

Demand for institutional credit and determinants of credit constraints of farm households in Pakistan: Implications for sustainable rural development

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Agricultural credit is an important tool that can improve farm production, ensure food security, increase household income, and ultimately catalyze rural development. This study examined the factors affecting the credit constraints on farm households in Punjab, Pakistan. A questionnaire was administered, and 519 farm households were recruited from five randomly selected districts of Punjab province. The data were analyzed using a two-step methodology. In the first step, direct elicitation was used to identify the credit constraints of farm households. In the second step, the Probit model was employed to analyze the factors that affect the likelihood of farm households facing credit constraints. The results showed that household head education, farm size, and farm capital had significant negative effects on the presence of credit constraints. The dependency ratio and household consumption expenditures had significant positive effects on farm households' likelihood of being credit constrained. These findings may help to mitigate the removal of farm household credit constraints and improve access to institutional credit, as well as reducing food insecurity and income inequality. The Central Bank of Pakistan should strictly monitor the lending procedures of commercial banks and introduce relaxed policies for new applicants and small landholders. Driving down the interest rate for agricultural businesses and offering loans for improved farm technologies at subsidized rates could be another important policy option. Awareness sessions about lending and repayment procedures should be conducted at the village level.

Keywords: Food security, formal credit, rural development, small farmers, Pakistan.

INTRODUCTION

The economy of Pakistan has been affected by the escalation of the war on terror over the last four decades (Khalid, 2020), which infiltrated into the national economy through a decline in foreign direct investment (FDI) and a notable reduction in net exports (Zakaria *et al.*, 2019). The country's economic growth has, therefore, remained volatile, adding to the uncertainty surrounding the economic conditions (GOP, 2022). The World Bank (WB) documented that the poverty ratio in Pakistan stood at around 39% in 2021-22 but is expected to decrease to 37.9% in 2022-23 (World Bank, 2022). During the COVID-19 pandemic, some containment measures were undertaken and the majority of the farm households experienced losses in wages and non-farm earnings (Waheed *et al.*, 2022). Throughout the pandemic, many restaurants across Pakistan were closed and demand for

high-value agricultural products decreased. This situation increased the poverty and food insecurity in the country.

In Pakistan, close to 63% of the population reside in rural areas, and approximately 38% directly or indirectly engage in agriculture or related activities for income generation (GOP, 2022). Any improvement in the agriculture production system may increase farmers' income, ensure abundant and affordable food, enhance diverse food supplies, and generate an exportable surplus. Farmers are perpetually trapped in a vicious circle of poverty and debt and are often not in a position to secure basic farm inputs from their own sources (Chandio *et al.*, 2018; Saqib *et al.*, 2018). The occurrence of poverty is particularly high among farming communities in Pakistan and varies significantly across provinces (Hussain *et al.*, 2019; Khan *et al.*, 2021). A myriad of reasons behind farm households being credit constrained could include imperfections in the financial market, asymmetric

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information, lack of monitoring, and complicated lending procedures (Mehmood *et al.*, 2018). During the post-COVID-19 period, political instability in the country, and the steep rise in prices made farmers more vulnerable, especially small landholders, who had been unable to purchase fertilizer, pesticides, and other inputs (Yamano *et al.*, 2020). Flooding and bad weather are the key challenges that are very costly for farmers (Arshad *et al.*, 2016). Gang *et al.* (2022) stated that high uncertainty and risk involved in the agricultural sector restrict the willingness of financial institutions to finance this sector. Pakistan's agriculture sector has the potential to contribute significantly to the national Gross Domestic Product (GDP) and economic development, but one of the salient features of the under-development of this sector is the presence of an inefficient rural credit system (Mehmood *et al.*, 2017, 2018).

Adequate access to credit may help farmers to invest in a timely fashion in farm inputs to get a better return. Agricultural credit is considered a key factor in structural

transformation, allowing farmers to escape from poverty (Bashir *et al.*, 2010). This ultimately triggers rural development and the country's overall economic growth. On the contrary, credit-constrained farmers are less risk-averse and invest less in productive technology or use fewer inputs (Chandio *et al.*, 2018). Chandra *et al.*, (2017) noted that besides input purchasing decisions, farm households' credit constraints negatively affect the consumption of food and non-food items, health, and children's education. Ray (2019) stated that low rates of return, low income, and high financial obligations of farmers have increased the incidence of suicide. However, the Pakistani Government has devoted considerable resources to supplying cheap credit, and the Central Bank has introduced many effective schemes such as the SME Asaan Finance Scheme, Revolving Credit Schemes, etc., (GOP, 2021). The results of many of these interventions are quite disappointing. Although, the informal credit market continues to be the most dominant in rural areas, the high-interest rate

Table 1. Identification of credit constraints in earlier studies using direct and indirect approaches and their interpretation.

Study	Technique	Method	Interpretation
Amman <i>et al.</i> , 2020	Direct elicitation approach	Direct method	Farm household credit constraints had a significantly negative effect on farmers' welfare and income. Farmer welfare can be improved if formal credit market performs efficiently.
Mehmood <i>et al.</i> , 2017	Direct elicitation approach	Direct method	Farm households were credit constrained because they didn't have adequate access to credit, considering multiple reasons. Furthermore, credit-constrained wheat growers were 9 % less efficient in Punjab.
Li <i>et al.</i> , 2016	Direct elicitation approach	Direct method	The results of the instrument variable revealed that consumption expenditures of credit-constrained rural households' were 7.34% less than credit non-constrained.
Zhao and Barry, 2014	Direct elicitation approach	Direct method	Rural households in China face both supply and demand-side credit constraints that arise because of insufficient disbursement by the financial institutions, rejection of loan application and household risk averting behavior.
Zhao <i>et al.</i> , 2014	Direct elicitation approach	Direct method	The study revealed that the credit constraints of rural households may result in the crowding-out effect of household consumption from its production inputs.
Flestcher <i>et al.</i> , 2008	Direct elicitation approach	Direct method	Based on a panel data set collected from northern Peru. Flestcher and colleague investigated that 28 percent of the farm households are credit constrained that reduce their profits by an average of between 17 and 27 percent.
Boucher <i>et al.</i> , 2008	Direct elicitation approach	Direct method	The households are constrained of transaction and risk rationing but the estimated impact of quantity rationing is twice.
Vakis <i>et al.</i> , 2004	Mixture distribution approach	Indirect method	Identified credit-constrained households' behavior according to non-separability.
Jappelli, 1990	Life cycle hypothesis	Indirect method	Credit constrained if their applications were rejected by formal institutional sources or they failed to apply considering several reasons.
Diagne <i>et al.</i> , 2000	Directly eliciting credit limit information	Direct method	Classified households as credit rationed if they had availed a sufficient credit limit from any formal source or if the institutions state that they cannot obtain the loan.
Rosenweig and Wolpin, 1993	Finite-horizon, structural dynamic model	Indirect method	Identified credit constrained and investigated its effects on the accumulation of bullocks and agricultural profitability associated with bullock liquidity.
Zeldes, 1989	Life cycle model	Indirect method	The study stated that the inability to borrow from financial sources against labor income affects the consumption of a significant portion of the population.

and collateral, early repayment, and low funds, restrict the ability of poor households to acquire informal loans.

Previous studies that have examined the adverse effects of credit constraints in developing countries, suffer with various shortcomings (Hu *et al.*, 2020; Chandio and Jiang, 2018; Asiamah *et al.*, 2021). Their identification of credit constraints is done without any clear reason, while some studies have ignored possible dimensions of supply-side and demand-side credit constraints. The present study has accounted for these gaps and contributes to the existing literature in two different ways. Firstly, an in-depth review of the literature was done. Secondly, the identification of credit-constrained farmers was based on the direct elicitation method that covers supply-side and demand-side credit constraints. The recognition of credit-constrained households in our study was linked to the condition of non-price rationing, in which total and partial quantity rationing are considered to be supply-side credit constraints. On the other side, demand-side constraints are drawn from credit markets due to high transaction costs and to accomplish risk rationing. Our study also investigated the possible factors that affect credit constraints of farmers. We employed a Probit regression model to estimate the determinants of credit constraints. The research questions addressed were as follows: (i) Who is credit constrained in Punjab, Pakistan? (ii) What are the determinants of farm households' credit constraints?

The rest of the study is designed as follows. The next section explains the various approaches used in earlier studies to design a theoretical framework for the recognition of credit constraints. Section 3 provides a comprehensive description of the study area, the data collection procedure, and the econometric technique used for quantitative data analysis. Section 4 explains the findings of the empirical analysis. The final section provides concluding remarks and policy implications for future work.

Research Methodology to identify credit constraints and theoretical framework: The identification of credit constraints in earlier studies was challenging. This section illustrates the methods used in previous studies to identify credit constraints and to design a theoretical framework that highlights the multiple factors behind credit constraints being placed under non-price rationing.

Literature review to identify credit constraints: Various approaches have been used to identify credit constraints in literature. These can be divided into two categories: direct and indirect. Direct approaches are based on participants' replies to theoretical questions about their financial situation (Zhao and Barry, 2014; Li *et al.*, 2017; Mehmood *et al.*, 2018), while indirect approaches are based on assessments of theoretical framework involving credit constraints (Vakis *et al.*, 2004). The most commonly used models for indirect credit constraints identification contain the farm labor demand model and the consumption smoothing model (Rosenwieg

and Wolpin, 1993). Vakis *et al.* (2004) employed an indirect approach (a mixture distribution approach), to measure the probability of being credit constrained via a Peruvian dataset. The authors find this approach more reliable because allows for the identification of non-separability and heterogeneity inseparability. In another study, Jappelli (1990) used similar approach to investigate credit-constrained households, more specifically, whether their loan applications were rejected by financial institutions or they did not apply for loans at all. Using the direct method and considering multiple reasons for the identification of credit constraints, Mehmood *et al.* (2017) found that farm households are credit-constrained due to their inadequate access to institutional credit. Further, they showed that how credit-constrained wheat growers are 9% less efficient than credit non-constrained in the state of Punjab (Pakistan). Li *et al.* (2016) in rural China use the direct elicitation method and highlight the consumption expenditures of credit-constrained households, which are 7.34% less than those who are not subjected to credit constraints. Fleischer *et al.* (2008) also use the direct approach and underline the importance of credit, based on a panel dataset collected from Northern Peru. They identified that financial inefficiency and credit constraints among 28% of farmers, reduced their profits by an average of, approximately, 17 to 27%. This study, therefore, adheres to the method employed by Fleischer *et al.* (2008); Li *et al.* (2016), and Mehmood *et al.* (2017). It uses the direct identification method and categorizes credit constrained households under factors relating to both the supply- and demand-side.

Theoretical Framework: To identify whether a farmer is credit constrained, one should be clear about its credit requirement from external financial sources. Sufficient amount of internal credit arrangement within the household results in zero external demand, hence considered as credit non-constrained. Based on the notion of non-price rationing, the authors designed a comprehensive model and classified reasons for credit constraints. This model not only incorporates the traditional supply-side constraints but also includes demand-side withdrawal from financial markets considering several reasons.

Demand-side credit constraints are usually embodied by households' risk aversion or take the form of credit depression and high transaction costs (Boucher *et al.*, 2008). While, it is possible that demand-side constraints also arise due to financial market imperfections, its formation specifically relates to households' risk aversion and cognitive biases, such as fear of losing property, fear of loan rejection, and fear of repayment. Strict regulation in the banking system increases risk dispersion that prevents households to take loans and invest in advanced inputs. In addition, the risk aversion of farm households explains their preference for fixed revenue and their reluctance to accept risks that may strengthen the effects of demand-side credit constraints. Transaction cost

rationing usually occurs because of the time costs associated with the approval and disbursement of formal loans. In agricultural enterprises, the scattered location of households in rural areas contributes to the high transaction costs. In this situation, farm households may give up taking institutional loans.

Supply-side credit constraints arise from the financial institutions' side. Empirically, supply-side credit constraints of farm households are associated with loan application rejection, whereby financial institutions cite several reasons, such as no mortgage or lack of guarantor, doubtful credit history, and shortage of capital. If anyone of these conditions is fulfilled, supply-side credit constraints can emerge. However, if an applicant receives a partial amount then it can be categorized into partial quantity rationed of credit. Zhao and Barry (2014) reported that supply-side credit constraints may arise when lenders deny accepting the loan application or deliberately release some partial amount with an incentive to avoid future default. However, if an applicant's loan application is considered for final approval and receives the requested amount they are not considered as credit constrained.

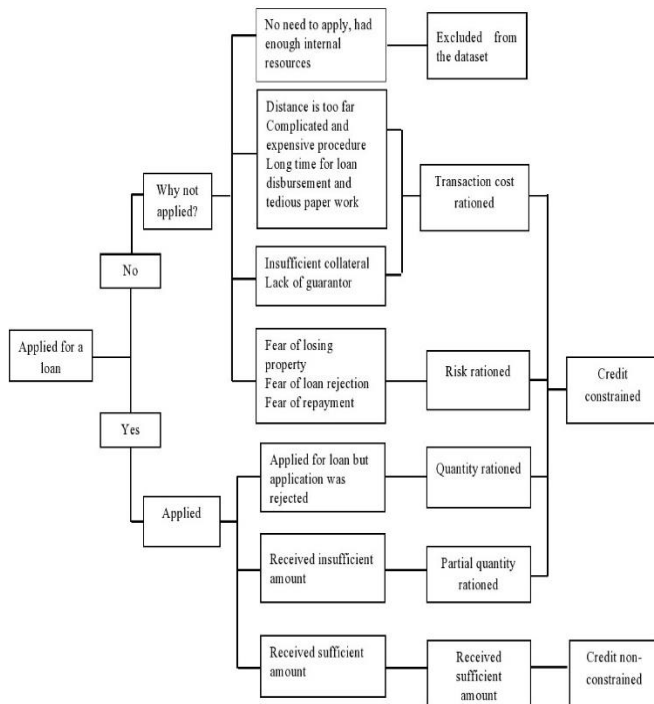


Figure 1. Identifying credit-constrained (both demand-side and supply-side credit constrained) and credit non-constrained farm households using direct elicitation method

MATERIALS AND METHODS

The study was conducted in the Punjab province of Pakistan. The province is densely populated, and a major proportion of

the population (around 65%) lives in rural areas. A majority of the rural population is directly or indirectly involved in agricultural activities. Punjab's soil is highly fertile, and varieties of crops, including wheat, rice, cotton, and sugarcane, are grown in the province (GOP, 2022). These four crops account for approximately 90% of the value added in major crops. Punjab also has the world's best canal irrigation system. The world-famous long grain basmati rice is also grown in a certain part of central Punjab. Punjab province was deliberately selected as a universe of the study due to its significant share of national gross domestic product, the area under cultivation, and the high engagement of labor in agricultural activities (Mehmood *et al.*, 2022). A high percentage of small landholders who cultivate crops in the province face a myriad of challenges, such as climate change, insect/pest attacks, water scarcity, and high input prices. Furthermore, they remain neglected in the financial market when trying to secure a loan.

A random sampling technique was used to collect the desired information from the targeted population. Five districts, namely Gujrat, Shikhpura, Faisalabad, Sahiwal, and Bahawalpur, were selected from Punjab province. Information from farmers (both who received and did not receive credit from formal sources) was obtained. A list of credit-using farmers was obtained from the financial institutions operating in the respective districts. Thus, a sample of 519 farmers was obtained, and, based on the theoretical model, 351 farmers were identified as being credit constrained and 168 as credit non-constrained. To obtain the required information, a well-structured and pre-tested questionnaire was used. The questionnaire consisted of different sections, including socioeconomic characteristics, farming characteristics, access to institutional credit, and credit constraint status obtained from the farmers. The questions included in the questionnaire were based on the author's observations and recent relevant studies (Zhao and Barry, 2014; Li *et al.*, 2016). Experts in agricultural economics and financial policy reviewed the questionnaire to assess the content validity. The questionnaire was framed in English but information from farmers was collected in Punjabi (local language).

To analyze the determinants of credit constraints, a Probit model was employed. The dependent variable (Y_i^*) i.e., credit constraints in the analysis is binary; i.e., it equals one for those who were credit constrained and zero for others. In equation (1), X^i indicates a vector of explanatory variables that could affect the credit constraints of farmers and μ_i the error term. This error term is normally distributed with zero mean and constant variance.

$$Y_i^* = X^i \beta + \mu_i \quad (1)$$

$$Y_i = \begin{cases} 1, & \text{if } y^* > 0 \\ 0 & \text{if } y^* < 0 \end{cases} \quad (2)$$

$$= \Pr(y = 1) = \Pr(x^i \beta + \mu_i > 0) \quad (3)$$

$$= F(X^i \beta) = F(X^i \beta) \quad (4)$$

Table 1. Supply-side credit constraints (partial-quantity rationing and total-quantity rationing) and demand-side credit constraints (transaction-cost rationing and risk rationing) of farmers (N= 351).

Description	Shiekhupura	Sahiwal	Faisalabad	Gujrat	Bahawalpur	Total	%
Partial quantity rationed	24	5	8	12	4	53	15.09
Total quantity rationed	8	0	6	3	5	22	6.26
Quantity rationed	32	5	14	15	9	75	21.36
Long distance	16	3	7	4	7	37	10.54
Complicated procedure	9	10	5	9	12	45	12.82
Long time and tedious paperwork	6	26	3	5	8	48	13.67
Insufficient collateral/ lack of guarantor	7	5	0	14	3	29	8.26
Transaction cost rationed	38	44	15	32	30	159	45.29
Fear of losing property	3	6	2	7	5	23	6.55
Fear of rejection	8	2	5	9	0	24	6.83
Fear of repayment	16	8	11	20	15	70	15.38
Risk rationed	27	16	19	36	20	117	28.15

Ten independent variables included in the model are household head age measured in years, household head education measured in schooling years, and dependency ratio measured in ratio form by dividing the number of dependent persons by the working persons then multiplying by 100. The income diversification index is measured using the Herfindahl Hirschman index (HHI) ($\sum_{i=1}^n S_i^2$) and it ranges from zero to one as estimated by Mehmood et al. (2021a, b). Farm size is defined as the total area owned by farmers for cultivation including rented in (measured in hectares). Farm capital is defined as the total assets available at a farm owned by a farmer (e.g., machinery, equipment, building, etc.) measured in US \$. Household consumption expenditures, defined as household total monthly consumption expenditure (measured in the US \$); distance to bank, defined as how far a bank is away from a farmer's home (measured in km). A dummy for district Shiekhupura (if a farmer resides in district Shiekhupura then one, otherwise zero); a dummy for district Gujrat (if a farmer resides in district Gujrat then one, otherwise zero).

RESULTS

Credit constraints status of farm households: District-wise status of credit-constrained farmers is presented in Table 2. Out of 351 credit-constrained farmers, 21.36% reported total quantity rationing of credit, including total-quantity rationing (6.26%) and partial-quantity rationing (15.09%). This particular situation falls under the category of supply-side credit constraints. On the other hand, around 45% of the farmers reported transaction-cost rationing that includes: long distance from bank branches (10.54%), complicated banking procedures (12.82%), long time and tedious paperwork (13.67%), and insufficient collateral/lack of guarantor (8.26%). Around 117 farmers (28.15%) were identified as credit-risk rationed which includes: fear of losing property (6.55%), fear of loan rejection (6.83%), and fear of repayment (15.38%). Finally, 21.36% of farmers were identified as

supply-side credit constrained, and 78.64% as demand-side credit constrained.

Determinants of credit constraints of farm households: The results of determinants of farmers' credit constraints are presented in Table 3. The coefficients of household head education ($\beta = -0.030$), farm size ($\beta = -0.251$), farm capital ($\beta = -0.0001$), and district Gujrat ($\beta = -0.357$) had significant negative effects on the credit constraints of farmers. The coefficients of dependency ratio ($\beta = 0.310$) and household consumption expenditures ($\beta = 0.001$) were positive and significant. Household head age, income diversification index (HHI), distance to bank and district Shiekhupura did not show any significant influence on farmers' credit constraints. The goodness of fit of the model employed can be assessed further by Pseudo R^2 (0.21), LR χ^2 (67.43), and the log-likelihood statistic (-124).

Table 3. Determinants of credit constraints of farm households using the Probit regression model.

Variables	Coefficient	SE	ME
Household head age (years)	0.0006	0.006	0.0002
Household head education (years)	-0.030*	0.015	-0.010*
Dependency ratio (%)	0.310**	0.145	0.107**
Income diversification Index (HHI)	-0.093	0.290	-0.032
Farm size (Ha)	-0.251***	0.0350	-0.087***
Farm capital (US\$)	-0.0001*	0.0001	-0.00004*
Household consumption expenditures (US\$)	0.001**	0.0005	-0.0003**
Distance to bank (km)	0.010	0.015	0.003
District Shiekhupura (1= yes)	0.010	0.155	0.003
District Gujrat (1= yes)	-0.357**	0.168	-0.130**
Log-likelihood	-273.00	-	-
LR χ^2	103.00	-	-
Pseudo R^2	0.158	-	-

SE: Standard Deviation; ME: Marginal Effect; *P < 0.10; ** P < 0.05; *** P < 0.01

DISCUSSION

One of the reasons for the under-development of the Pakistani rural economy is the inefficiency of the formal credit system. Farming communities in rural Pakistan are confronted with a myriad of challenges. The increasing prices of farm inputs, outdated technology and credit constraints increase the vulnerability of farm households. The majority of the farmers, especially small landholders, have poor resources; including the issue of water scarcity, increasing prices of fertilizers, pesticides and outdated technology, resulting in low productivity, extreme poverty, food insecurity, and the slow growth of the agricultural sector (Bashir and Mehmood, 2010; Chandio and Jiang 2018).

There are two types of credit sources in Pakistan: informal sources and formal sources. In informal credit markets, money is usually borrowed from friends, relatives, landlords, traders, commission agents, and private professional moneylenders that charge high-interest rates. Loan repayment is often for a short period with high collateral requirements. People sometimes hesitate to borrow money from an informal source due to the social stigma that is attached to borrowing (Amanullah, 2020). On the other side, the formal credit market is inefficiently performing due to multiple reasons. Bank officials critically review the loan applications, demanding a variety of documents (legal and non-legal), and in most cases rigorously evaluate the net worth of loan applicants. This procedure sometimes takes six months or more from application submission to loan approval. If the loan does get approved then farmers are asked to prepare the legal documents themselves and pay extra money for mortgage purposes. For these additional procedures, farmers have to wait for even longer, often months. Gonzalez-Vega (2003) stated that high transaction costs and the risks associated with the rural credit market indicates a large degree of market fragmentation. The absence of suitable assets as collateral for loans, political interference regarding the sanctioning of loans, complicated banking procedures, etc., results in high disappointment and the exploitation of loan applicants. Mehmood et al. (2012) noted that elements of bribery also prevail and a considerable amount is needed to pay for loan approval. All these issues restrict the farmers ability to apply for a loan, creating an ever-increasing debt burden on the rural population. Such situations encourage willful default, hampering the credit efficiency system. The present situation presents a challenge for both government agencies and policymakers alike, as they know the importance of finance for both agricultural growth and economic development. The need to remove farmers' credit constraints, reducing the debt burden of the poor household, increasing farm production, and to ensure food security in the region, effective financial institutional policies are direly needed. The Central Bank should also create a system of appropriate policies for the restructuring and rescheduling of loans in the

case of non-repayment. This will provide a chance for farmers to pay back their loans, resulting in the security of their mortgaged property and in turn, further improving the efficiency of the Pakistani credit system. Nevertheless, excessive involvement of political interference in the disbursement of loans should be discouraged.

The results of the Probit regression model showed that the household head education had a significant negative effect on the credit constraints of farmers (Table 3). The value of the coefficient signifies that a 1% increase in household head education decreases farmers' credit constraints by 0.030%. Education is a significant component of human capital and enables comprehension of the complicated procedure of institutional credit. The findings are in line with the studies by Lin et al. (2019) and Asiamah et al. (2021). On the contrary, the variable of dependency ratio had a significant positive effect on farmers' credit constraints. A high dependency ratio in a family leads to an increase in household expenditure, a decrease in productivity, and results in farmers' credit constraints. Evidence by Cruz and Ahmed (2018) stated that an increase in the share of the working-age population in a household reduces poverty and results in higher per capita income growth. Neither the household head age nor the income diversification index had any significant effect on farmers' credit constraints.

The coefficient of farm size had a significant positive effect on farmers' likelihood of being credit constrained. This result is consistent with that of the Pakistani farmers Saqib et al. (2016) (2016) and Chandio and Jiang (2018) studied. Larger farm holdings allow farmers to cultivate more land, and receive greater returns, which ultimately eliminates their credit constraints. In rural Punjab, the average rent for land per acre is approximately PKR 100,000/per year. Thus, in most cases, farmers rent their land to generate income and eliminate their credit constraints. In contrast to this study's results, Ojo and Baiyegunhi (2020) found that farm size had no effect on farmers' credit constraints. The coefficient of farm capital was significant at the 10% level. These findings are consistent with those in Kofarmata et al.'s (2016) earlier study. Further, Twumasi (2020) and Akudugu (2016) stated that, in Ghana, the availability of capital encourages farmers to engage in farming and helps them improve their operations by purchasing hybrids, agrochemicals, and farm machinery, and hiring skilled laborers. The coefficient of household consumption expenditures had a significant positive effect on farmers' credit constraints. The results showed that farmers who had higher household consumption expenditures are more likely to be credit constrained, findings that Li et al. (2016)'s earlier study supports. The coefficient of District Gujarat had a significant negative effect on credit constraints, while the coefficient of District Sheikhpura was non-significant. This showed the presence of regional disparities in the operation of Sheikhpura's rural financial markets. In a similar study, Kedir (2003) noted that compared to District

Mekele, the households of Districts Addis Ababa and Bahar Dar were more credit constrained.

Limitations of the study: Our study has some limitations that are worth noting. This study aimed to assess the credit components only. Information about other services offered by financial institutions, including crop insurance schemes and the profit on saving accounts were not collected from the respondents. Farmers who were credit constrained from informal sources were not included in the analysis. Household consumption expenditure was considered as a proxy for household welfare. Information bias may have occurred as the data was collected on the respondents' past recall. The findings of this study can only be generalized for other provinces if similar data is collected and analyzed from all four provinces in Pakistan.

Conclusion: Farming communities in Pakistan direly need credit. The issues of credit constraints, higher input costs, and low returns in agribusiness make farmers more vulnerable. Using a direct elicitation approach, around 68% of farm households were identified as credit constrained, including total quantity rationed of credit (21.36%), transaction-cost rationed (45%), and credit-risk rationed (28.15%). Household head education, farm size, farm capital, and residency in the Gujrat district significantly decreased the probability of a farm being credit constrained. It appears that both supply- and demand-side credit constraints are faced by farmers in Pakistan. Emphasis should be given to relaxing financial institutions' policies, as 21.36% of the farmers stated the total quantity rationed of credit. Financial institutions are reluctant to issue funds in agriculture due to the high uncertainty in this sector. Introducing a comprehensive government insurance scheme, along with timely disbursement in the case of natural calamities may solve the issue of quantity rationing. Creating awareness and knowledge about agricultural credit and banking loaning procedures may reduce demand-side credit constraints, and such education should be done at the village level. The Central Bank must critically monitor the loan disbursement time, lending procedure, and loan documentation asked by each commercial bank. Most importantly, the Central Bank should drive down the interest rate and offer different credit schemes for introducing new farm technologies with highly subsidized interest rates. Such policies and efforts can reduce poverty and improve the food security of farm households.

Authors Contribution Statement: All authors contributed to the study conception and design. Yasir Mehmood was responsible for the questionnaire design, methodology, data collection, data analysis, and manuscript draft writing; Muhammad Arshad was involved in the questionnaire design, methodology, data analysis, interpretation of results and manuscript reviewing; Rong Kong and Muhammad Khalid

Bashir, was responsible for interpretation of results and proofreading of the manuscript.

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