



## CREDIT DEMAND AMONG SMALL FARMERS: A DISTRICT LEVEL APPROACH, PAKISTAN

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### ABSTRACT

In the current study, determinants of credit demand among small farmers in the Mandi Bahauddin district of Pakistan were investigated. For this purpose, interviews with 123 small farmers in six villages of this district were conducted. Both qualitative and quantitative techniques were used to examine factors that affect credit demands. Seven determinants were devised and tested, and a probit model was employed to analyze the effects of education, household size, and income on the credit demand. Through qualitative methods, factors like informal lending, interest rate, consumption smoothing, and transaction cost were analyzed. It was noted that informal borrowing, higher interest rates, and high transaction costs crowded out formal lending. A positive correlation was observed between education and credit demand. Household size and all types of incomes did not significantly correlate with credit demand.

### Contribution/ Originality

Holding small land by the majority of farmers and having no other major source of income, makes high credit demand theoretically understandable. The objective of the study is to identify important factors that play a significant role in decision making of small farmers, regarding demand for formal loans, which has not extensively available on district level in Punjab province of Pakistan.

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## 1. INTRODUCTION

A light purse is a heavy curse. People living in rural areas of Pakistan, are very familiar with this saying. These are people mostly having small land and fewer opportunities to earn livelihoods. Pakistan has a population of 197 million, of which 64 percent live in rural areas (World Bank, 2017). Poverty incidence is higher in rural areas than in urban areas, since rural households rely mostly on agriculture as their main source of income (Akhtar, 2012). More than seven hundred million people globally live in a household with per capita income of \$ 1.90 per day or less (World Bank, 2015).

The federal and provincial governments of Pakistan and non-governmental organizations (NGOs), are responsible for credit disbursements to support small farmers, by providing financial services. Among small and big financial institutions, the most prominent are Zarai Taraqati Bank Limited (ZTBL), Bank of Punjab (BoP) and National Bank of Pakistan (NBP); and among NGOs, the most prominent are Agha Khan Rural Support Program (AKRSP), National Rural Support Program (NRSP) and Orangi Pilot Project (OPP). Extensive research have been carried out, to compared incomes and overall living standards of borrowers and non-borrowers in different areas of Pakistan. Some of these showed positive signs of improvement in living standards. For instance, micro credit significantly improved households' income (Waheed, 2009). Households with access to credit are often more able to increase their income and food consumption than those without credit (Sharma and Zeller, 1998). Similarly, institutional credits in Pakistan are not only effective determinants of the agricultural output, but also affect household consumption and other household welfare indicators (Khandker and Faruquee, 2003). Credit disbursements by Pakistan Poverty Alleviation Fund decreased the poverty level of borrowers from 6.61% to 3.07%.

The effectiveness of microcredits and commercial loans among small farmers depends on the demand and supply of credits. The scope of this study is limited to the demand side of credits in the Mandi Bahauddin (M.B.Din) district. It is a plain area situated at the heart of Pakistan and very suitable for agricultural production. This district is enriched with vast irrigation facilities as it is bounded by the country's two big rivers i.e. Chenab and Jhelum<sup>1</sup>. Like the rest of the Punjab province, there is also a high concentration of small farmers surviving in this district. The majority of farmers own less than 12.5 acres of land. In 2010 in the Punjab province, 90.52% of small farmers holding land less than 12.5 acres of land, owned just 58% of farms and 9.48% of farmers owned 42% of farms (Naseer *et al.*, 2016).

Credit demands depends on different factors such as education, households' size, interest rate, collateral, assets, households' income and so forth. For instance, interest rates charged on the microcredit loans were greater than other loans (Fernando, 2006). This was because, the credit services provided were for small sums of money and the administrative costs of these small loans made the interest rates high. The distance from the rural borrower to the bank, was an important determinant affecting access to credit (Mensah *et al.*, 2017). A positive correlation was observed between credit demand and family size (Shah *et al.*, 2008). The age, education, marital status, farm type, farm size, and farm status are key determinants in credit obtained and repayment (Du *et al.*, 2008). Group based lending also released need for collateral for households that had previously limited access to loans from conventional commercial banks (Kausar, 2013).

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<sup>1</sup> For this reason, it was named Mandi Bahauddin (or Market Bahauddin) after the establishment of a grain market in the early 20<sup>th</sup> century (District Courts, 2018).

## 2. METHODOLOGY

### 2.1. Site selection

To gather information pertaining to credit demands among small farmers, M. B. Din was selected for data collection. The total population of the district, is 1.59 million, and the total reported area of the district is 269,000 hectares, and the total agricultural land being used for all types of cultivation purpose is 226,000 hectares (PBS, 2018; BOS, 2010). Total of 6 villages were targeted from all three tehsils (sub-district) and villages were selected in such a way that no corner of the district was left unattended. Lakhnewala and Shahidanwali are situated on the east side, Chak Abdullah on the south, Wara Alam Shah at the centre, Kang Sahali on the south-east corner and Badshahpur on the north-west corner. All the households interviewed, owned at least some land, but there were some households who had rented out their land and earned their income from other activities different from agricultural farming.

### 2.2. Data collection

The total rural population of the district was around 1.26 million, and the total numbers of rural households were 199336. There were 4852 total households in six villages (PBS, 2018). The data was collected from 123 farm households. In this study, a household was defined as: members of a household, living in the same lodging and acknowledge a common household head and eat commonly prepared food together (Beaman and Dillon, 2010). The sample size with respect to rural households of the entire district was 0.061% of the population and 2.53% of the population with respect to six villages. Around 9 weeks were devoted on interviewing the farmers with the help of a questionnaire. The questionnaire was also translated into Urdu - the national language. The total agricultural land owned by 123 small farmers was 464.7 hectares (or 1148.3 acres of land) with an average of 9.33 acres per farmer, which made up of 0.20% of the total agricultural land in the district. The questionnaire details are given in the appendix.

### 2.3. Econometric and statistical models

The probit model is used to estimate the credit demand, and to know the effects of certain factors on credit demanded. It was assumed that every household faced two choices, either to take credit from formal lending institution or not at all. Thus, the general model is represented as:

$$D_i = f(\text{Age}_i, \text{Edu}_i, T\_Mem_i, \text{Total\_Y}_i, T\_Assets\_value_i) \dots\dots\dots (1)$$

Where  $D_i$  is a dummy variable taking value; 1 if the individual took credit, and 0 otherwise.  $\text{Age}_i$  and  $\text{Edu}_i$  represents head of the households' age and education, while  $T\_Mem_i$ ,  $\text{Total\_Y}_i$  and  $T\_Assets\_value_i$  represents the household size, total income, and the total value of household's assets.

$$\text{Got\_loan}_i = \alpha_0 + \alpha_1 \text{Age}_i + \alpha_2 \text{Edu}_i + \alpha_3 T\_Mem_i + \alpha_4 \text{Total\_Y}_i + \alpha_5 T\_Assets\_value_i + \varepsilon_i \dots\dots\dots (2)$$

$\text{Got\_loan}$  represents credit demand (binary outcome) variable. Total income variable was decomposed into three types of incomes i.e. livestock income, agricultural production income and other sources of income.

By replacing the separate income variables with total income variable, the estimated model (2) changed to equation (3):

$$\text{Got\_loan}_i = \alpha_0 + \alpha_1 \text{Age}_i + \alpha_2 \text{Edu}_i + \alpha_3 T\_Mem_i + \alpha_4 \text{Live\_Y} + \alpha_5 \text{Prod\_Y} + \alpha_6 \text{Oth\_sou\_Y} + \alpha_7 T\_asset_i + \varepsilon_i \dots\dots\dots (3)$$

According to factors based on the previous studies, following signs of coefficients were expected:

**Table 1a: Expected signs of the predictors**

<i>Variables</i>	<i>Expected Signs</i>
Edu	(+)
T_Mem	(+)
Total_Y	Non-linear (+/-)
Live_Y	Non-linear (+/-)
Prod_Y	Non-linear (+/-)
Oth_sou_Y	Non-linear (+/-)
Interest rate	(-)
Transaction Cost	(-)

Due to expected nonlinear correlation of income with credit demand, square of all types of income and total income variables were also included in the probit model (Table 1b).

**Table 1b: Squared income variables**

LiveY_sq	Square of livestock income
ProdY_sq	Square of (agricultural) production income
OthY_sq	Square of other sources of income
TotalY_sq	Square of total income

### 3. RESULTS AND DISCUSSION

#### 3.1. Descriptive analysis

Only 5 households were found to be headed by widows and all other households were headed by husbands. No women were head of the household in the presence of the husband. The average age of head of households (HHHs) was 54 years. In addition, average household size was 6 persons, ranging from 2 persons to 16 persons in a household.

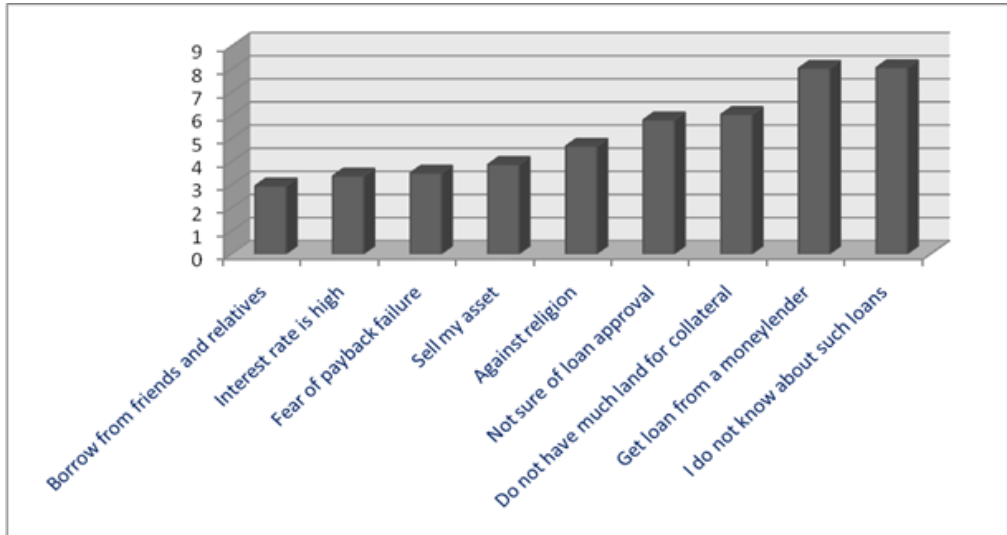
Among 123 households, 79 households (64.22%) never applied for any kind of formal loan and only 44 (35.78%) had applied for loans. It could be noticed that credit rationing was a minimal factor here because, among 44 households who applied for any loan, 43 (97.72%) got the same amount for which they had applied for and only one person was rejected (see Table 2).

**Table 2: Distribution of households based on demand for credit**

	<b>Applied</b>	<b>Not Applied</b>	<b>Total</b>	<b>Got Loan</b>	<b>Rejected</b>	<b>Total</b>
No. of Households	44	79	123	43	1	44
Percentage	35.78%	64.22%	100%	97.72%	2.28%	100%

#### 3.2. Informal lending

79 respondents, who had never applied for any sort of loan at any financial institution, were asked to rank 9 possible stated reasons in the questionnaire, and were also allowed to give any other reason apart from the stated reasons. The ranking was based on the following principle i.e. Rank 1= most likely to Rank 9 = most unlikely. To get an average score for each reason, the mean values of each reason were calculated. Then mean values of each reason were tabulated in ascending order. The respondents ranked the reason '*borrow from friends and relatives*' (with mean value 2.94) as their most likely reason and '*I don't know about such loans*' (with mean value 8.06) was found to be the most unlike reason for not taking loans from financial institutions at the time of credit need (see Figure 1). This also shows that the respondents were aware of the possibility and availability of loans from banks.



**Graph 1: Ranking of reasons**

Out of 43, who got formal loans, more than half i.e. 25 (56.81%) households also got loans from informal sources (i.e. informal lending, friends, relatives and inter-linkages). These people borrowed money from informal sources 141 times, which was almost twice as often as formal loans. Not surprisingly, the majority of these loans were taken from friends and relatives i.e. 128 times, collectively (see Table 3). So, this proved that informal lending from friends and relatives crowded out formal lending, which could be explained by the reason that, loans from friends and relatives were interest-free.

**Table 3: Informal loans distribution**

Loan type	Frequency (last 5 years)
Informal lending	1
Friends	59
Relatives	69
Inter-linkage	12
Total times	141
Average informal loan (USD)	286

**3.3. Interest rate**

The second most commonly stated reason for not applying for any formal loan was a high rate of interest on bank loans (Figure 1). While in hypothetical questions sub-section (see appendix), households gave first priority to the low interest rate. The second important thing was to instalment condition. It implied that returning half loan after one year was more difficult for them than returning the full amount after two years. This could be possible because, farmers usually did not have other sources of income, and they did not earn and save much from agriculture so that they could repay the loan. Another reason could be that, their discount rates were higher than the interest rates, so that paying back after two years gave them a higher net present value, than paying back after one year. The collateral condition was the third in the list of priorities. They preferred smaller collateral conditions in the requirements list for a loan. Group lending was the least important for farmers.

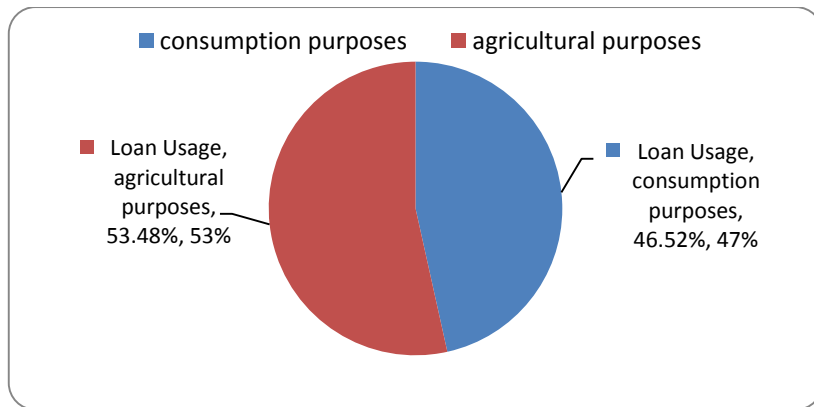
**3.4. Transaction cost**

It was further hypothesized that, high transaction costs resulted in less demand for loans. Apart from stated reasons in the questionnaire for not taking loans; 20 respondents out of 79 also stated

other reasons, such as corruption, remittances and no need (to get a loan). Not surprisingly, 40% described corruption as one reason for them not to ask for a loan. Other reasons included difficult to find a guarantor who was acceptable to banks, lengthy and difficult procedure works and administrative charges. This showed a possible impact of transaction costs on the farmers' decision.

### 3.5. Consumption smoothing

The data showed that out of the 43 households who took formal loans, 20 (46.52%) used their loans for consumption purposes such as son or daughter's marriage, house construction or renovation, to repay private and informal loans etc. The other 23 (53.48%) households used the loans for agricultural purposes such as purchasing seeds, fertilizers, tractors, fuel etc. (see Figure 1).



**Figure 1: Percentage of loan usage**

Upon further decomposing the loans' distribution, it came out that out of the 43 households who received formal loans, 37 households had applied for agricultural loans from different banks but only 24 respondents (64.86%) used these loans for agricultural purposes. The remaining 13 households spent these loans on consumption purpose. 6 households out of 43 households applied for loans for other purposes than agriculture (see Figure 2 & 3). All of these loans were spent on activities for which they were taken. So, the data did not verify that the majority of the loans were spent for consumption smoothing.

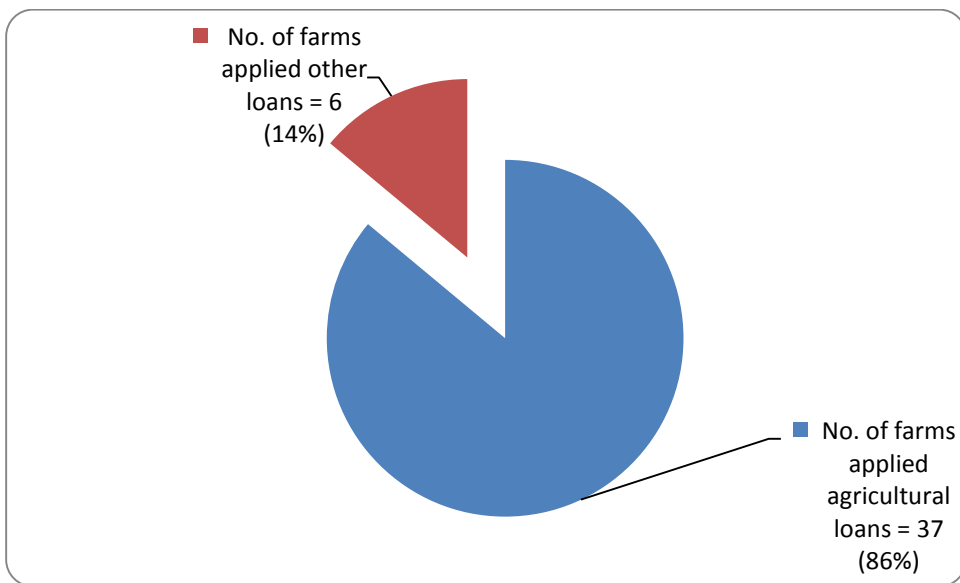


Figure 2: Loan applications distribution

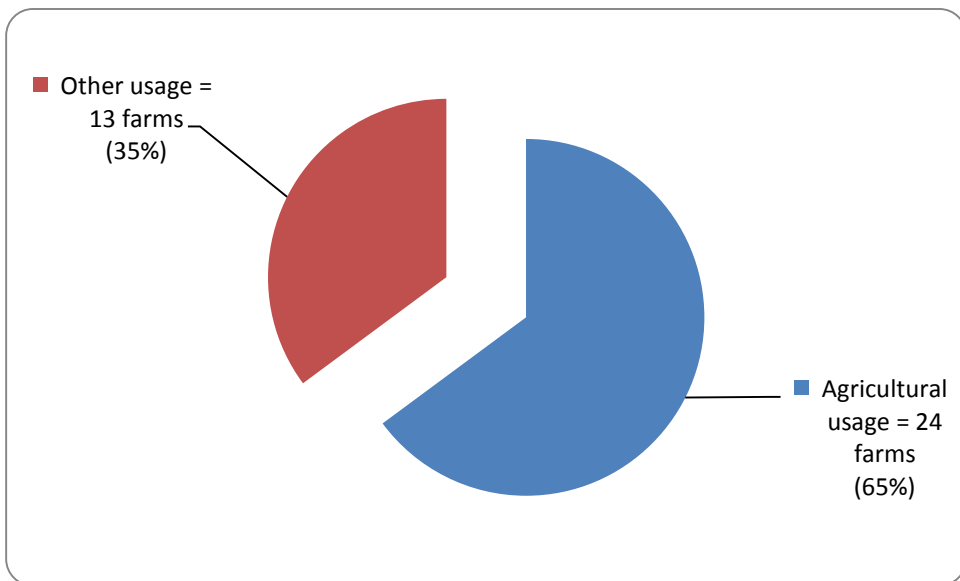


Figure 3: Agricultural loans usage distribution

### 3.6. Econometric analysis

The overall probit model was statistically significant at 95% of the confidence interval, showing that at least one of the regression coefficients was not equal to zero (Table 4). The results of the whole estimation can be seen in the appendix.

Table 4: Results of probit model

Variable (Got_loan)	Coefficient	Standard Error	Z	p> z	Marginal Effects
Age	0.002	0.011	0.24	0.809	0.000
Education	0.739	0.028	2.6	0.009	0.224***
Total members	0.078	0.060	1.3	0.192	0.023

Livestock income	-9.26e-13	2.08e-06	-0.45	0.656	-2.81e-07
Livestock income sq.	9.32e-13	3.43e-12	0.27	0.786	2.83e-13
Total asset value	-5.14e-08	2.22e-07	-0.23	0.817	-1.56e-08
Production income	3.23e-07	2.39e-07	1.34	0.181	9.74e-08
Production income sq.	-1.91e-14	1.86e-14	-1.03	0.303	5.81e-15
Other sources income	-1.22e-07	5.12e-07	-0.24	0.811	-3.72e-08
Other sources income sq.	4.24e-14	1.72e-13	0.25	0.806	1.28e-14
Constant	-2.064	0.833	-2.48	0.013	

No. of obs. = 123; Wald  $\chi^2$  (11) = 23.24; Prob. >  $\chi^2$  = 0.016\*\* Log LH = -66.058;  
Pseudo  $R^2$  = 0.1764

\*\*\* Significant at 1%

### 3.7. Education

A significant positive impact of education was found on credit demand. However, interpretation of the coefficients in probit regression was not as straightforward as the interpretations of coefficients in linear regression or logit regression. The increase in probability attributed to a one unit increase in a given predictor is dependent both on the values of the other predictors and the starting value of the given predictors. The results in Table 4 showed that, increase in years of schooling would increase the predicted probability of credit demand (with 0.009 p-value). The marginal effects showed that changing one unit in the education variable, increases the probability of credit demand by 0.022. Thus, higher education could reduce the cost of gathering information, and make the understanding of loan regulations easier. It could also imply that higher educated respondents had higher income to repay loans.

### 3.8. Family size

Surprisingly, *household size* showed no significant influence on credit demand. The two-way graph showing credit demand (Got\_loan) and household size (T\_Mem) revealed a positive pattern in the data (see figure 1 in Appendix). It was plausible to use consumer/worker ratio variable, instead of household size variable in line with the intuition that higher consumer/worker ratio could lead to increase in credit demand. The result showed that (like household size) consumer/worker ratio also did not affect credit demand.

### 3.9. All (decomposed) incomes

The probit model showed insignificant relationships between all sources of income and credit demand. It was plausible to expect that increase in income could increase credit demand first, as a farmer might want to enhance agricultural production or to start a small business along with agricultural farming. After some time, the farmer could be self-reliant and need no further financial assistance, which might result in a decrease in credit demands with further increase in income. By taking square of all sources of income variables, new variables were generated (i.e. LiveY\_sq, ProdY\_sq and OthY\_sq). These variables also show an insignificant association in the probit model.

### 3.10. Livestock income

However, the quadratic fitted values graph between credit demand and (squared) livestock annual income variable, showed a convex relation (see Figure 2 in appendix). The intuition behind this convexity could be that, when livestock income is increasing, the farmers' need for loan may decrease. After a certain amount of increase in livestock income, they might think about taking loans for enhancement of their livestock or to start other production activities along with livestock farming.

### 3.11. Production income

In the case of agricultural production income, the quadratic fitted values graph (see Figure 3 in appendix), showed a concave relationship between credit demand and agricultural production



income. The intuition could be that, at a lower level of agricultural production, income credit is needed to enhance production activities; for instance, by renting more land or buying agricultural inputs such as improved seed and fertilizer. At higher levels of agricultural production income, they might not need as many credits anymore. This could be because of management problems of big land, unavailability of more land to rent etc.

### **3.12. Other sources of income**

Like the livestock income variable, the quadratic fitted other sources of income variable also showed a convex relationship with credit demand (see Figure 4 in appendix). Other sources of income included selling of milk, salary, business, land rents, remittances and pension. The reasons behind this convex relationship could be the same as in the case of livestock income. For instance, if a household's income increased due to a job, promotion in a job, land rents, remittances etc. then at the first, credit demand could decrease. After sometime, when they have savings in the banks, it might be a possibility that they could take loans by relying on these savings, which would result in increased credit demand. It implied that, the relationship between credit demand and all incomes also depended on other things e.g. availability of land for rent, rents on land, different crops and livestock markets, etc., but these elements were beyond the scope of the current study.

### **3.13. Total income**

The regression analysis of total income instead of decomposing income, did not yield any significant results for the income variables. It showed a concave relationship between demands for credit and total income, which might imply that increase in total income would eventually decrease credit demand (see Figure 5 in appendix). It might imply that at first when income increased, farmers demanded credits to enhance agricultural activities like taking land on rent, buying of new livestock or establishing a small business, and then afterwards, they might not need any loan for financial support. However, this result is not significant, as can be seen by the heavy shaded area around the fitted line.

## **4. CONCLUSION**

In order to determine the impacts of certain factors on credit demand, interviews of 123 small farmers were conducted in six villages of the Mandi Bahauddin district of Pakistan. With the help of this dataset, seven determinants were tested, of which four factors (informal lending, interest rate, consumption smoothing, and transaction cost) were tested through qualitative methods, and the remaining three factors (education, family size and income) were tested through a quantitative method. Out of 123 households, the majority of small farmers had never applied for any formal loan and listed 'borrowing from friends and relatives' as the most likely reason for not applying for formal loans, thus indicating that informal lending crowds out formal lending. Moreover, their second-most likely reason for not applying for formal loan was high interest rates. In the hypothetical loan packages section, farmers preferred those packages that offered a loan at low interest rate. Apart from the stated reasons, a considerable number of farmers described corruption as a reason for not seeking any loan, which affirmed the third factor (i.e. transaction cost). However, the data could not verify the hypothesis that most of the formal loans were taken for consumption smoothing rather than for agricultural purposes.

In the quantitative analysis, a probit model was used to analyze the impact of education, household size, and income on credit demand. It was noted that years of education for the head of household increased the probability of credit demand, but no significant impact of household size on credit demand was observed. However, the coefficient had the expected positive sign. Furthermore, no significant correlation between all types of income and credit demand was found.

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## APPENDIX

### Questionnaire details

The first part of the questionnaire collected information about household characteristics, such as gender, age, marital status, education, occupation etc. The second part was about the households' assets and properties. Assets included land, livestock and machinery. The value of the assets was derived from the estimated price of the assets on which farmers were willing to sell them. The third part was about farmers' previous year production activities. All types of commonly cultivated crops, fruits, vegetables and pasture were included. The last part was about other sources of income, for example, income from rented out land, selling of milk, jobs, remittances etc. The last part was about credit and borrowing. It was further divided into 3 parts; applied and got loan (both formal and informal), applied but could not get and never applied for any loan. Those who never applied for loans, they were further questioned about their preferences to the loans with varying attributes e.g. interest rate, less collateral, payback period, group lending etc. with the help of hypothetical loan packages (Table a and b).

**Table A: Detail of all packages**

<i>Packages</i>	<i>Amount (USD)</i>	<i>Interest rate (%)</i>	<i>Payback period (Years)</i>	<i>Collateral (Acres of land)</i>	<i>Payback installment (USD per year)</i>	<i>Group lending (Number of persons)</i>
Package 1	2000	10	2	5	-	-
Package 2	2000	17	2	3	-	-
Package 3	2000	10	2	3	1000	-
Package 4	2000	10	2	-	-	4

**Table B: Hypothetical scenarios**

<b>Scenarios</b>	<b>Packages</b>	<b>Your preferences</b>
Scenario 1	Package 1 vs Package 2	
Scenario 2	Package 1 vs Package 3	
Scenario 3	Package 1 vs Package 4	
Scenario 4	Package 2 vs Package 3	
Scenario 5	Package 2 vs Package 4	
Scenario 6	Package 3 vs Package 4	

### Probit model estimation of determinants of demand for credit

No. of obs	= 123
LR Chi <sup>2</sup> (12)	= 28.30
Prob > Chi <sup>2</sup>	= 00.50
Log likelihood	= -66.058
Pseudo R <sup>2</sup>	= 0.176

<b>Variable</b>	<b>Coefficient</b>	<b>Standard error</b>	<b>Z</b>	<b>P &gt;  z </b>	<b>95% Confidence interval</b>	
Age	0.0027	0.1151	0.24	0.809	-0.0197	0.0253
Education	0.0739	0.2840	2.60	0.009	0.0183	0.1296
Total members	0.0784	0.0601	1.30	0.192	-0.0394	0.1964
Live stock income	-9.26e-07	2.08e -06	-0.45	0.656	-4.99e -06	3.14e -06
Live stock	9.32e -13	3.43e -12	0.27	0.786	-5.79e -12	7.66e -12

income sq.						
Total assets value	-5.14e -08	2.22e -07	-0.23	0.817	-4.87e -07	3.84e -07
Production income	3.20e -07	2.39e -07	1.34	0.181	-1.49e -07	7.90e -07
Production income sq.	-1.91e -14	1.86e -14	-1.03	0.303	-5.55e -14	1.73e -14
Other source income	-1.22e -07	5.12e -07	-0.24	0.811	-1.13e -06	8.81e -07
Other source income sq.	4.24e -14	1.72e -13	0.25	0.806	-2.96e -13	3.80e -13
Lakhnewala	0.9478	0.4939	1.92	0.055	-0.2034	1.9159
Shahidanwali	0.7268	0.5093	1.43	0.154	-0.2725	1.7251
Badshahpur	0.8474	0.5015	1.69	0.091	-0.1356	1.8304
Wara alam shah	0.4655	0.5432	0.86	0.391	-0.5990	1.5302
Chak Abdullah	-0.8992	0.6413	-1.40	0.161	-2.1562	0.3577
Constant	-2.0645	0.8331	-2.48	0.013	-3.6974	-0.4316

### Marginal effects

Variable	dy / dx	Standard error	Z	P >  z	95% Confidence interval	
Age	0.0008	0.0034	0.24	0.809	-0.0060	0.0077
Education	0.0224	0.0078	2.85	0.004	0.0070	0.03794
Total members	0.0238	0.0178	1.33	0.183	-0.0112	0.0589
Live stock income	-2.81e -07	6.29e -07	-0.45	0.655	-1.51e -06	9.52e -07
Live stock income sq.	2.83e -13	1.04e -12	0.27	0.786	-1.76e -12	2.33e -12
Total assets value	-1.56e -08	6.75e -08	-0.23	0.817	-1.48e -07	1.71e -07
Production income	9.74e -08	7.13e 08	1.37	0.172	-4.23e -08	2.37e -07
Production income sq.	-5.81e -15	5.58e -15	-1.04	0.298	-1.67e -14	5.13e -15
Other source income	3.72e -08	1.55e -07	-0.24	0.811	-3.42e -07	2.68e -07
Other source income sq.	1.29e -14	5.24e -14	0.25	0.806	-8.98e -14	1.16e -13
Lakhnewala	0.2881	0.1430	2.01	0.044	0.0076	0.5685
Shahidanwali	0.2209	0.1506	1.47	0.142	-0.0742	0.5161
Badshahpur	0.2576	0.1468	1.75	0.079	-0.0302	0.5454
Wara alam shah	0.1415	0.1635	0.87	0.387	-0.1790	0.4621
Chak Abdullah	-2.733	0.1920	-1.42	0.155	-0.6497	0.1030

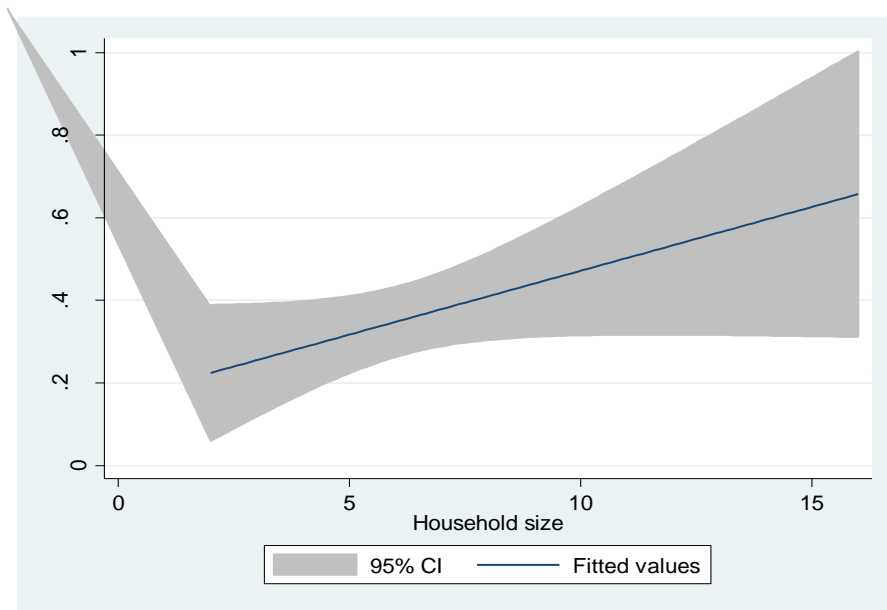


Figure 1: Households size and demand for credit

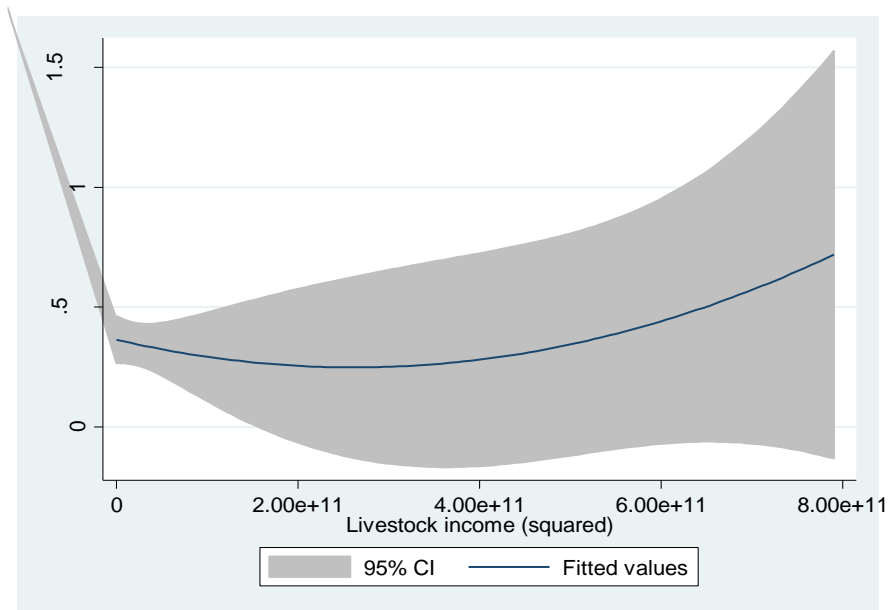
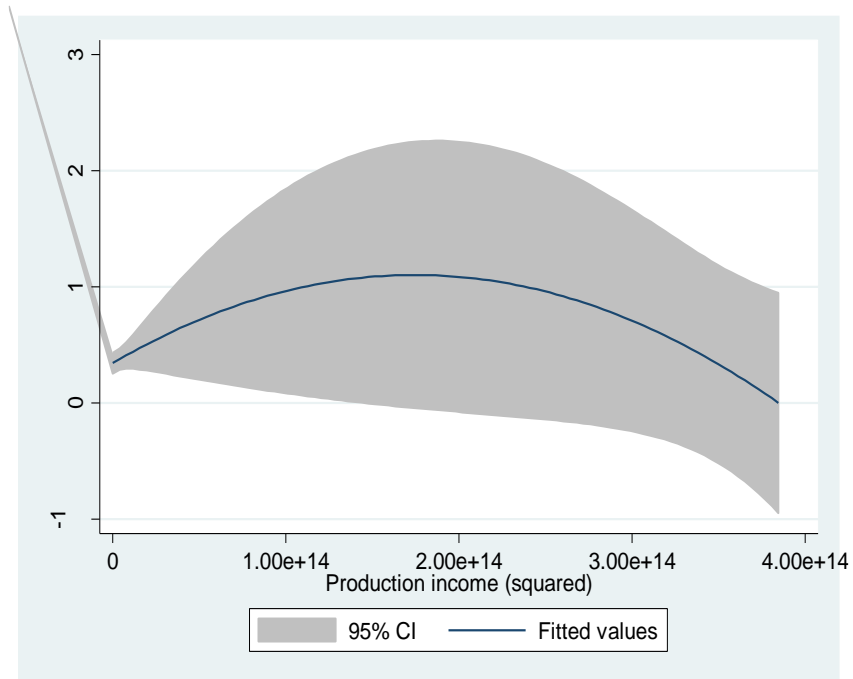
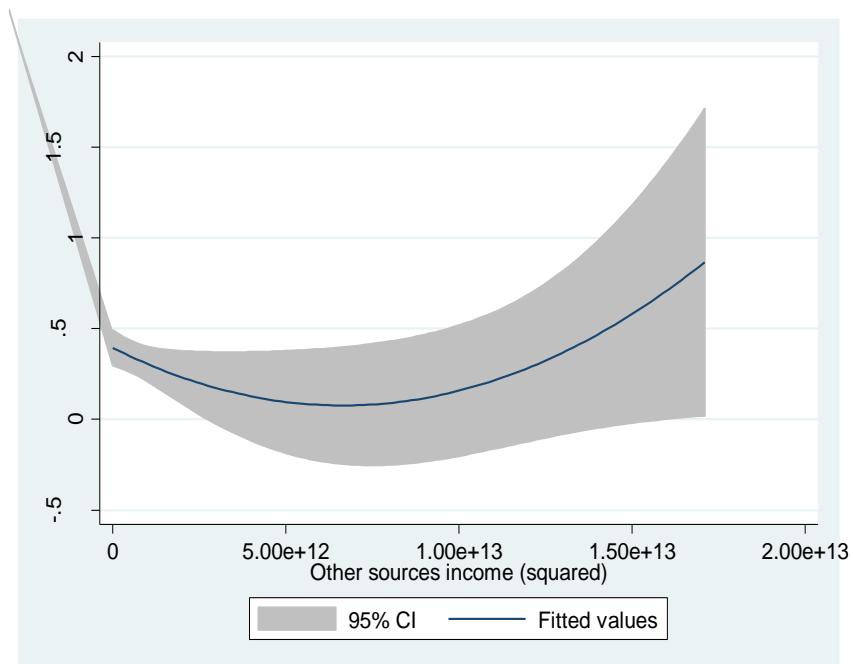


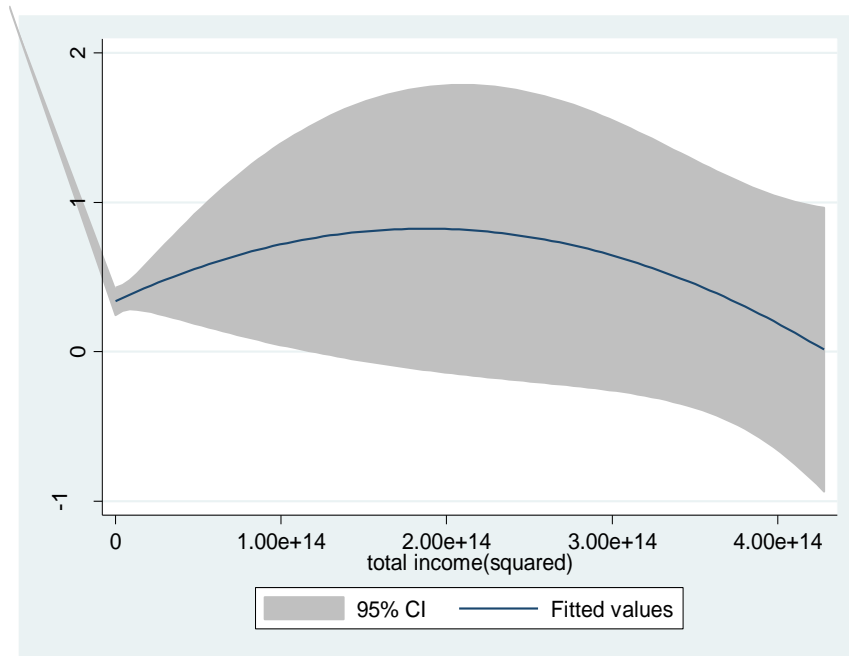
Figure 2: Quadratic fitted-values graph between (squared) annual livestock income and demand for credit



**Figure 3: Quadratic fitted-values graph between (squared) annual (agricultural) production income and demand for credit**



**Figure 4: Quadratic fitted-values graph between (squared) annual other sources of income and demand for credit**



**Figure 5: Quadratic fitted-values graph between (squared) annual total income and demand for credit**