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IMPACT OF AGRICULTURAL CREDIT ON FARMER'S INCOME: EVIDENCE FROM CENTRAL PUNJAB, PAKISTAN

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ABSTRACT

Access to credit had a substantial influence on farmers decisions, their income and the long-term sustainability of agriculture. This study investigated the impact of agricultural credit on farmers' income in Central Punjab, Pakistan. A conveniently chosen sample of 200 farmers from the Sargodha district was interviewed face-to-face on a structured, validated and reliable questionnaire. To explore the effect of agricultural credit along with different factors among small farmers, the Ordinary least Square (OLS) method was used. According to the results of the study for each unit increase in credit utilization, the predicted value of the dependent variable increases by approximately 6.691 units. This relationship is statistically significant at the 0.05 significance level. Other variables of age, family members and land ownership has also positive and significant impacts on the farmers' income while the variable of experience has a negative and significant impact. Policies should encourage responsible credit usage due to its proven positive and statistically significant effect on farmers' income. Such initiatives may include promoting financial literacy programs and ensuring access to affordable credit options. Agricultural credit adoption is influenced by various socioeconomic factors, which have a direct bearing on farmers' income. For the advancement of sustainable and inclusive agricultural development, policymakers should take these findings into account and design policies that facilitate credit accessibility, provide tailored financial education, and address the specific needs of diverse farming communities.

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INTRODUCTION

In developing economies, agriculture plays a vital role in overpowering starvation and poverty by creating job opportunities, ensuring food security and helping to promote the Gross Domestic Product (GDP) of a country. It also helps in achieving the Millennium Development

Goals (MDGs) to accomplish sustained economic growth. To meet this target, there is a steady movement of agriculture is shifting from a conventional approach to an advanced approach, to produce more (Hussain & Thapa, 2012; Jan et al., 2017; Saqib et al., 2018). Productivity of the agriculture sector increased through

the utilization of advanced technologies and modern techniques of cultivation. Agricultural credit is an important tool and plays a major role in accepting advanced technologies for the improvement of rural communities. Hence, agricultural credit has a great need in rural areas, where it helps to enhance agricultural productivity. Nevertheless, from formal sources access to credit is often a trouble for small farmholders due to shortages and lack of proper security or other conditions (Hussain & Thapa, 2012; Jan & Khan, 2012; Nouman et al., 2013). According to Mahmood and Bakhsh (2020) The efficiency of agricultural credit increases in large-scale farming as compared to small-size farming.

Institutional credit is a significant part of agricultural inputs. Advanced technologies play an important function in enhancing crop production and stimulating farming and financial improvement (Anang et al., 2015). The well-being of families is influenced by credit access (Zeller et al., 1998; Anjum et al., 2020) and reducing restrictions on crop development, thus enhancing the capacity of those who have minimum savings or who cannot afford the costs for their production of crops (Zeller et al., 1998).

Ahmad (2011) highlighted that in Africa and Asia, the development of smallholder farmers played an important role in the alleviation of poverty, living standards and food security by utilizing agricultural credit to improve production in agriculture. In the farming sector, the sources of formal credit for agriculture have enhanced than non-institutional credit for agriculture. Agricultural loan plays a major function in the production of agriculture, but access to credit is not easy for farmers because of complicated management procedures and limitations of the authorized formal credit lending institutions (Malik et al., 1991).

In emerging nations like Pakistan, small farm holder face difficulties in accessing credit for agriculture due to the very little amount of credit demanded by small growers, which cannot be managed easily, and the incapability to offer the collateral required by institutional sectors (Hussain & Thapa, 2012; Saqib et al., 2018). The rural economy of Pakistan is directly affected by its access to formal and formal sources of credit bureaus that have been set up to promote agricultural and rural economic growth. In rural Pakistan, Commercial credit institution provides rural mortgage for the improvement of the rural sector, and official institutions support agricultural

loans for particular functions to meet the agricultural families' necessities (Khandker & Faruquee, 2003).

REVIEW OF LITERATURE

Agriculture is the largest sector in Pakistan and has a significant impact on the country's social and rural conditions. As a major sector, it provides 21.4% of the Gross Domestic Product (GDP), employs 45% of the country's labour force and promotes other sectors of the economy to develop (GOP, 2018a, 2018b). For economic sustainable growth, uplifting people's life status and reducing poverty in Pakistan's backward areas, continuous agricultural growth is essential. In terms of agriculture, loans are available for various agricultural activities. Modern technology, fertilizers and better seed procurement are essential for the credit period. Therefore, agricultural credit is an important part of increasing innovation in the farming sector. At a large scale, emerging states have introduced structured institutions to provide micro-credit to farmers (Machete, 2004).

Farming and using these materials together result in higher productivity. However, it requires funds for farming communities (Bashir et al., 2010). To fulfill the needs of farmers money from savings or lending institutions is required. Therefore, agricultural credit is an important part of meeting investment needs. Also, agricultural credit is high in developing countries to modernize agricultural markets (Riaz et al., 2012). Amjad and Hasan (2007) found that small-scale farmers subscribe to primary sources compared to non-primary sources. However, these credit sources cannot meet the needs of farmers. Modernization of agriculture has led to the rapidly growing demand for credit needs of farmers in recent times. Pakistan's agricultural credit system includes fake and formal sources of credit. Sources are friends, family members, board members, employers and informal lenders. Currently, financial institutions such as Zarai Tarakiati Bank Limited (ZTBL), commercial banks and cooperatives are the main sources of credit. Due to the transformation of the agricultural sector (Jan et al., 2012; Shabir et al., 2020), the credit needs of farmers have increased rapidly in recent decades. ZTBL provides loans to Pakistani agricultural companies.

Credit facilities are a key factor in increasing access to credit for the rural poor, which reduces vulnerability

and short-term financing. It enhances the working ability of poor farmers by multiplying income in terms of physical and human resources (Okurut et al., 2004). Agricultural credit centres play an important role in agricultural modernization and rural economic development. Improvement of the farming sector depends upon the introduction of modern techniques, improvement of the work workforce, management of natural resources and betterment in the quality of the environment, agricultural institutional credit stands of greater importance.

Loan schemes for agriculture provide farmers with access to adequate infrastructure, modern technology, and a fair distribution of national resources to ensure food security and uproot poverty (World Bank, 2003). Funding for agriculture, in particular through credit to smallholders, proves to be a major drive for agricultural and economic development (Anetor et al., 2016). In Pakistan, the government has introduced policies for disbursement of credit among small farm holders to increase agricultural yield and thereby ensure food security. In its execution, the policy was somewhat satisfactory in increasing the number and opportunity of households receiving credit. However, it has not been very successful in meeting the needs of farmers (Hussain & Thapa, 2012).

It increases the gap between credit demand and credit supply. Agricultural loan facilities are of greater importance in increasing farmers' output in Pakistan. Researchers have shown that agricultural loan has a positive effect on agricultural production per hectare and contributes to farmers' and family education (Hussain & Thapa, 2012; Rahman et al., 2014; Saqib et al., 2016; Abdallah, 2016). The latest published research manifested a positive relationship between loans for agriculture and agricultural produce. For instance, it has increased the farmers' capacity to maximize the use of fertilizers and pesticides and thereby multiply their income. Rahman et al. (2014) and Akudugu (2016) argued that credit allows farmers to buy high-yielding varieties, effective medicines and fertilizers. Over time, there will be an increase in the share of the agricultural sector. However, the relationship between loan schemes and wheat production in Pakistan has been a concern of few researchers. Bashir et al. (2010) assessed the impact of loan schemes on wheat production by the application of the Cobb-Douglas yield function, the impact of credit

schemes upon per hectare wheat production, use of fertilizers and pesticides good watering and soil preparation. Similarly, Ahmad et al. (2015) stated that loan schemes for agriculture have an important impact on wheat production.

Most researchers have analyzed the influence of credit schemes on farm production in different parts of the world (Chandio et al., 2016) and revealed that loan schemes have a constructive impact on agricultural yields. Doubtlessly For the betterment of farmers' conditions, agriculture proves a major source. Credit works as a catalyst for enhancing agricultural output in developing countries (Okurut et al., 2005). The importance of the credit market in connection with food production is acknowledged universally. The role of loan schemes in agricultural production and the betterment of the socio-economic status of villagers in Pakistan are brought to light in recent studies.

Chandio et al. (2016) examined the effect of corporate credit, planting area, fertilizer usage, and access to water on wheat yield for 30 years. Considering the OLS method, the estimation results manifest corporate loans, planting fields and irrigation facilities leave a positive impact on said crop production in Pakistan. Another study by von Braun et al. (1993) shows that input costs stand 37% higher than those those who do not have access to informal credit have input costs 37 percent higher than those without access to informal credit. In the same way, other studies have pointed out the negative relationship between the dearth of access to loan schemes and agricultural yields in backward countries such as Pakistan, India, Kenya Ethiopia, Peru, Vietnam and Tunisia (Foltz, 2004).

Agricultural yield and security are negatively influenced by limited access to loan schemes. (Chandio et al., 2017) investigated the approach of smallholders to agricultural loans in Sindh province, Pakistan. By the application of the wage model, the results show that various socio-economic elements, consisting of family size, farming experience, lack of income and availability of contracts, have a significant impact on employment opportunities. Chachar (2007) has analyzed agricultural credit keeping in view the family size for output and advancement needs. In Pakistan, almost 95% of tillers own less than 25 hectares of land. In rural areas, agricultural loans are non-refundable except for those provided by ZTBL.

Farmer land ownership is a major determinant of access to formal credit, for example, Saqib (2015) finds a relationship between land ownership and opportunities for an agricultural loan. In addition, Akram and Hussain (2008) report that farmers have small inconsistencies such as small plots of land which stop their way to institutional credit. Moreover, land was the first and easiest form of contract to accept, preventing the majority of landless farmers from accessing formal credit markets. For instance, farmers with small farms have small access to rural loan schemes. Likewise, Dzadze et al. (2012) reported that large landholdings require greater access to credit while Javed et al. (2022) found that land increase hurts credit utilization.

Plus, new research finds that farm size affects the demand for farm loans. In addition, Kosgey et al. (2013) reported a direct relationship between farm size and the opportunity of finding institutional loans. The above study discussed that land area is a common decisive factor among others influencing access to agricultural credit, which can leave an impact on the need for loan schemes. SBP provides 70% loans to help small farmers. About 20% of total credit is given to farmers with economic potential and 10% to farmers with excess wealth (Saqib et al., 2016).

Ogada et al. (2014) found an increase the maize production by the availability of fertilizers and seed varieties arranged with the help of agricultural credit in Kenya. In addition, Saqib et al. (2016) and Hussain and Thapa (2012) reported that agricultural credit is essential for improving agriculture and developing a fish economy.

Khan et al (2019) found that smallholders use a major chunk of loans to arrange for soil preparation other inputs than the landlords. More loans for these activities. But in agriculture like the everyday use of pesticides, they need no credit.

Hussain and Thapa (2012) found that most farmers use agricultural loans for education, health-related issues, vacations and loan repayments. However, our research finds that large and medium-scale farmers often misuse agricultural credit. Our findings align with Chandio et al. (2018).

According to Nosiru (2010), agricultural loan is used for non-agricultural purposes. In the same study by de Klerk et al. (2013) Agricultural credit is widely applied for agricultural purposes. This research is

supported by the results of Katchava and Barry (2005) which show that agricultural loan is used in different ways. The study by Elahi et al. (2018) brought to light that poor tillers and money earners misuse agricultural loans for business and domestic activities. The findings by Raza et al. (2018) are akin to our research showing that agricultural credit is used for health care, education, housing needs, business and various services.

Many studies have examined farmers' access to agricultural loans, and their use and misuse of agricultural loans. However, several studies have examined the influence of agricultural credit on agricultural output. In addition, research has analyzed the use and misuse of credit as a percentage. Also, previous research has shown access to credit or lack of access. This study examines the factors that determine credit scores. First, study the influence of agricultural loans on agricultural output by collecting farm-level data. Second, assess the use and misuse of agricultural credit. Third, the factors that affect the amount of credit received by farmers are also investigated (Chaiya et al. 2023).

Due to small holdings, primitive farming techniques, insufficient water management and other factors, agricultural output is comparatively lesser in developing countries, especially in Pakistan. To maximize agricultural yield, agricultural credit is direly needed. When credit is available, farmers can purchase inputs and machinery for farming. The results show that although some farmers are involved in moneylenders, they can increase the production of agricultural loans. Farmers use loans for various agricultural activities. However, it was found that the use of credit varied among different groups of farmers in different activities. It is noted that large and medium farmers are more prone to mutualize the loans than small farmers. Socio-economic status is of vital importance in determining the size of agricultural credit. Policymakers are advised to ensure the easy access of these farmers to loans. agricultural output is multiplied, it ensures food security and proves a helping hand in lifting people above the poverty line. Moreover, strict action must be taken to curb the abuse of agriculture credit. Banks must ensure that loans are only used for agricultural purposes (Saqib et al., 2018; Chaiya et al., 2023). The provision of agricultural credit services

can be a source of poverty alleviation among farmers in the district (Sedem et al., 2016).

Other factors such as pre-existing household wealth, demographic characteristics and the surrounding physical, social and economic conditions are important factors in determining household income. Therefore, agricultural productivity can be constrained by factors far beyond the availability of credit, and changes in other input markets can have a significant impact on farm income, and thus productivity. Determining whether this variable is significant or not helps provide evidence of the impact of credit on agricultural productivity. Most of the research finds that credit constraints and agricultural production, profits and agricultural productivity have a negative relationship (Fletschner et al., 2010).

Every economic activity including agriculture relies upon financial resources. This problem is very serious in the agricultural economy. Shah et al. (2008) researched the relationship between loans and farm output and income of selected growers. For this purpose, data was collected from both borrowers and non-borrowers from selected villages in Chitral district in 2007. The findings indicate a positive correlation between agricultural production and agricultural credit. Selected farmers verified the similar relationship between their income and agricultural credit. This ratio is due to timely access and execution of the required resources by obtaining a loan from ZTBL.

Problem Statement and Objective

The agricultural sector in Punjab, Pakistan, holds a central position in the nation's economy (Khan et al., 2019). Nevertheless, even with the presence of agricultural credit programs, concerns are emerging regarding the influence of credit access on the income of farmers (Ahmed et al., 2020). The primary objective of this research is to assess the effectiveness of credit utilization in enhancing the economic welfare of farming households. These considerations hold significant importance in shaping policy choices and implementing initiatives geared toward the encouragement of sustainable agricultural growth and alleviating poverty within the region. Therefore, this study briefly discusses the impact of agricultural credit along with other socio-economic factors influencing the farmers' income. The specific objective of the research is to estimate the

impact of agricultural credit on the farmers' income and suggest policy recommendations.

METHODOLOGY

We picked a sample of 200 people to gather information. We used a well-organized list of questions that had already been tested during the pretesting phase. We talked to people directly to get the information for the said purpose. We chose district Sargodha from the central Punjab the province of Pakistan. We picked the people in a way that was easy for them. We looked at certain qualities based on the farming characteristics and chose 200 farmers through a convenient sampling technique. We made sure the questions were good for finding out about the farmers. We asked about things like how old they are, how much they know, how long they've been farming, how big their families are, how much money they make from farming, how many helpers they have, how much money they make from other things, how their families are set up, how much they spend, if they're married, how many people in their family help with farming, how much land they have, if they own it or not, and if they borrowed money. This study is all about why farmers in Sargodha, in Punjab, use credit for farming.

The model for the impact of agricultural credit utilization on the income of farmers is as under;

OLS was used for the analysis. The equation of the OS model is given below:

$$\text{AGINCM} = \beta_0 + \beta_1 \text{CU} + \beta_2 \text{AG} + \beta_3 \text{EXP} + \beta_4 \text{FM} + \beta_5 \text{EDU} + \beta_6 \text{FMF} + \beta_7 \text{LND} + \beta_8 \text{TN} + e \quad \dots\dots\dots (1)$$

The description of variables used is given as under;

Age of the farmer (AG): How old the farmer is.

Qualification of the farmer (EDU): How many years of schooling the farmer has.

Farming experience (EXP): How many years the farmer has been involved in farming.

Family members (FM): The number of people in the farmer's family.

Agricultural income (AGINCM): How much money the farmer makes from farming in a year from one acre of land (in thousands of Pakistani Rupees).

Family members involved in agriculture (FMF): The number of family members who help with farming.

Agricultural land (LND): How much land the farmer owns in acres.

Tenant cum owner (TN): Whether the farmer is both a tenant and an owner (1) or not (0).

Credit utilization (CU): Whether the farmer uses credit (1 for yes) or not (0).

RESULTS AND DISCUSSION

Socioeconomic Characteristics of Farmers

Table 1 shows that more than half (55%) of respondents were aged from 30 to 50 years, followed by 36% of respondents who fell into the age bracket of less than 30 years. Out of total respondents, 9% were aged >50 years. Regarding education, 34.5% of respondents had less

than matriculation. Whereas, 15.0% of respondents had matriculation. Out of the total respondents, 15 and 10% had graduation and master's degrees respectively. In the context of income, slightly more than one-fifth (21%) of respondents had income level <Rs. 40,000 followed by 49.5% of respondents reporting an income level of Rs. 40,000 to Rs. 70,000. Moreover, 29.5% of respondents had an income level of >Rs. 70000. In terms of land size, most of the farmers were small landholders. Almost 46% of respondents had less than 5 acres of land, 24% had 5-10 acres and 29.5% had more than 10 acres of land.

Table 1. Socio-economic attributes of the respondents.

Socio-economic attributes	Frequency	Percent
Age		
Less than 30 Years	72	36.0
30 to 50 years	110	55.0
More than 50 years	18	9.0
Education		
Under Matric	69	34.5
Matric	30	15.0
FA	51	25.5
BA	30	15.0
MA	20	10.0
Income		
Less than Rs. 40,000	42	21.0
Rs. 40,000 to Rs. 70,000	99	49.5
More than Rs. 70,000	59	29.5
Land size		
Less than 5 acres	93	46.5
5 to 10 acres	48	24.0
More than 10 acres	59	29.5

Impact of agricultural credit on farmer's income

Table 2 provides summary statistics of all variables used in a regression model to estimate the impact of different factors on the agricultural income of the farmers. As shown in the table the farmers' ages span a wide spectrum, ranging from 20 to 70 years, with an average age of 37.33 years.

Similarly, there exists diversity in educational levels, with an average of 10.51 years of formal education. These disparities in age and educational attainment underscore the heterogeneous nature of the farming population and how it may potentially influence their decisions regarding the adoption of agricultural credit

and its subsequent impact on income. The data reveals variations in farmers' experience in agriculture, with an average of 16.80 years. Those with more extensive experience in farming may be more inclined to strategically utilize agricultural credit, potentially leading to a positive effect on their income. The size of farming households also plays a pivotal role in agricultural credit adoption. The average family size is 7.015 members, with a range from 1 to 25 members. Larger family sizes may drive increased credit utilization as farmers seek financial support to meet the needs of their extended families, which can potentially have a positive effect on their income.

Table 2. Summary statistics of the Variables used in the Multiple Regression Model (OLS).

Descriptive Statistics	N	Minimum	Maximum	Mean	Std. Deviation
Age	200	20.00	70.00	37.3300	10.88594
Education	200	4.00	16.00	10.5100	3.42616
experience	200	2.00	50.00	16.8000	10.44873
Family members	200	1.00	25.00	7.0150	3.55640
Family member farming	200	1.00	8.00	2.3500	1.51624
Land	200	1.00	250.00	14.4525	35.38733
Tenant cum owner	200	0.00	1.00	0.2900	0.45490
Credit utilization	200	0.00	1.00	0.3300	0.47139

Table 3. Results of Multiple Regression Model (OLS).

Variables	Unstandardized Coefficients		t	Sig.
	B	Std. Error		
(Constant)	24.956	8.774	2.844	0.005
Credit utilization	6.691	3.315	2.019	0.045***
Education	.378	.466	.811	0.418
Experience	-.536	.219	-2.451	0.015***
Family member	1.964	.521	3.766	0.000***
Land	.117	.054	2.149	0.033***
Tenant cum owner	-3.132	3.396	-.922	0.358
Family member farming	-2.337	1.269	-1.841	0.067**
Age	.598	.201	2.977	0.003***
	R: 0.436a		R ² : 0.190	Adjusted R ² : 0.156

Note: OLS model and dependent variable is agricultural income (AGINCM)

Table 3 represents the OLS model. The R-value, also known as the Multiple Correlation Coefficient, measures the strength and direction of the linear relationship between the dependent variable and the independent variables in the OLS regression model. In this model, the R-value is 0.436, indicating a moderate positive linear relationship between the variables. The R Square, or Coefficient of Determination, represents the proportion of the variance in the dependent variable that is explained by the independent variables in the OLS model. In this model, the R Square is 0.190, suggesting that approximately 19.0% of the variance in the dependent variable can be accounted for by the independent variables. This indicates a relatively low degree of explanatory power. The Adjusted R Square is a modified version of the R Square that takes into account the number of independent variables in the model. It penalizes the inclusion of unnecessary variables and provides a more conservative estimate of the variance explained. In this model, the Adjusted R Square is 0.156,

indicating that about 15.6% of the variance in the dependent variable is explained while accounting for the model's complexity. For each unit increase in credit utilization, the predicted value of the dependent variable increases by approximately 6.691 units. This relationship is statistically significant at the 0.05 significance level ($p = 0.045^{***}$). This shows that credit utilization has a significant impact on farmers' income the results are aligned with Akram et al. (2020). For each unit increase in experience, the predicted value of the dependent variable decreases by approximately 0.536 units. This relationship is statistically significant at the 0.05 significance level ($p = 0.015^{***}$). For each additional family member, the predicted value of the dependent variable increases by approximately 1.964 units. This relationship is highly statistically significant at the 0.05 significance level ($p = 0.000^{***}$). For each unit increase in land ownership, the predicted value of the dependent variable increases by approximately 0.117 units. Land has a positive on agriculture income and the findings is

aligned with are aligned with Akram et al. (2020). This relationship is statistically significant at the 0.05 significance level ($p = 0.033^{***}$). Family member farming status is not statistically significant at the 0.05 significance level ($p = 0.067^{**}$), although it approaches significance. For each year increase in age, the predicted value of the dependent variable increases by approximately 0.598 units. This relationship is statistically significant at the 0.05 significance level ($p = 0.003^{***}$). The variable of Education, Tenant Cum Owner, and Family Member Farming do not appear to have a statistically significant impact on the dependent variable in this model, it's essential to continue monitoring them and consider additional factors that may influence economic outcomes.

CONCLUSIONS AND RECOMMENDATIONS

Promote responsible credit utilization, recognizing its positive and statistically significant impact on the dependent variable. This may involve initiatives such as financial literacy programs and ensuring access to affordable credit options. Emphasize the value of work experience, with policies designed to foster skill development and create job opportunities. Increased experience levels have a positive effect on the dependent variable. Take into account the influence of family size on the dependent variable. Policies supporting larger families, such as social welfare programs and family-friendly workplace policies, can yield positive economic outcomes. Implement policies that facilitate land ownership or access, as land ownership exhibits a positive and statistically significant effect on the dependent variable. Acknowledge the significance of age in economic outcomes. Develop policies addressing age-related concerns, including retirement planning and improved healthcare access for older individuals. It is essential to tailor these policy recommendations to the specific context and needs of the target population. Furthermore, further research and in-depth data analysis can offer a more nuanced understanding of the relationships between these variables and the dependent variable, facilitating more precise policy interventions. The adoption of agricultural credit is influenced by various socioeconomic factors, which in turn impact farmers' income. To promote sustainable and inclusive agricultural development, policymakers should consider these findings and craft policies that ease credit access, offer customized financial literacy

programs, and cater to the unique requirements of diverse farming communities. By doing so, an enabling environment can be created, empowering farmers to harness credit effectively, thereby enhancing their income, and fostering prosperity and economic growth in the agricultural sector. Governmental and agricultural institutions should prioritize educating farmers through proper training on the positive impact of credit utilization on agricultural production.

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