and food. Retrieved from World Bank: https://www.worldbank.org/en/topic/agriculture/overview

Yeasmin, S., Haque, S., Adnan, K. M., Parvin, M. T., Rahman, M. S., Rahman, K. M., ... & Hossain, M. E. (2024). Factors influencing demand for, and supply of, agricultural credit: A study from Bangladesh. *Journal of Agriculture and Food Research, 16*, 101173.

Zakaria, M., Jun, W., & Khan, M. F. (2019). Impact of financial development on agricultural productivity in South Asia. *Agricultural Economics, 65*(5), 232- 239. Retrieved from https://www.old- aj.cz/web/agricecon.htm?type=article&id=199_2018-AGRICECON

APPENDICES

APPENDIX-1

Time series data from 1986/87 to 2021/22

AD	LRGDPA	LRCBLA	LFERT	LSED	LIRI
1986/87	12.317	7.020	10.716	7.788	10.507
1987/88	12.388	8.192	10.900	7.844	10.452
1988/89	12.428	8.824	10.948	7.625	10.884
1989/90	12.497	9.002	11.117	7.781	10.153
1990/91	12.499	9.101	11.194	7.730	10.012
1991/92	12.486	9.198	11.343	7.675	10.429
1992/93	12.459	9.355	11.331	7.529	10.322
1993/94	12.528	9.361	11.209	8.182	10.421
1994/95	12.527	9.671	11.410	8.212	10.141
1995/96	12.576	9.381	11.158	8.115	10.790
1996/97	12.623	9.564	11.069	8.275	10.374
1997/98	12.616	9.700	10.758	7.709	9.973
1998/99	12.694	9.871	10.729	7.492	10.800
1999/00	12.741	9.946	10.525	7.857	10.483
2000/01	12.715	9.970	10.070	7.546	10.298
2001/02	12.741	9.947	9.889	7.884	9.775
2002/03	12.750	9.320	10.570	7.627	9.378
2003/04	12.784	9.499	9.368	7.692	9.454
2004/05	12.793	10.285	9.823	7.919	9.335
2005/06	12.782	9.998	9.004	8.165	9.820
2006/07	12.778	9.984	9.453	8.126	10.202
2007/08	12.809	9.930	8.097	8.238	9.718
2008/09	12.887	9.745	8.057	8.281	10.160
2009/10	12.991	9.670	10.650	8.375	10.333
2010/11	13.075	9.558	10.296	8.341	14.062
2011/12	13.060	9.986	10.729	7.761	14.087
2012/13	13.046	10.216	12.084	8.208	14.102
2013/14	13.075	10.383	12.355	8.894	14.116
2014/15	13.084	10.570	12.607	9.122	14.130
2015/16	13.063	10.688	12.464	9.432	14.146
2016/17	13.081	10.818	12.692	9.081	14.176
2017/18	13.102	11.211	12.790	8.382	14.203
2018/19	13.132	11.520	12.752	10.452	14.205
2019/20	13.136	11.683	12.901	8.270	14.213
2020/21	13.138	11.995	12.839	10.402	14.227
2021/22	13.139	12.001	12.879	10.990	14.389

APPENDIX-2

Data tables for trends and patterns

Fiscal Year	Contribution of GDPA in Total GDP (in %)	GDPA Growth Rate
1974/75	68.88	-
1976/77	60.12	-9.62
1977/78	58.88	11.81
1978/79	51.15	15.06
1979/80	57.9	1.16
1980/81	60.75	14.72
1981/82	57.17	14.22
1982/83	56.42	7.72
1983/84	57.44	18.28
1984/85	48.86	0.85
1985/86	48.69	19.22
1986/87	47.95	12.85
1987/88	47.79	20.02
1988/89	47.69	15.83
1989/90	48.8	18.55
1990/91	46	9.7
1991/92	43.59	17.68
1992/93	40.87	7.57
1993/94	40.44	14.98
1994/95	39.04	6.18
1995/96	38.93	13.24
1996/97	38.78	12.27
1997/98	37.39	3.41
1998/99	38.7	17.67
1999/00	38.24	9.64
2000/01	35.25	7.23
2001/02	36.15	6.72
2002/03	35.11	4.04
2003/04	34.68	7.71
2004/05	33.82	7.12
2005/06	32.37	6.19
2006/07	31.16	7.14
2007/08	30.31	8.98
2008/09	31.32	25.23

2009/10	33.18	27.85
2010/11	34.98	20.82
2011/12	33.15	5.88
2012/13	31.53	5.58
2013/14	30.27	11.24
2014/15	31.74	5.26
2015/16	31.61	4.93
2016/17	29.65	10.28
2017/18	28.57	8.31
2018/19	27.51	6.94
2019/20	27.65	10.34
2020/21	25.8	8.57
2021/22	26.9	-

APPENDIX-3

Regression results for different models

Model Number	Model Functions:	ECM table:				
		R-squared	F-stat [lower-upper]	Coineq(-1) (prob.)	Overall F-stat (prob.)	DW -stat
MODEL 1	GDPA=f (LCBLA, PCI, IRI, FERT, SED, LBR)	0.537	2.21 [2.45-3.61]	-0.0425 (0.002)	4.312 (0.0027)	1.753
MODEL 2	GDPA=f (LCBLA, IRI, FERT, SED, LBR)	0.496	3.671 [3.12-4.25]	-0.460 [0]	9.862 [0.0001]	1.749
MODEL 3	GDPA=f (LCBLA, PCI, FERT, SED, LBR)	0.5014	3.64 [3.12-4.25]	-0.454 [0]	10.059 [0.000095]	1.6439
MODEL 4	GDPA=f (LCBLA, PCI, IRI, SED, LBR)	0.5057	3.71 [3.12-4.25]	-0.472 [0]	10.232 [0.000084]	1.6099
MODEL 5	GDPA=f (LCBLA, PCI, IRI, FERT, LBR)	0.537	3.255 [3.12-4.25]	-0.486 [0]	8.4358 [0.00012]	1.673
MODEL 6	GDPA=f (LCBLA, PCI, IRI, FERT, SED)	0.527	2.864 [3.12-4.25]	-0.37 [0.0001]	8.097 [0.00016]	1.739
MODEL 7	GDPA=f (LCBLA, PCI, IRI, LBR)	0.48	2.99 [2.86-4.01]	-0.420 (0.0003)	5.18 (0.0017)	1.652
MODEL 8	GDPA=f (LCBLA, FERT, IRI, LBR)	0.481	4.292 [3.47-4.57]	-0.518 [0]	9.274 [0.000170]	1.77
MODEL 9	GDPA=f (LCBLA, SED, IRI, LBR)	0.445	4.068 [3.47-4.57]	-0.4308 [0]	12.450 [0.000107]	1.675
MODEL 10	GDPA=f (LCBLA, LBR, FERT, SED)	0.439	3.472 [3.47-4.57]	-0.488 [0.00001]	7.838 [0.00052]	1.6085
MODEL 11	GDPA=f (LCBLA, FERT, SED, IRI)	0.36	4.24 [2.56-3.49]	-0.252 [0.036]	not shown	1.75
MODEL 12	GDPA=f (LCBLA, FERT, LBR, PCI)	0.498	4.501 [3.47-4.57]	-0.484 [0]	9.957 [0.0001]	1.65
MODEL 13	GDPA=f (LCBLA, FERT, PCI, IRI)	0.52	3.46 [3.47-4.57]	-0.412 [0.00001]	7.888 [0.00019]	1.77
MODEL 14	GDPA=f (LCBLA, PCI, SED, LBR)	0.493	4.389 [3.47-4.57]	-0.418 [0]	9.726 [0.00012]	1.629
MODEL 15	GDPA=f (LCBLA, PCI, IRI, SED)	0.486	3.4007 [3.47-4.57]	-0.3377 [0.0002]	9.482 [0.000146]	1.69
MODEL 16	GDPA=f (LCBLA, PCI, FERT, SED)	0.446	4.087 [3.47-4.57]	-0.343 [0]	12.504 [0.0001]	1.66
MODEL 17	GDPA=f (LCBLA, IRI, LBR)	0.42	5.45 [3.23-4.35]	-0.457 [0]	24.08 [0.000026]	1.72
MODEL 18	GDPA=f (LCBLA, PCI, LBR)	0.489	5.61 [4.01-5.07]	-0.451 [0]	9.587 [0.000135]	1.63
MODEL 19	GDPA=f (LCBLA, IRI)	0.43	4.63 [4.87-5.85]	-0.437 (0.0006)	7.623 (0.0006)	1.67
MODEL 20	GDPA=f (LCBLA, LBR)	0.346	4.710 [4.87-5.85]	-0.372 (0.0005)	8.208 (0.001)	1.561

Model Number	Model Function:	Bounds Test: F-stat [lower-upper] (5% sig. level) (N=35)	LONG RUN COEFFICIENTS: LRLDCBS [prob.]	LRPCI [prob.]	LIRI [prob.]	LLBR [prob.]	LRFER [prob.]	LRSEED [prob.]
MODEL 1	GDPA=f (LCBLA, PCI, IRI, FERT, SED, LBR)	2.21 [2.864-4.324]	-0.099 (0.28)	-0.023 (0.58)	0.026 (0.24)	1.505 (0.03)	-0.003 (0.92)	0.018 (0.77)
MODEL 2	GDPA=f (LCBLA, IRI, FERT, SED, LBR)	3.671 [3.673-5.002]	-0.0881 [0.1251]	-	0.0408 [0.0445]	1.256 [0.1732]	-0.0148 [0.5397]	0.0242 [0.457]
MODEL 3	GDPA=f (LCBLA, PCI, FERT, SED, LBR)	3.6469 [3.673-5.002]	-0.047 [0.036]	-0.0206 [0.09]	-	0.2235 [0.5040]	0.0058 [0.522]	0.004 [0.72]
MODEL 4	GDPA=f (LCBLA, PCI, IRI, SED, LBR)	3.714 [3.673-5.002]	-0.0912 [0.147]	-0.0369 [0.283]	0.01515 [0.3951]	0.626 [0.45]	-	0.0114 [0.697]
MODEL 5	GDPA=f (LCBLA, PCI, IRI, FERT, LBR)	3.255 [3.673-5.002]	-0.0705 [0.17]	-0.037 [0.27]	-0.0066 [0.79]	0.1503 [0.85]	0.015 [0.42]	-
MODEL 6	GDPA=f (LCBLA, PCI, IRI, FERT, SED)	2.864 [3.673-5.002]	-0.084 [0.22]	-0.047 [0.294]	0.0066 [0.793]	-	-0.0189 [0.53]	0.018 [0.614]
MODEL 7	GDPA=f (LCBLA, PCI, IRI, LBR)	2.997 [2.86-4.01]	-0.091 [0.20]	-0.020 [0.57]	0.029 [0.02]	1.44 [0.005]	-	-
MODEL 8	GDPA=f (LCBLA, FERT, IRI, LBR)	4.292 [4.036-5.304]	-0.0727 [0.1117]	-	0.0358 [0.0318]	0.9442 [0.1773]	-0.01096 [0.5991]	-
MODEL 9	GDPA=f (LCBLA, SED, IRI, LBR)	4.068 [4.036-5.304]	-0.1217 [0.03]	-	0.033 [0.04]	1.280 [0.17]	-	0.0212 [0.53]
MODEL 10	GDPA=f (LCBLA, LBR, FERT, SED)	3.47 [4.036-5.304]	-0.090 [0.14]	-	-	0.645 [0.41]	0.026 [0.11]	0.011 [0.70]
MODEL 11	GDPA=f (LCBLA, FERT, SED, IRI)	4.243 [2.947-4.088]	0.028 [0.20]	-	0.016 [0.08]	-	0.005 [0.63]	0.115 [0.39]
MODEL 12	GDPA=f (LCBLA, FERT, LBR, PCI)	4.501 [3.47-4.57]	-0.093 [0.07]	-0.042 [0.14]	-	0.379 [0.56]	0.012 [0.46]	-
MODEL 13	GDPA=f (LCBLA, FERT, PCI, IRI)	3.463 [4.036-5.304]	-0.0748 [0.2005]	-0.0419 [0.26]	0.0074 [0.74]	-	-0.013 [0.58]	-
MODEL 14	GDPA=f (LCBLA, PCI, SED, LBR)	4.389 [4.036-5.304]	-0.101 [0.16]	-0.057 [0.08]	-	0.2127 [0.7]	-	0.013 [0.69]
MODEL 15	GDPA=f (LCBLA, PCI, IRI, SED)	3.4007 [4.036-5.304]	-0.134 [0.10]	-0.059 [0.26]	-0.0066 [0.75]	-	-	0.015 [0.69]
MODEL 16	GDPA=f (LCBLA, PCI, FERT, SED)	4.08 [4.036-5.304]	-0.015 [0.03]	-0.065 [0.17]	-	-	-0.0059 [0.77]	0.014 [0.70]
MODEL 17	GDPA=f (LCBLA, IRI, LBR)	5.456 [3.615-4.913]	-0.107 [0.0047]	-	0.0368 [0.0001]	1.3465 [0]	-	-
MODEL 18	GDPA=f (LCBLA, PCI, LBR)	5.61 [4.568-5.795]	-0.087 [0.10]	-0.054 [0.059]	-	0.071 [0.88]	-	-
MODEL 19	GDPA=f (LCBLA, IRI)	4.630 [5.457-6.57]	-0.075 (0.044)	-	0.010 (0.301)	-	-	-
MODEL 20	GDPA=f (LCBLA, LBR)	4.710 [5.457-6.57]	-0.102 (0.04)	-	-	-0.103 (0.85)	-	-

AGRICULTURAL CREDIT AND PRODUCTIVITY OF COMMERC...

By: TANKA PRASAD ARYAL

As of: Aug 13, 2024 9:46:35 AM
15,647 words - 44 matches - 4 sources

Similarity Index

6%

Mode: Summary Report

sources:

378 words / 3% - from 02-Feb-2024 12:00AM
elibrary.tucl.edu.np

132 words / 1% - from 20-Jun-2024 12:00AM
www.scirp.org

131 words / 1% - Internet from 04-Nov-2017 12:00AM
mpra.ub.uni-muenchen.de

114 words / 1% - Internet from 11-Feb-2023 12:00AM
www.researchgate.net

paper text:

ABSTRACT The World Bank has highlighted that in the least developed countries, the agriculture sector can contribute over 25% of GDP and is vital for economic progress. In Nepal, a national shift towards prioritizing industrial and service sectors has led to a relative underdevelopment in agriculture. However, global trends indicate that agricultural development can spur overall economic growth. Therefore, it is crucial to investigate whether the agricultural sector in Nepal is benefiting from commercial bank loans. This study analyzes

the short -term **and long** -term effects **of agricultural credit on** agricultural growth **in Nepal**

from 1988 to 2022 using time series data. The variables analyzed include agricultural growth (GDPA), commercial bank lending to agriculture (CBLA), fertilizer supply (FERT), seed supply (SED), and irrigation supply (IRI). The ARDL cointegration test results show a significant and positive long-term relationship between lending and GDPA, while the ECM indicates that CBLA is insignificant in the short term. The findings suggest that credit has facilitated the increased use of purchased inputs and changes in the input mix, supporting long-term agricultural evolution, but it has not contributed to short-term agricultural GDP growth. Thus, based on the results and existing research in Nepal's context, it can be concluded that lending to the agriculture sector is beneficial. Thoughtful plans, programs, and actions are needed to transform the agriculture sector. It is recommended that both the government and the Nepal Rastra Bank (NRB) reconsider current policies, increase credit flow to the agriculture sector, and invest more in actual farmers

to ensure they have access to the necessary services **and facilities to drive agricultural transformation.** **Keywords** : Agricultural Productivity, **Agricultural Credit**