



SOWING GROWTH WITH FINANCE: CROP-WISE IMPACTS OF AGRICULTURAL CREDIT ON FARM PRODUCTION IN PAKISTAN

Dr. Zahid Iqbal

Assistant Professor, Department of Commerce, University of Kamalia, Punjab, Pakistan.

Email: zahidiqballak@gmail.com

Dr. Rashid Maqbool

Incharge, Main Library, University of Okara, Punjab, Pakistan

Email: rashid_gee@yahoo.com

Mr. Khalid Mehmood

PhD Scholar, Department of Education, University of Okara, Lahore, Pakistan.

Email: chkhalidgujjar56@gmail.com

Shazia Akram

PhD Scholar, Time Institute, Multan, Punjab, Pakistan.

Email: shaziaakramnayaab98@gmail.com

Abstract

One of the ways to understand the development of the agricultural sector in Pakistan through the supply of agricultural credit is to see how it helps in the enhancement of the productivity of the farming sector through the provision of new inputs and production techniques. Therefore, this paper focuses on agricultural credit and its influence on the production of major and some selected minor crops in Pakistan, namely, wheat, rice, cotton, sugarcane, maize, tobacco, and bajra. The study used secondary data for the period 2015-2025, which was collected from the Ministry of Finance and the State Bank of Pakistan, to employ Structural Equation Modeling (SEM) in estimating the effects of agricultural credit for each crop. It is noted that in comparison to other estimation techniques, the SEM is preferred in that it allows for estimating various relationships at the same time as it incorporates errors of measurement and relationships of dependent and independent variables. The findings of the study show that agricultural credit positively impacts the production of each of the selected crops. It was also found that the most notable production for wheat, maize, and rice was that these input-intensive crops valued high in credit responsive production. Positive extended production was also noted in cotton, sugarcane, tobacco, and bajra. This shows the necessity for production-oriented credit policies in agriculture opposed to generalized credit extension policies. This research outlines the practical implications for farmers, banking institutions, and policymakers, emphasizing the necessity of precise credit allocation, adaptable loan disbursement systems, and increased financial inclusion. From this perspective, the study adds to the literature by identifying and assessing, on a comprehensive and disaggregated basis, the effectiveness of credit on crops, providing insights with policy relevance on sustaining the growth of agriculture and ensuring food security in Pakistan.

Keywords: *Agricultural credit; Crop production; Structural Equation Modeling; Pakistan; Farm productivity*

1. Introduction

Pakistan's economy cannot grow without the growth of the agricultural sector as it contributes significantly to all the components of the economy: the Gross Domestic Product (GDP), the employment levels, the food security, as well as the provision of raw materials for the industries such as textiles, sugar, and tobacco (Perveen et al., 2021). With the agro provision being an



economic driver for the country, imbalances in the agricultural production is evident in modern agro inputs being used, such as the improved seed, chemical fertilizers, pesticides, mechanization, and irrigation (Chandio et al., 2021a). Financial resource availability to the farmers is the greatest limiting factor in the full adoption of all modern agricultural inputs, and in particular for the small and marginal landholder farmers, this is most aggravated. Financial constraints in the agriculture sector is greatest, and even is the main focus of the institutional agricultural credit for the Commercial, Zari Taraqiati Bank Limited (ZTBL), and Micro Finance banks that are directed to enhance the crop production and the agriculture sectors stability. Farmers with more credit tend to adopt more productivity enhancing technologies, manage production risks more efficiently, and respond to climate and market fluctuations more effectively (Chandio et al., 2023). In Pakistan, crops such as wheat, rice, cotton, sugarcane, maize, tobacco, bajra, etc. are important. Therefore, studying application of agricultural credit in influencing production of these crops is important.

The government and financial institutions in Pakistan have been trying to increase the agricultural credit available to farmers however, the agricultural output in the country has been inconsistent as evidenced by crops that have been produced in different time periods. Farmers in Pakistan still find it difficult to acquire formal credit due to the lack of collateral, the high costs of the credit, the delays in credit disbursements, and the recession in the country (Khan et al., 2022). Besides, strong agricultural credit is needed, and it is likely that it will vary by the crop as a result of nonuniform regional dispersion in the credit. Central theorist such as policymakers concentrates on the need to increase credit access as positive for farming, however, it has been recognized that few analysts have researched the credit that results in production increase of Chandio and associates (2021b). The continuing field gap and lack of productivity increase over several crops raise concerns as to the utilization of agricultural credit over a time period. It is to answer the question of whether agricultural credit has the same influence over the production of the different crops in Pakistan or does it differ, that the State Bank of Pakistan is Gul and associates (2022).

The studies conducted in the field of agricultural credit and crop production in Pakistan that have been made use of appreciate the studies for what they are worth. Most past studies have been limited to a study of the aggregate agricultural output of the entire system or a very limited number of individual crops, predominantly wheat and rice, and have thus ignored crop-level heterogeneity (Wahab et al., 2024). Additionally, crops like bajra and tobacco, have, in the context of agri- financing, been ignored studies, even though these crops are of nutritional, commercial and, in some cases, regional important. A number of studies have also been dependent on studies that are outdated, have ignored the temporal factor, or employed simple strategies that do not capture the short and long run dynamics (Ahmad & Afzal, 2022). In addition, the empirical studies have, almost without exception, ignored the recent policy reforms and financial inclusion efforts of the State Bank of Pakistan (Abbas, 2022). This makes it manifest that a gap exists in the empirical studies of the effect of agri- credit on output, on a crop-by-crop basis, using recent data and accurate econometric methodologies.

This study is of great significance both academically and for policy implications. The study identifies the nuanced effects of credit on various sub-sectors of agriculture by investigating the differential impact of agricultural credit on each of the crops: wheat, rice, cotton, sugarcane, maize, tobacco and bajra. With this differentiated impact, policymakers would be able to avoid the policy failure of adopting a generalized credit expansion approach



and be able to craft crop-specific credit policies. In this regard, financial entities may also reallocate their lending portfolios to include crops that are more responsive to credit. The study, in a constructive manner, combines large and, more frequently, underappreciated crops. The study also fills the gaps in the literature and presents fresh empirical data that aids in moving the discourse forward. From this angle, the study is academically constructive.

The remainder of the paper is organized as follows. Section 2 analyzes the relevant theoretical and empirical literature on agricultural credit and crop production. Section 3 outlines the data, definitions of the variables, and the econometric models employed to assess the effects of agricultural credit on different crops. Section 4 discusses the findings, focusing on the differential effects of credit on various crops. Finally, Section 5 concludes the study by summarizing the key findings and suggesting possible enhancements to the agricultural credit system in Pakistan.

2. Literature Review

Many studies show a positive correlation between agricultural credit and productivity as it allows farmers to purchase modern technologies and inputs. Credit is said to reduce barriers to the timely use of, for example, mechanization, and irrigation (Yadav & Rao, 2024). Studies have argued that the active provision of institutional credit in developing countries boosts agricultural output and improves technical efficiency (Sardar et al. 2021). Most of the studies done in Pakistan have found that agricultural credit positively impacts the productivity of staple crops (wheat and rice) (Ahsan et al. 2020). These studies highlight that credit provision reduces production and weather-related risks, thereby improving the stability of crop production. Several studies have documented the disparate impacts of agricultural credit on various crops. In Pakistan, the production of wheat and rice is significantly and positively impacted by credit, owing to the considerable use of agricultural inputs and the commercial orientation of the crops (Moahid et al. 2023). Similarly, it is empirically supported that crops like sugarcane and cotton have credit benefits because of the additional working capital required for inputs such as pesticides, fertilizers, and for irrigational (Ullah et al, 2020).

The production of maize has also been positively responsive (to credit) particularly in the case of hybrid seed use in the area (Raza et al. 2021). Some research has suggested, and is mostly accepted, that slippages attributable to poor credit use and to the distortions of the productivity increase/decline attributable to the lack of robust institutional oversight (Farooq et al. 2023). There has been very little research on minor or area specific crops, like bajra and tobacco, although much research has been done and documented on the area and cash food crops. Most of the research either leaves out or aggregately summarizes the crops and therefore, the research on credits in the agricultural sector is very limited (Ahmad & Afzal 2020). The majority of the research in this area has woefully out of dated and the economically recently changed agricultural credit markedly within the sector unaccounted for. From the literature, it also seems that there are no extensive comparative studies analyzing the short-run and long-run impacts of credit on several crops in an integrated manner. Such gaps emphasize the importance of having an analysis that is disaggregated, by crop, to assess the impact of agricultural credit on the production of bajra, wheat, tobacco, sugarcane, maize, cotton, and rice in Pakistan, which the current study attempts to do.

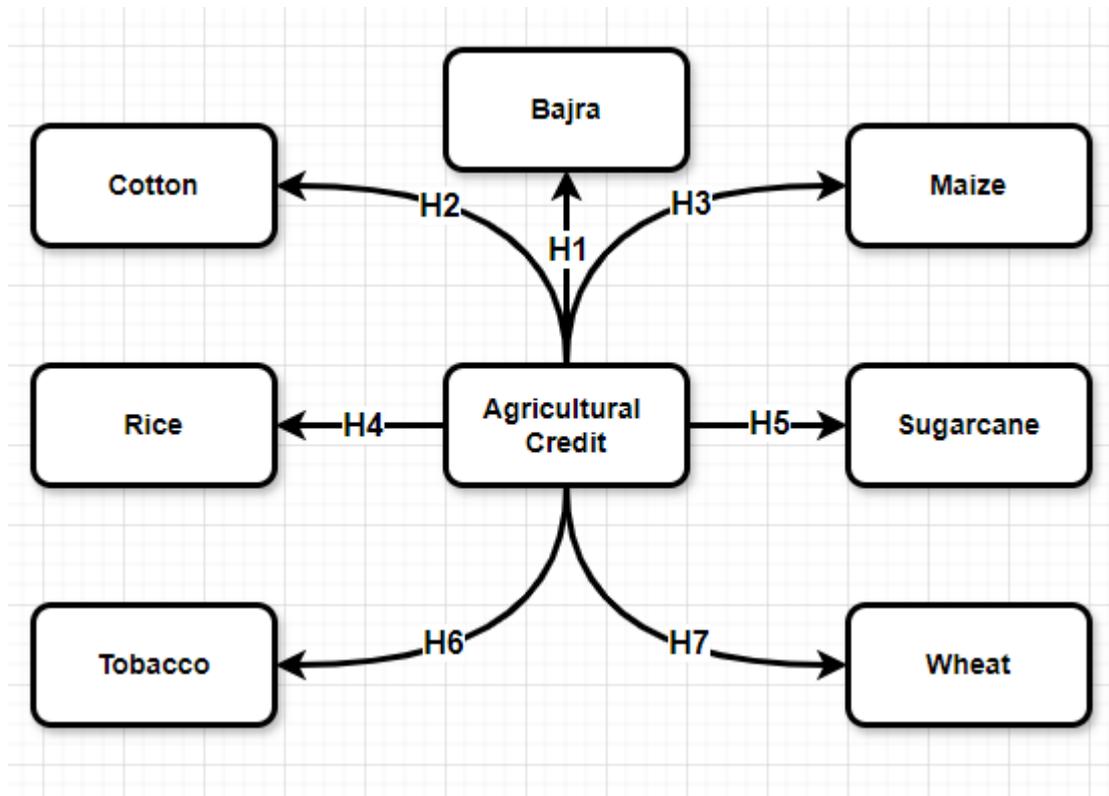


Figure-1: Conceptual Framework

3. Methodology

The research focuses on agricultural credit and its effect on the production of major and selected minor crops in Pakistan using a quantitative research model with secondary time series data. From the Ministry of Finance, Government of Pakistan, and the State Bank of Pakistan, reliable secondary data was obtained on agricultural credit and production of bajra, wheat, tobacco, sugarcane, maize, cotton, and rice for the period 2015-2025. These institutions offer reputable and consistent credit and agricultural output statistics which enhances the data's reliability and validity (SBP, 2023; Ministry of Finance, 2024). The main method of analysis for this study was Structural Equation Modeling (SEM) to measure the effect of agricultural credit on the production of individual crops. This study is best suited for using SEM because of its ability to estimate several relationships at the same time, measure errors, and other relationships within a system and among the variables (Hair et al, 2019). In this model, agricultural credit is the exogenous variable, and the production of bajra, wheat, tobacco, sugarcane, maize, cotton, and rice are the endogenous variables. According to Kline (2023), the SEM framework allows us to analyze the direct impact of agricultural credit on crop outputs and the total credit effect on agricultural production.

4. Results and Analysis.

The findings show that the impact of credit on the production of bajra is very positive owing to one of the path coefficients being high ($\beta = 0.772$) along with a significant t-value ($t = 6.382$, $p < 0.01$). Hence, H1 is accepted. The reason for this is that bajra is grown mostly in arid and



semi-arid areas where the farmers are poorly resourced, and financially depend on credit to buy farm production essentials, including, seeds, fertilizers, and irrigation. Small and subsistence farmers are able to get agricultural credit to boost their investment in crop productivity and output levels. The findings of the study show that available credit for neglected crop is important, and that financially, even low-input crops can perform better (Spies, 2023). Moreover, the approved H2 can be attributed to the fact that the estimated coefficient of cotton production is positive and statistically significant ($\beta = 0.431$, $t = 2.317$, $p < 0.05$). Cotton is a very commercially viable and, for the most part, a very input-intensive crop; that is, it involves high monetary investments for the provisioning of all the necessary productive inputs, such as fertilizers, pesticides, and their accompanying irrigation systems, which are required through the extended duration of the crop's growing season. Agricultural credit allows for the timely procurement of such inputs; thus, it aids in the cost of pest management, and, in turn, lowers the cost of production. Although in comparison with other crops the coefficient is not that high, this further justifies the evidence of the importance of credit in fostering the cotton production of Pakistan's export oriented agricultural economy (Abbas et al, 2021).

Most importantly, there exists a solid positive link between agricultural credit and maize production, which is reinforced by the strong coefficients ($\beta = 0.892$) and t-statistics ($t = 12.967$, $p < 0.01$). Therefore, H3 is accepted. The association is attributed to the more widespread use of hybrid maize varieties, which are more expensive due to the investments needed in seed, fertilizers, and mechanization. Agri credit allows farmers to take on modern production technologies which means more yield. It is maize production that responds best to the availability of credit (Adnan et al., 2021). Despite this, the findings creditably shows that agricultural credit impacts rice production positively ($\beta = 0.879$, $t = 11.795$, $p < 0.01$) which confirms H4. Growing rice in Pakistan is one of the most expensive crops due to the high water, labor, and other inputs needed. Without agricultural credit, farmers are unable to cover these costs to implement better production systems. The vital role of credit in increasing rice output hinges on food security and export earnings (Tuan Anh et al., 2020). This study accepted H5 which states that agricultural credit has a positive impact on sugarcane production ($\beta = 0.760$, $t = 5.436$, $p < 0.01$). As a complex perennial crop, sugarcane is water and fertilizer intensive which heightens the dependence of farmers on external financing. This describes farmers' production cycle and input use over time. The relationship confirms the importance of working capital for credit-dependent crops of longer durations (Saqib et al, 2021).

The results indicate that agricultural credit positively affects tobacco production ($\beta = 0.746$, $t = 5.032$, $p < 0.01$) lending support to H6. For tobacco production, cultivators need to obtain special production inputs, hire skilled labor, and incur costs for post-harvest handling, thus increasing production costs. When credit is available, farmers are able to cover the costs for these inputs which facilitates compliance with the quality criteria set by the processing firms. The role of credit in the production of cash crops, which is important for farm income and industry supply chains, is noteworthy (Ozdemir, 2024). Lastly, the H7 is accepted focusing on agricultural credit and wheat production relationship being the strongest with high coefficients and significant t values ($\beta = 0.906$, $t = 13.824$, $p < 0.01$) Khan et al. (2021) highlighted unquestionable and strong impact of agricultural credit on the wheat production. It is acknowledged that wheat is the major food crop with policy provisions on subsidies and food procurement, thus wheat the food crop policy is credited for high agricultural economic



subsidies and food production, in extension, for reducing the food insecurity, and credit on agricultural inputs upgraded the farmer's seed and irrigation technologies and during the production cycles. Further, strong credit is emphasized in relation to food security in Pakistan and is on stabilizing wheat production.

Table-I: Hypothesis Testing Results (Bootstrapping @5000 subsamples): -

Hypothesis:	β	Standard Deviation	T Statistics	P Values	Decision
Direct Effect					
H1: AgriCredit -> Bajra	0.772	0.121	06.382	0.000	Accepted
H2: AgriCredit -> Cotton	0.431	0.186	02.317	0.021	Accepted
H3: AgriCredit -> Maize	0.892	0.069	12.967	0.000	Accepted
H4: AgriCredit -> Rice	0.879	0.075	11.795	0.000	Accepted
H5: AgriCredit -> Sugarcane	0.760	0.140	05.436	0.000	Accepted
H6: AgriCredit -> Tobacco	0.746	0.148	05.032	0.000	Accepted
H7: AgriCredit -> wheat	0.906	0.066	13.824	0.000	Accepted

Note: ***, **, * Denotes significance Level @1%, 5% and 10%

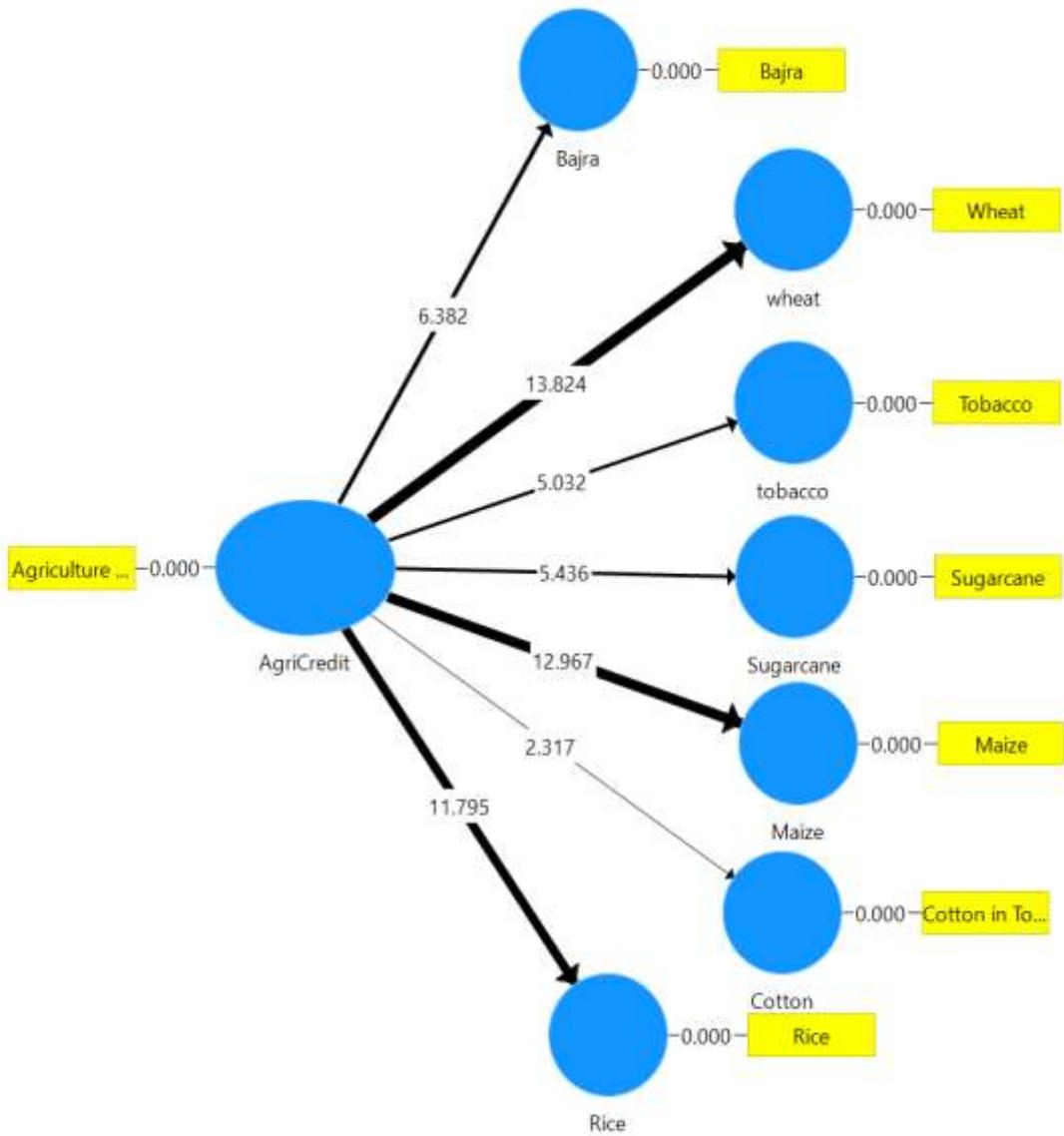


Figure-2: Structural Model.

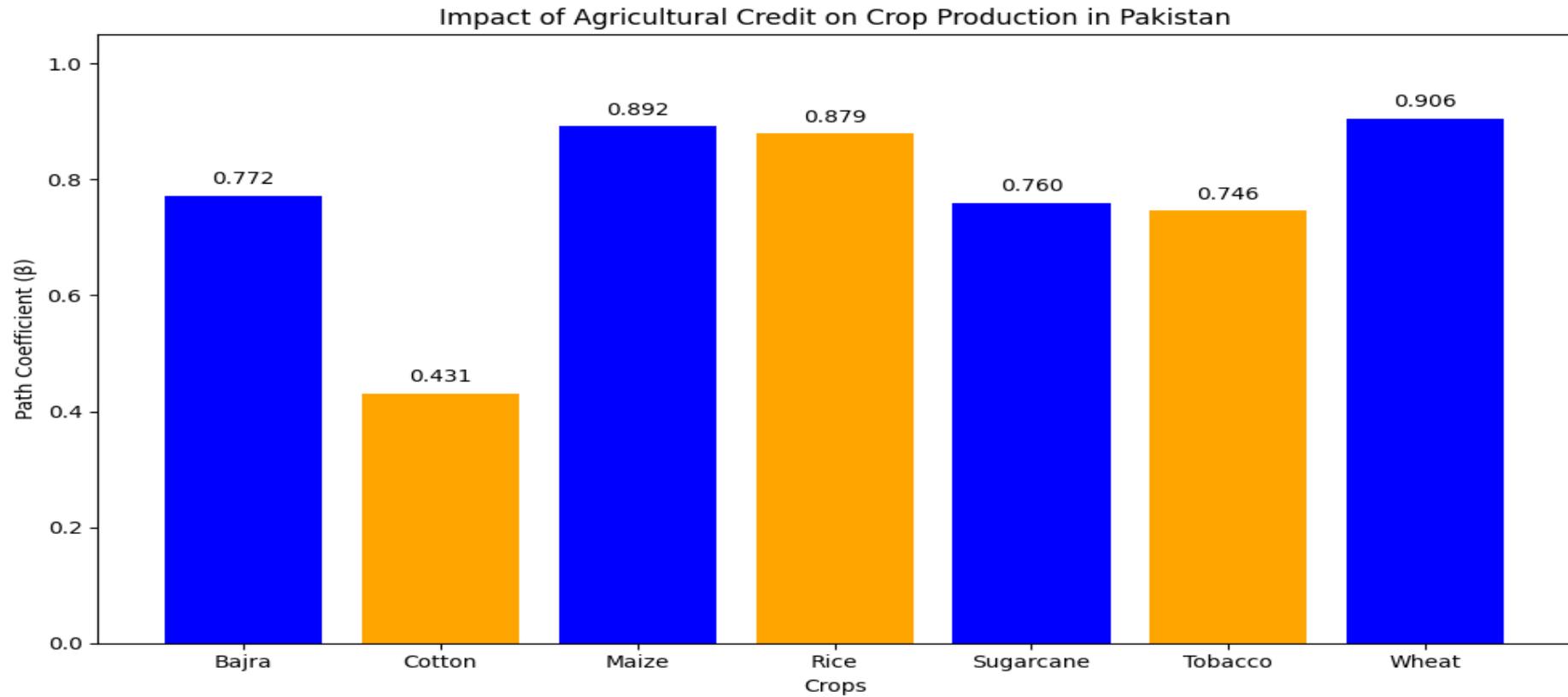


Figure-3: Beta Coefficient.



5. Discussion

The findings of this study illustrate how significant agricultural credit is for enhancing the levels of crop production in Pakistan. This is supported by the considerable positive influence agricultural credit has had on all the crops researched (Perveen et al., 2021). Between the crops studied, those which are staples (wheat, maize, and rice) and require heavy production inputs, are the most impacted by agricultural credit. What this entails is that, when farming practitioners are given agricultural credit, they can obtain higher quality production inputs such as seeds, fertilizers, and equipment for irrigation and mechanization, as well as invest in critical time periods for production. This credit research is similar to the most previous studies which stress credit's ability to alleviate liquidity constraints and encourage adoption of newer technologies in farming (Khan et al., 2021). Chandio et al. (2023) highlighted the significance of agricultural credit in wheat production and by implication, the food security and output stabilization of the agrarian economy of Pakistan. The other cash and small crops besides staple foods and the evidential impact of agricultural financing on development are also applicable to agricultural financing and the production of cotton, sugarcane, tobacco, bajra, and small lentils (Wahab et al, 2024). Credit helps diffuse some of the production-related constraints on the high cost, time, and risk associated with the market, although the impact of such production constraints differs from one crop to another (Abbas, 2022). Cotton's credit response is relatively low, which is at least partially due to structural constraints such as the pest problem, price rise, high input cost, and some other factors, which also operate to reduce the impact of credit (Ahsan et al, 2020). Given the relatively varying crop-related production structures, the financial crop-related production structures and the financial crop-related production structures, Pakistan appears to have an adequate cycle of pruned institutional credit delivery, optimized loan targeting, and crop-specific input credit supply to attain improved agricultural productivity as well as sustainable rural development (Farooq et al, 2023).

5.1. Practical Implications.

The results of this study have significant implications for all stakeholders, including farmers and those involved in banking, regulation, and policy-making within the agricultural and financial sectors in Pakistan. Why? Because of the statistically significant effect of agricultural credit on the production of the major and minor crops, farmers understand that production and income stabilization depends on timely access to formal credit. Because credit is available, productivity can influence and, as a result, output can be improved. When farmers know this, it will assist them in making better selections regarding the crops they will grow, the investments they will make, and the risks they will manage. What do commercial banks and other agricultural lenders have to gain from this study? First, there are positive effects of credit, but these effects can be to varying degrees for different crops. Therefore, in this case, customized lending products and services can be developed for different crops, such as wheat, maize, rice, sugarcane, cotton, tobacco, and bajra. This will assist in the financial and production cycles of agriculture. In addition, there is a significant credit gap that exists and will be reduced, thereby increasing the financial position of the lending institution. More so than the others, the results will assist the State Bank of Pakistan and the Ministry of Finance in creating credit policies that are agricultural in nature. The findings may assist regulatory authorities in adjusting credit allocation policies and guidance, refining credit monitoring



systems, and designing financial inclusion initiatives targeted at lower-order and underrepresented agrarian practitioners. Also, agribusinesses, input service providers, and development partners may utilize the findings to optimize their support services, contract farming, and extension methodologies to the credit production systems nexus. Within this context, the study contributes to the existing body of knowledge by fostering stakeholder collaboration and underscoring integrating the agriculture credit system in Pakistan, with sustainable agricultural and rural development.

5.2. Limitations and Avenue for Further Studies.

This study does contribute to outlining some of the impacts of agricultural credit on crop production in Pakistan, however, it does have limitations which need to be pointed out. First, the analysis is based on secondary time-series data acquired from relevant authorities, which as it stands, does not take into consideration the informal credit system, and the informal regional disparity in credit accessibility, which is commonplace for the agricultural sector in Pakistan. Secondly, the study attempts to explain the outcome of crop production by agricultural credit alone. Therefore, it does not consider other explanatory variables such as climate, the level of technology employed, the prices of agricultural inputs, the size of the holding, the quality of soil, and other factors. Third, in as much as Structural Equation Modeling helps in estimating many interrelationships, the use of national data averages conceals the differences within and between national entities, whether among provinces or within levels of aggregation in farming systems. In addition, the author perceives a straight-line relationship between agricultural credit and crop production without taking into account the advanced production theories of variable interdependencies, i.e., there are some crops which have very restricted levels of credit, or some which are in excess of credit.

This study opens several avenues for future research. Subsequent research can utilize farm- or province-level panel data to assess regional differences to gain an understanding of the impact of credit across varying agro-ecological zones. Future studies may analyze informal credit along with institutional credit to provide a more holistic view of the agricultural credit market. Additionally, empirical models may be enriched by including more variables, such as climate, technology, and input subsidies. Future research may utilize dynamic econometric methods or some form of non-linear modeling to analyze the short- and long-term effects of credit on crop production, as well as to identify and analyze any credit production thresholds that may exist. Lastly, research on the role of credit in promoting sustainable agricultural practices and climate-resilient farming may provide valuable insights to policymakers regarding the position of Pakistan's agricultural sector within a changing world.

6. References

- Abbas, G., Ali, A., Khan, M., Mahmood, H. Z., Wahab, S. A., & Amir-ud-Din, R. (2021). The transition from arid farming systems to agroforestry systems in Pakistan: a comparison of monetary returns. *Small-scale Forestry*, 20(3), 325-350.
- Abbas, S. (2022). Climate change and major crop production: evidence from Pakistan. *Environmental Science and Pollution Research*, 29(4), 5406-5414.
- Adnan, K. M., Ying, L., Sarker, S. A., Yu, M., & Tama, R. A. Z. (2021). Simultaneous adoption of diversification and agricultural credit to manage catastrophic risk for maize



- production in Bangladesh. *Environmental Science and Pollution Research*, 28(41), 58258-58270.
- Ahmad, D., & Afzal, M. (2020). Climate change adaptation impact on cash crop productivity and income in Punjab province of Pakistan. *Environmental science and pollution research*, 27(24), 30767-30777.
- Ahmad, D., & Afzal, M. (2022). Synchronized agricultural credit and diversification adoption to catastrophic risk manage for wheat production in Punjab, Pakistan. *Environmental Science and Pollution Research*, 29(42), 63588-63604.
- Ahsan, F., Chandio, A. A., & Fang, W. (2020). Climate change impacts on cereal crops production in Pakistan: Evidence from cointegration analysis. *International Journal of Climate Change Strategies and Management*, 12(2), 257-269.
- Chandio, A. A., Jiang, Y., Akram, W., Adeel, S., Irfan, M., & Jan, I. (2021). Addressing the effect of climate change in the framework of financial and technological development on cereal production in Pakistan. *Journal of Cleaner Production*, 288, 125637.
- Chandio, A. A., Jiang, Y., Akram, W., Ozturk, I., Rauf, A., Mirani, A. A., & Zhang, H. (2023). The impact of R&D investment on grain crops production in China: Analysing the role of agricultural credit and CO2 emissions. *International Journal of Finance & Economics*, 28(4), 4120-4138.
- Chandio, A. A., Jiang, Y., Rehman, A., Twumasi, M. A., Pathan, A. G., & Mohsin, M. (2021). Determinants of demand for credit by smallholder farmers': a farm level analysis based on survey in Sindh, Pakistan. *Journal of Asian Business and Economic Studies*, 28(3), 225-240.
- Farooq, U., Gang, F., Guan, Z., Rauf, A., Chandio, A. A., & Ahsan, F. (2023). Exploring the long-run relationship between financial inclusion and agricultural growth: evidence from Pakistan. *International Journal of Emerging Markets*, 18(7), 1677-1696.
- Gul, A., Chandio, A. A., Siyal, S. A., Rehman, A., & Xiumin, W. (2022). How climate change is impacting the major yield crops of Pakistan? an exploration from long-and short-run estimation. *Environmental Science and Pollution Research*, 29(18), 26660-26674.
- Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European business review*, 31(1), 2-24.
- Kaya, E., & Kadanali, E. (2022). The nexus between agricultural production and agricultural loans for banking sector groups in Turkey. *Agricultural Finance Review*, 82(1), 151-168.
- Khan, I., Akram, A., Fatima, S., Ahmad, B., Rehman, Z., Arshad, N., ... & Ahmad, Z. (2022). Problems of agriculture in Pakistan: an insight into their solution. *Pakistan Journal of Biotechnology*, 19(02), 73-83.
- Khan, N. A., Gong, Z., Shah, A. A., Abid, M., & Khanal, U. (2021). Farm-level autonomous adaptation to climate change and its impact on crop productivity: evidence from Pakistan. *Environment, Development and Sustainability*, 1-26.
- Kline, R. B. (2023). *Principles and practice of structural equation modeling*. Guilford publications.
- Moahid, M., Khan, G. D., Bari, M. A., & Yoshida, Y. (2023). Does access to agricultural credit help disaster-affected farming households to invest more on agricultural input?. *Agricultural Finance Review*, 83(1), 96-106.



- Ozdemir, D. (2024). Reconsidering agricultural credits and agricultural production nexus from a global perspective. *Food and Energy Security*, 13(1), e504.
- Perveen, F., Shang, J., Zada, M., Alam, Q., & Rauf, T. (2021). Identifying the determinants of access to agricultural credit in Southern Punjab of Pakistan. *GeoJournal*, 86(6), 2767-2776.
- Raza, M. Y., Khan, A. N., Khan, N. A., & Kakar, A. (2021). The role of food crop production, agriculture value added, electricity consumption, forest covered area, and forest production on CO2 emissions: Insights from a developing economy. *Environmental Monitoring and Assessment*, 193(11), 747.
- Saqib, S. E., Arifullah, A., & Yaseen, M. (2021). Managing farm-centric risks in agricultural production at the flood-prone locations of Khyber Pakhtunkhwa, Pakistan. *Natural Hazards*, 107(1), 853-871.
- Sardar, A., Kiani, A. K., & Kuslu, Y. (2021). Does adoption of climate-smart agriculture (CSA) practices improve farmers' crop income? Assessing the determinants and its impacts in Punjab province, Pakistan. *Environment, Development and Sustainability*, 23(7), 10119-10140.
- Spies, M. (2023). Promises and perils of the China-Pakistan economic corridor: agriculture and export prospects in northern Pakistan. *Eurasian Geography and Economics*, 64(7-8), 869-895.
- Tuan Anh, N., Gan, C., & Anh, D. L. T. (2020). Does credit boost agricultural performance? Evidence from Vietnam. *International Journal of Social Economics*, 47(9), 1203-1221.
- Ullah, A., Shah, T. M., & Farooq, M. (2020). Pulses production in Pakistan: status, constraints and opportunities. *International Journal of Plant Production*, 14(4), 549-569.
- Wahab, F., Khan, M. J., Khan, M. Y., & Mushtaq, R. (2024). The impact of climate change on agricultural productivity and agricultural loan recovery; evidence from a developing economy. *Environment, Development and Sustainability*, 26(10), 24777-24790.
- Yadav, I. S., & Rao, M. S. (2024). Agricultural credit and productivity of crops in India: field evidence from small and marginal farmers across social groups. *Journal of Agribusiness in Developing and Emerging Economies*, 14(3), 435-454.