Role of Commercial Banks in Agricultural Development: Evidence From Pakistan

*Jameel Ahmed Khan**

Abstract

This paper discusses the role of commercial banks in the development of the agricultural sector in Pakistan, especially the role that institutional credit, among others, plays in agricultural productivity. Based on the annual time series from 2000 to 2024, the study investigates the correlation between institutional credit, labor per hectare of cultivated land, farm water supply, crop intensity, policy rates, and agricultural GDP per hectare (AGDP). To capture the long- and short-term dynamics, the study used quantitative techniques, namely the Autoregressive Distributed Lag (ARDL) model and Ordinary Least Squares (OLS) regression. The results show that institutional credit has a statistically significant, positive effect on AGDP, reiterating the importance of official credit tools as an effective means to promote agricultural output. Conversely, water availability, agricultural labor per acre, and AGDP are negatively associated, whereas crop intensity and policy rates give mixed results. Policy implications of the results include the following: First, policymakers should make it easier to access institutional credit, manage water resources, and address labor inefficiencies to enhance sustainable and inclusive agricultural growth.

Keywords: ***Institutional credit, Agricultural GDP, Water availability, Crop intensity, Policy rate, Pakistan, ARDL model.***
JEL Classification: C12, C22, G21, O13

INTRODUCTION

Background of Study

The banking industry in most countries has been recognized as a driver of growth and development in the world economy. The facilitating role of banks ends there, unless the excess resources are actively mobilized and allocated to deficit units to make productive investment. On the one hand, commercial banks perform catalytic functions through credit policies, contributing to the development of other branches of the financial sector by transferring funds to the real sector. Bank advances and loans are the basic mechanisms through which a nation's economic growth can be promoted. The length and level of the credit facilities greatly affect

Correspondence:

**Faculty Member, Bahria University, Karachi Campus, jameelhakro@gmail.com*

the rate of growth and development in the real sector. Banks are principally entrusted with the role of providing credit to the real sector, yet the returns from the sector have not been very encouraging most of the time, mainly because of inadequate financing and inefficient capital use.

The main role of commercial banks is they act as financial intermediaries and guide the flow of money between those who save and those who borrow. They have the second, but still important, task of directing the available financial resources into their productive ventures, thus avoiding economic inefficiency and financial disruptions. By providing credit and loans, banks facilitate the use of capital assets and the operations of different sectors, including agriculture, manufacturing, telecommunications, and the service industry, thereby directly driving national economic growth. There are three important factors that affect productivity in the sphere of agriculture: the enhancement of the use of agricultural inputs, improvements in technology, and improvements in technical proficiency. My research and development generate technological change, and the successful adoption of new technologies requires knowledge transfer, access to better tools, financial resources, and farmers' ability to use them. Access to agricultural credit is critical for small-scale farmers who have little savings, as in developing economies such as Pakistan. That credit, together with modern technologies, can considerably improve agricultural output and productivity. It is therefore necessary that the important role commercial banks play in expanding financial access be utilized to foster agricultural and broader economic growth.

Omojimite (Omojimite) is a Japanese study (2012). A study of the expansion of the Nigerian agricultural sector and the relationship between macroeconomic policy and institutions found strong evidence that institutions are more serious about economic growth, particularly in the Nigerian agricultural sector. The report recommended that credit rates for the agricultural industry be lowered, and that institutional support be considerably strengthened in areas such as farmer extension services and subsidized inputs. These ideas argued that the impact of agricultural loan policy on the value of goods produced was varied. Some of these theories aim to demonstrate the relevance of credit to the industry, while others argue that credit and loans are entirely irrelevant and unimportant.

Allen et al. (2012) attempted to explain the relationship between fund allocations and the performance of various sectors. They used loan-specific data to show that there is a substantial inverse relationship between allocations and sector performance, and that sectors that do not get government subsidies perform better statistically. They concluded that bank loan financing reduces farmers' profits because most of their revenue is used to repay the loan. Aivazian, Booth, and Cleary (2006) examined the relationship between government-sector smoothing policy and bank debt versus agricultural performance and found that government loan schemes and funding produce better results than bank credit.

According to Udih (2014), the agricultural industry is projected to be influenced by bank loans and advances from agricultural produce. He goes on to say that if agriculture projects are only supported by banks, the surplus food supply will result, attracting more owners into the system. So, if appropriate lending facilities are put in place by the bank and the government, the heavy, bulky agricultural productivity that supports civilian well-being will be guaranteed. Other than the agricultural sector, deposit banks prefer lending and move on to other sectors; as a result, farmers will be unable to repay if banks charge them exorbitant interest rates, which they are fully aware of. However, there is a danger in agricultural finance vs. filling the

gap by preparing a warrant addressed at the federal government's agricultural credit guarantee programme (ACGS).

Many policymakers and economists are increasingly accepting that the domestic economy's future growth will be largely dependent on the agricultural and rural sectors' solid performance. The manufacturing and service sectors will not be able to sustain economic growth if the rural sectors do not function well. The Indian economy has performed better than those of Pakistan and Bangladesh, driven by contributions from the banking and finance sectors. Advances in timely commercial banks and aggregate deposits growth, respectively, of 27.9% and 15.4% for India in 2005-2004, demonstrate this. On the other hand, financial services are not as accessible to agricultural and rural areas and the public. More deposits are generated in the economy during the commercial banks' loan expansion phase, thereby improving the country's domestic product. This had a favorable impact on economic growth and the country's overall development. As a result, a bank can be defined as an instrument of growth in the societies in which it operates, and in a developing country like Nigeria, the banking industry is a critical foundation in encouraging economic development and expansion.

As a result of increased fertilizer use, biocides, improved seeds, mechanization, and higher prices, financing requirements in the farming sector have risen rapidly during the last 10-20 years. The agricultural loan system in Pakistan comprises both informal and formal outlets. Friends, relatives, commission agents, merchants, and private money lenders are examples of informal sources. Financial institutions such as the Bank of Zarai Taraqiati “ZTBL”, formerly known as Pakistan's Bank of Agricultural Development (ADBP), “Commercial Banks, and Federal” Cooperative Banks are currently the formal providers of credit. Non-governmental organizations (NGO) have recently provided agricultural finance to rural populations. Unlike most developing countries, Pakistan has seen a significant development of subsidized institutional lending. As a result, the goal is to achieve high agricultural growth by alleviating liquidity constraints, which will lead to increased input utilization, the adoption of new technologies, and a feasible diversification of the crop mix and revenue sources on the farm. However, in Pakistan, only a small number of studies have examined the impact of institutional lending on farm production. In evaluating the production role in the farming sector, Zuberi (1989) concluded that the effect of institutional credit stems from seed and fertilizer finance. Fixed investment finance was found to have a minimal position. However, Qureshi and Shah (1992) found that institutional credit affects agricultural productivity through capital investment finance. They discovered that agricultural production is more sensitive to institutional credit than fertilizer production.

The goal of this research is to see how institutional loans affect agricultural production in Pakistan. Its goal is to evaluate the role of production in the relationship between agricultural output and institutional credit, along with other independent variables, including labor, water, cropping intensity, and the policy rate. According to the findings, commercial banks and other financial institutions should increase agricultural lending and expand the institutional credit net to a larger share of the farming population, particularly farmers. These institutions are needed in the event of a significant crop failure to provide consumer loans to farmers in need, particularly those with a good loan record, and these loans are provided for farm operations through the inclusion of credit requirements.

Sources of Institutional Credit in Pakistan

Pakistan's institutional credit history dates to minor loans made before independence and loans made by supportive groups at the time. The farmers were heavily reliant on non-organizational sources for their financial needs. The Land Improvement Loans Act of 1883 (LILA) and the Agriculturists Loan Act of 1884 (ALA), which were later replaced by the West Pakistan Agriculturists Loan Act of 1958, controlled Taccavi loans (ALA). Loans were made available under the “LILA” act for the construction of irrigation dams/tube wells, land leveling, and agricultural land reclamation and expansion.

ALA provides loans to reduce poverty and purchase seed, fertilizer, livestock, and equipment. Taccavi loans were made available through provincial revenue agencies. With the introduction of new institutional channels, the importance of these loans for overall institutional credit has decreased over time. In provincial budgets, small amounts have been allocated to those loans. The Federal Bank for Cooperatives (FBC) was founded by the federal government in 1976 with the approval of the provincial governments, and the cooperative credit idea has evolved significantly.

An explicit relationship was proposed between credit consumption and inputs, as well as the size of the credit and the farm. The FBC is dependent on financial assistance from Pakistan's State Bank. Farmers could obtain credit only from institutions before independence, and their only sources were laccavi loans and cooperative borrowing. Small farmers have been forced to rely on non-organization sources to meet all the requirements. To address this shortcoming, the Agricultural Development Finance Corporation (1952) and the Pakistan Agricultural Bank (1957) were established. On February 18, 1961, these two institutions amalgamated to form Pakistan's Agricultural Development Bank (ADBP).

Zarai Taraqiati Bank Limited was recently rebranded and is the country's first provider of institutional agricultural loans. Multilateral agencies finance several of the Bank's special funding programmes, such as the World Bank, the Asian Development Bank, and the International Fund for Agricultural Development. Another important official agricultural supplier is the commercial banking sector. The State Bank of Pakistan provided this information. The Federal Bank of Cooperatives provides production loans, whereas the “ZTBL/ADBP” and commercial banks provide both production and growth loans. The NCCC assigns annual loan quotas to such institutions in order to encourage investment in the agricultural sector. Governments around the globe tend to emphasize financial facilitation for farmers to boost agricultural growth, and for this purpose, schemes are launched through commercial banks, special banks are set up, and the government itself provides grants directly. It will be interesting to learn about the impact of institutional credit, labor, and water availability, cropping intensity, and policy rate. The objectives of the study are to examine institutional credit, labor, water availability, crop intensity, and the policy rate on agricultural growth.

Literature Review

Institutional Credit

Credit is a loan of cash that one can use to buy products and services needed. Credit might be obtained from a grantor of credit, and the actual sum obtained, along with the relevant

charges, is refunded to the bank at a concurred time. As indicated by Olomola & Yaro (2015), there are four kinds of credit:

Rotating credit: In rotating credit, people seeking credit are given the most stringent credit cutoff feasible, and taxes are minimized as much as possible. Every month, you send a message of balance (or make an installment and rotate the obligation). Most credit cards are forms of credit plans that require regular payments and a certain spending limit. Charge cards are comparable to spinning Visas in that they are smeared in the same way. However, with credit cards, the person who obtained the assets is responsible for the entire sum regularly.

Service credit: In this course of action, powers, cellular services, gym memberships, and other services are obtained, and the recipient pays for them monthly. The agreement with the network's service providers is an example of administrative credit.

Installation credit: In this credit gaming plan, the amount obtained, plus any collected interest, is returned in equal installments over a set period. Installment credit includes cash used to purchase a vehicle and to take out a home loan.

In recent years, credit standards in several industries have risen dramatically. Because of the increased use of fertilizers, biocides, improved seeds, and mechanization, as well as their rising prices, credit requirements in the agricultural sector have grown rapidly in recent decades. In Pakistan, the agricultural finance system comprises both informal and formal sources of loans (Iqbal, Ahmad, & Abbas, 2018). In Pakistan, as in most poor countries, the practice of extending sponsored institutional loans was widespread. The goal is to generate higher agricultural development by reducing liquidity constraints, allowing for more input utilization, flexibility for innovation, and probable enhancement of yield blend and farm pay sources.

Agricultural Output

In its most basic form, agriculture includes cultivation, farms, fisheries, and domesticated animals, as well as production, breeding, and research (Awoyemi, 2019). According to Anyanwu, Oyefusi, Oaikhenan, and Dimowo (1997), agribusiness encompasses land development, animal husbandry, and crop production with the purpose of producing food for humans, livestock feed, and raw materials for enterprises. Cropping, domesticated animals, farming, and fishing, as well as the preparation and promotion of agricultural products, are all included. Binswanger & Townsend (1999) conclude that agribusiness has both forward and backward links with itself and with other divisions of the economy when discussing the role of agriculture in economic growth.

Agriculture's role in shaping both the social and monetary structures of an economy, as evidenced by the food it provides and the raw materials it supplies to the modern world, cannot be overstated, according to Anyanwu, Oyefusi, Oaikhenan, and Dimowo (1997). The sector is also crucial for the growth of job opportunities, which allows for the reduction of poverty, the improvement of pay distribution, the acceleration of industrialization, and the improvement of a country's equalization of installments (Asom, 2016).

Role of Commercial Banks

In Pakistan, commercial banks are an important traditional source of agricultural loans. Commercial banks were often reticent to lend to the agriculture sector prior to the 1972

Banking Reform. The investment was limited to agricultural promotion, with items such as credit insurance (Qureshi & Akhtiar, 2019). Business banks were required to expand the scope of lending under the 1972 reforms to support current farm inputs and investments. Banks are obligated to meet the target loaning goal for the farming segment and are subject to penalties if they fail to do so. Unlike traditional lending institutions, commercial banks rely entirely on their stores to fund agricultural credit (Iqbal, Ahmad, & Abbas, 2018).

With the support of a business bank's cash credit, farmers can cultivate crops, feed their families, build beautiful homes, and prepare their children for school. Because of government-backed financial assistance from business banks, developing activities are now considered a worthwhile enterprise. Unfortunately, farmers, particularly those who are uneducated, find it extremely difficult to secure credit from these commercial banks. This could be due to the passionate nature of issues like hosting promises, security, and jug-neck administration. Most of the time, improvements are not made when they are needed, and we understand that farming depends on seasons. Banks, on the other hand, run the risk of the money not being returned due to the high-risk nature of the farming business, such as robbery, attacks, and catastrophic events, such as the dry season, drowning, and illnesses that result in low agricultural yields.

Agricultural Finance

According to Enyim, Ewno, and Okoro (2013), lending to the farming sector is riskier, more difficult, and less effective than lending to other sectors. As a result, banks and other lending institutions believe it is challenging to extend financing to farmers for agricultural production (Obilor, 2013). Previously, when banks were required to lend to farmers or bear the consequences of their actions, the agricultural sector was bolstered; nevertheless, a few institutions insisted on bearing the consequences nonetheless (Gurdenson, Glory, & Due, 2019). Farmers then used cooperatives, network improvement organizations, frugal organizations, family, friends, and money lenders to raise funds. According to Akinleye, Akanni, and Oladoja (2003), this strategy for raising assets is known as the casual asset source strategy. According to Zakaree (2014), the government launched the Guarantee Scheme of Agricultural Credit in 1977 to address the looming agricultural financial crisis (Zakaree, 2014). With the goal of encouraging commercial banks to create cash for the agriculture sector. The government planned to achieve this by offering guarantees to address the inherent risks in agricultural lending. Even though the Guarantee Scheme of Agricultural Credit has been in place for quite some time, Akinleye, Akanni, and Oladoja (2003) stated that the extent of business bank assistance in credit distribution to the farming sector remains debatable.

Agricultural Productivity

Many researchers have discussed agricultural profitability, each emphasizing the importance of agricultural efficiency through their own ideas and rules. According to Onogwu, Audu, and Igbodor (2017), agricultural efficiency is defined as yield per unit of information or yield per unit of land in agricultural geography, as in financial affairs. They went on to say that increasing farming efficiency is a component of utilizing creation's components. Taking everything into account, the more productively the components of creation are used, the greater the improvement in agricultural efficiency.

Agricultural profitability can also be defined as the ratio of yield to input (for example, the amount of wheat per acre of land) (Wiebe, 2003). Traditional efficiency ratios are the amounts of yield examined relative to the number of data sources. If yields and inputs both increase at the same rate, profitability will remain unchanged. If, on the other hand, the yield grows faster than the rate of information sources, efficiency is assured.

The relation between Credit and Productivity of Agriculture

Agricultural production requires significant investment. According to Abdul Rahman (2013), agribusiness is capital-intensive. Finances are anticipated to support basic manufacturing expenditures, such as labor and input purchases, prior to production. Similarly, money is necessary after creation to adjust families' usage from year to year, especially when there is a yearly difference. This indicates that credit has both positive and negative impacts on agricultural profitability. Furthermore, according to Petrick (2004), the agribusiness production cycle requires capital, and credit from business banks is a key source of capital to address the problem.

The fundamental cycle of production: land planning, planting, development, and gathering are usually finished over a period in which a small amount of money is made, whereas the use of materials, data sources, and utilization should be made in real money. Along these lines, insufficient financing may prevent agriculture from being profitable. This is because, as Petrick (2004) indicates, farmers with limited funds who lack access to credit use fewer inputs, whereas the opposite is true for farmers with sufficient capital and access to official credit.

Agriculture production is severely limited by the fact that the resources that enter the production process (inputs) are completely transformed into something better and increasingly useful (yield) with time intervals that are sufficiently large in magnitude to be significant (Conning & Udry, 2005), forcing the country family unit to adjust its spending limit throughout the season while input purchases and utilitarian purchases are high.

It is considered that access to credit enables the adoption of risky agricultural improvements by lowering the liquidity constraint, rather than by increasing the family unit's ability to shoulder risk. Credit limitation has been cited as a significant impediment to the adoption of contemporary cassava production technologies in Nigeria, such as herbicides, crossbreed cassava stakes, bug sprays, inorganic compost, tractors, fitting dividing, planting date, and cultivation practices (Nweke, Spencer, & Lynam, 2002). However, various findings in the literature (Iyanda, Afolami, Obayelu, & Ladebo, 2014) have highlighted the enormous task of selecting such improvements to boost efficiency, eliminate needs, and achieve food security in developing countries like Nigeria.

Furthermore, enough financing is seen as a critical tool for smoothing utilization and boosting production, particularly for low-income families (Swain, Sanh, & Tuan, 2008). This means that households that require more reserve funds can now obtain assets to purchase farming inputs, particularly data sources critical for weed, pest, and disease control, as well as for successful operations. Furthermore, easy access to capital and adequate financing enable ranchers and business owners to expand by starting a new enterprise.

THEORETICAL FRAMEWORK

The Quantity Theory of Credit

Werner introduced the Quantity Theory of Credit in 1993, focusing on various trade computations that distinguish between cash used for transactions reported in the country's GDP and cash used for transactions not documented in the country's GDP (Iwedi, Igbanibo, & Onuegbu, 2015). He also remarked that for GDP to grow, monetary transactions must first increase, and for this to happen, finances must be both accessible and satisfactory. As a result, when banks produce additional cash, there will be enough to support exchanges.

The Credit Channel Theory

The credit channel idea was proposed by Bernanke and Gertler (Iwedi, Igbanibo, & Onuegbu, 2015). This theory proposes that the beneficial effect of money-related arrangements on loan costs is supported by variations in the outside account premium that lack an obvious external cause (the difference between the cost of obtaining and the cost of issuing inside reserves).

The Bank Lending Credit Channel Theory

According to the bank loaning channel theory, the Central Bank's approach, which controls the amount of cash available for use and the rate at which individuals can borrow cash, affects the outside account premium by shifting the distribution of intermediated credit, which primarily originates from business banks.

Loan Pricing Theory

Banks, according to adherents of this theory, are eager to set high lending rates to enable them to earn large salaries while also making the greatest profit. However, as Olokoyo (2011) points out, charging excessively high interest rates may raise concerns about negative determinants, as debtors who face a challenge may engage in risky moral behavior, and they may also gravitate toward extremely risky endeavors or investments. In this light, banks should refrain from imposing excessively high interest rates.

Theory of Agricultural Development

Ester Boserup, a Danish economist, proposed this hypothesis. According to the Boserupian hypothesis, the rate of agricultural development and improvement is determined by the proportion of the population engaged in farming.

Interventionist Theory

A variety of principles governs agricultural credit. According to the interventionist hypothesis, some smaller-scale activities of individuals and organizations might lead to macroeconomic outcomes in which the economy operates below its potential capacity for yield and development (Keynes). Interventionist theory holds that, instead of relying solely on the market system, that is, the forces of demand and supply, government should strive to influence what is going on in its region using financial or possibly financial speculations and strategies. He claims that government interference in the market has been motivated by concerns that business sectors

and expenses were not allocating assets in a way that satisfies the desires of people (farmers) and the community. As a result, government intervention through financial institutions to infuse the economy, as well as the government's role in influencing agricultural markets or the agricultural pay and food segment, would aid in rebuilding the economy's agricultural yields. Farmers require resources to produce agricultural products, which is exemplified by credit facilities. In any case, accessible writing has revealed that resources are severely lacking, necessitating the use of other sources of information. The Cobb-Douglas function of production clarifies the pertinence of resources as he accepted a straight equivalent degree of production function that incorporates two sources of input: labor and capital, for the total yield.

Neoclassical Theory of Production

In predicting agricultural production from productivity usage of institutional credits, the study also considers the neoclassical concept of creation. To achieve an ideal level of creation, the neoclassical theory of creation emphasizes that resources must be available and productively utilized. Because credits issued to farmers are intended to be repaid, these linkages to the credit's goal and agricultural produce are justified. However, it will be impossible to obtain such credits without first making funds available to farmers and ensuring they are used effectively to achieve optimal production. Furthermore, it is because of the productive use of assets that farmers' government assistance can be improved, and so the neoclassical production theory can be used to achieve the critical goal of improving farmers' government assistance.

RESEARCH METHODOLOGY

The research employed a quantitative, causal research method and secondary data. Various official publications of the Government of Pakistan are used to collect annual time-series data for the period 2000-2024. It is especially pertinent because this period emphasizes profound changes in the banking sector and modifications to agricultural credit policies. The data consist of absolute cumulative values for each variable over the twenty-five-year period and represent the entire agricultural industry of Pakistan. In the study, five independent variables have been taken into consideration: Institutional Credit (in million rupees), Labor per Cultivated Hectare (percentage), Farm Water Availability per Cultivated Hectare (in million hectares), Crop Intensity per Cultivated Hectare (in million hectares), and the Policy Rate (percentage).

The dependent variable is Agricultural GDP Per Hectare (AGDP), measured in million rupees. The main aim of this study is to examine the role of commercial banks in encouraging agricultural growth in Pakistan, with institutional credit and the policy rate as the two variables of interest. Several control variables have also been added to limit the risk of omitted-variable bias and ensure robustness of the analysis.

Research Hypothesis

H1: There is an impact of agricultural credit on agricultural growth.

H2: There is an impact of labor on agricultural growth.

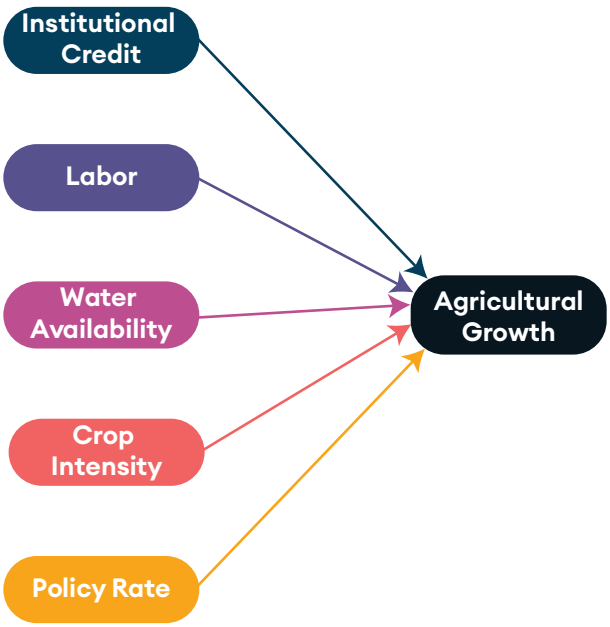
H3: There is an impact of water availability on agricultural growth.

H4: There is an impact of crop intensity on agricultural growth.

H5: There is an impact of the policy rate on agricultural growth.

All variables are converted to their natural logarithms to enable proper and valuable analysis. The secondary data are initially analyzed using descriptive statistics to outline some important characteristics of the dataset. To empirically analyze the study, the Bounds Testing method and the Autoregressive Distributed Lag (ARDL) are used to examine the relationship between the variables in the short and long run.

Conceptual Framework



Data Analysis

Table 1 *Descriptive statistics*

	AGDP	CI	IC	PR	LF	WA
Mean	1931308	7.5095	75851.4	9.4775	43.3205	119.702
Median	1936912	5.57	76826.5	9.5	43.21	121.825
Maximum	2502181	4.12	89215	14	48.42	138
Minimum	1513844	6.41	37293	5.75	41.62	92.59
Std. Dev.	296257.4	0.787321	35330.1	2.48646	1.665	16.6317
Skewness	0.079006	0.525369	-0.2704	0.17919	1.42921	-0.1937
Kurtosis	2.023177	2.491376	1.87112	2.05694	5.31572	1.34185
Jarque-Bera	0.815959	0.811814	1.49442	0.84817	11.2776	2.41622
Probability	0.664993	0.633873	0.47606	0.65437	0.00356	0.29876

From this Descriptive Statistics table, it can be observed that the average value of AGDP is 1931308, the minimum value is 15138466, the maximum value is 2502181, and the standard deviation of AGDP is 296257, indicating that the data are deviated from the center and are

far from the mean. The average value of Crop Intensity is 6.5095, the maximum is 8.12, the minimum is 5.41, and the standard deviation is 0.7473, indicating the data is not much deviated from the center and is close to the mean. The average value of Institution Credit is 65851, the maximum value is 99215, the minimum value is 27293, and the standard deviation is 25330. This means the data deviates from the center and is far from the mean value.

The average value of Labor is 43.32, the maximum value is 48.42, the minimum value is 41.62, and the standard deviation is 1.665. This means the data deviates from the center and is far from the mean value. The average value of Policy Rate is 9.4775, the maximum value is 14, the minimum value is 5.75, and the standard deviation is 2.486. This means the data is not much deviated from the center and is close to the mean. The average value of Water is 119.70, and the maximum value is 138, the minimum value is 92.59, and the standard deviation is 16.63. This means the data deviates from the center and is far from the mean value.

ADF

The Augmented Dickey Fuller "ADF" received the Unit Root Test for time series data to rectify the information. This test is used to see if the "mean and variance" of the assessments are equal to zero (Dicky and Fuller, 1979). When the probability estimation is smaller than the critical value, this test gives ADF aggregate statistics and fixes variables.

Table 2

Variables	ADF-T-Statistics	P-Value
AGDP	-4.100213	0.0546
Crop Intensity	-5.241014	0.0019
Credit	-6.421796	0.0026
Labor	-4.61537	0.0034
Water	-6.377918	0.0037
Policy Rate	-4.146542	0.0745

The information stationary is tested using the ADF Unit Root Test, which reveals that all dependent and independent variables are below 0.05, and we obtain this result for the first and second differences, which means we reject the null hypothesis that the variables have a unit root.

Bounds test

I(0) is the lower bound, whereas I(1) is the upper bound. If the F-statistic value is greater than the critical value of the upper bound, we reject the null hypothesis, which means there is co-integration and a long-run relationship between our variables.

If the F-statistic value is lower than the critical value of the lower bound I(0), then we do not reject the null hypothesis, meaning there is no co-integration and no long-run relationship.

Table 3

Test Statistic	Value	K
F-statistic	2.851411	5

Critical Value Bounds		
Significance	I(0) Bound	I(1) Bound
10%	3.26	3.45
5%	3.62	3.80
2.50%	4.96	5.18
1%	6.41	6.68

Hence, it is proven that our F-statistic is below the 5% lower bound; we conclude that there is no co-integration and no long-run relationship, and we do not reject the null hypothesis.

Table 4 *OLS (Ordinary Least Square)*

"Variable"	**"Coefficient"**	**"Std. Error"**	**"t-Statistic"**	**"Prob"**
AGDP	14.41993	1.29988	11.09328	0
CI	0.065334	0.187183	0.349037	0.7323
IC	0.248915	0.030984	8.033722	0
WA	-0.253228	0.104099	-2.432579	0.029
PR	0.038711	0.046454	0.833329	0.4186
LF	-0.450106	0.28273	-1.591997	0.1337

R-squared	0.962573	Mean dependent variable	14.46237
Adjusted R-squared	0.949206	S.D. dependent variable	0.155197
S.E. of regression	0.034978	Akaike info criterion	-3.6249
Sum squared	0.017128	Schwarz criterion	-3.32618
Log likelihood	42.24895	Hannan-Quinn criter.	-3.56658
F-statistic	72.01161	Durbin-Watson stat	1.067599
Prob(F-statistic)	0		

INTERPRETATION

Ordinary least squares, or linear least squares, estimate the parameters in a regression model by minimizing the sum of the squared residuals. In this table we can interpret if the t-statistic value is greater than or equal 2 in absolute form, than we say that the variable are significant otherwise it will be insignificant, as you can see that my some variables are less than 2 and some are greater than 2, we can say that variables are in significant, and you can also check the variables from probability value, if the value is less than 0.05 or 5%, than you can say variables are significant.

The coefficient of Crop Intensity is 0.065, it means if the crop intensity is increase by 1%, than the GDP will increase by 0.065, and the coefficient of institution credit is 0.248 and it means if the institution credit is increase by 1% than the GDP will increase by 0.248, and the coefficient of water is -0.253 having a negative sign which represent that it have a negative relationship with the dependent variable, so in this case it will be interpret as if the water is increase by 1% than the GDP will be decrease by 0.253, and the coefficient of policy rate is

0.038, it means if the policy rate is increase by 1% than the GDP will be increase by 0.038, and the labor having negative sign -0.45, it means if the labor will increase by 1% than the GDP will decrease by 0.45.

Table 5 *Correlation*

	AGDP	CI	IC	LF	PR	WA
AGDP	1	0.809368	0.854386	-0.42777	-0.02163	-0.78926
CI	0.909368	1	0.65654	-0.55708	-0.40631	-0.76273
IC	0.854386	0.75654	1	-0.33927	-0.01851	-0.66201
LF	-0.34277	-0.55708	-0.43927	1	0.529607	0.348347
PR	-0.03163	-0.40631	-0.02951	0.529607	1	-0.00596
WA	-0.87926	-0.76273	-0.56201	0.348347	-0.00596	1

Negative values in this table indicate a negative correlation between variables, and positive values indicate a positive correlation. The aim of correlation analysis is to determine the degree of association between variables. As shown in this table, crop intensity and institutional credit are positively correlated with AGDP. The labor, policy rate, and water have a negative correlation with AGDP.

CONCLUSIONS AND DISCUSSION

In Pakistan, a large share of formal agricultural credit disbursement is handled by commercial banks. Over the past decades (2000-2024), such banks have been expanding their credit portfolios into the agricultural sector. This growth has contributed immensely to increasing agricultural productivity, mainly by expanding access to growth- and output-oriented loans from formal financial institutions. This has been empirically demonstrated in this study, as agricultural credit has positively impacted agricultural GDP. Also, crop intensity, labor per cultivated hectare, and policy rate are other factors that have emerged as positively influencing agricultural productivity. On the other hand, variables such as water availability and the policy rate did not show statistical significance in the ARDL model estimation performed in E-Views. This study was conducted to further expand knowledge of how institutional credit is related to agricultural performance in Pakistan. The results indicate that credit, crop intensity, and labor have significant statistical impacts on agricultural GDP, whereas water availability and the policy rate do not. It is advisable to conduct further study on this relationship to gain a deeper understanding and inform policy on building agriculture with the aim of uplifting the economy and society.

With the government's interface to improve credit availability through disbursements by commercial banks, there has been a stagnation in agricultural productivity in Pakistan. The performance of commercial bank credit in enhancing agricultural GDP, however, as shown in this study, is positive and significant. Institutional credit is strongly and significantly related to agricultural gross domestic product, suggesting that formal financial assistance is essential to stimulate agricultural growth. In this study, other critical determinants of agricultural GDP include the availability of irrigation water, labor per hectare of cultivated farmland, crop intensity, and the policy rate. These factors are sources of different results in agricultural performance, either directly or indirectly. These results also highlight the need for additional research in this field to develop more efficient methods for increasing agricultural output. These can help not

only with the rise of the agricultural industry but also with the nation's economic development and the improvement of its social welfare.

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