Agricultural credit constraints and borrowing behavior of farmers in rural Punjab

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27 January 2008

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Abstract

The government of Pakistan introduced several agricultural credit programmes through institutional sources. The impact of these programmes was less than optimal due to rambling credit policies. The farmers were facing many constraints to avail agricultural credit in a timely fashion. The collateral *inter alia* was one of the major constraints. The objective of the paper is to identify constraints and suggest remedial measures to make efficient use of agricultural credit schemes. Majority of the farmers revealed that they could not avail credit because of needed collateral. The hard hits were tenants and share croppers who do not own land, and thus were unavailable to avail credit. The high mark up both from formal and informal sources was another constraint.

The borrowing behavior of the respondents was estimated through the logit model and identified the determinants of credit constraints. The results showed that the coefficients of transitory income, education level, and predicted interest rate have important bearing on borrowing behavior. The household consumption expenditure was positively and significantly determined by operational holding and value of implements

Keywords: Agricultural credit, Borrowing Behavior, Interest Rate, Collateral.

Introduction

The agricultural loans in Pakistan amounting to Rs. 104.8 billion were disbursed during (July-March, 2006-07) as against Rs.91.2 billion during the corresponding period last year, thereby registering an increase of 15 percent (GOP, 2007). The growth momentum in rural credit suggests that the sector was given sufficient priority in terms of the availability of loan. However, the challenges faced by needy farmers as well as the lending institutions were still daunting. A large majority of needy, willing and able to borrow farmers generally cannot avail agricultural credit because of the procedural and bureaucratic lending process that favored and was skewed toward influential farmers in the rural sector.

Most countries including Pakistan motivated by consideration of the potential gain and the increase in welfare of the farmers, especially the smaller farmers, have undertaken widespread credit programmes. However, in most such cases, the Government intervention takes the form of interest rate ceiling or subsidies interest rates thereby necessitating rationing. When credit was rationed some borrowers could not obtain the amount of credit they desired at the prevailing interest rates, nor did they secure more credit by offering to pay higher interest rate. In such cases, liquidity can become a constraint and most binding where the access to credit is limited by consideration inherent either in the design of credit programmes or those that arise out of the skewed socio- economic and political structure which diverted such credit away from those that need it. (Malik, 1999)

It was important to note, however, that credit constrain (of which rationing is a special case) would arise even if there were no government intervention in credit markets. There are three stylized facts about credit markets which make it quite likely that even unregulated credit markets can easily be constrained (Hoff and Stiglitz, 1990). The facts are: i) screening problem: Borrowers differ in the likelihood that they will default, and it is costly to determine the extent borrower's risk; ii) Incentives problem: It is costly to ensure that borrowers take those actions which make repayment most likely; and iii) Enforcement problem: It is difficult to compel repayment.

The upshot is that "interest rates may not equilibrate credit supply and demand; there may be credit rationing, and in period of bad harvest, lending may be unavailable at any price (Hoff and Stiglitz, 1990)

There were several questions regarding agricultural credit which solicit answers. The questions are: what is the nominal interest rate reported by respondents? What is the borrowing behavior of the respondents at this interest rate? Are farmers really credit constrained? How the credit constraints are determined? How the credit constraints affecting the consumption pattern of the farm households? How the credit constraints affecting the farm production of the farmers? In order to provide answer these and related questions, some simplifying assumptions were made. First of all, if a household was constrained in the formal market, then, credit being fungible, it must be constrained overall. Therefore, the present paper focused on the market of institutional credit.

2. Data and Methodology

The two data set were utilized for the analysis in this paper. The data from Pakistan Rural Household Survey (PRHS) 2001 comprising 2642 households from 16 districts of Pakistan was taken to identify the credit constraints. In addition, household and farm survey of 160 farm households was conducted in summer 2007 from Sargodha region, Punjab.

In the Pakistan Rural Household Survey (PRHS 2001), a number of questions were asked to determine the factors affecting the use of institutional credit in Pakistan. These ranged from the reasons for not applying credit to a formal institutions, distance of the bank, interest rates of the institutions, time lapsed between application and loan disbursement, purpose of loan, formal institutions and collateral used for the loan from the institutional sources. These were the issues that covered the wide range of problems affecting the institutional credit structure in Pakistan. The respondent's response highlighted the relative importance of each constraining factor. These perceptions were ascertained in most cases from the experience of the rural credit and non-credit users. In the present study, the data were disaggregated according to agro climatic zones. The classification of the districts of into agro-climatic zones was based on Pakistan Agricultural Research Council (1989). This classification highlighted the different areas that would need to be addressed when designing policies of these regions.

2.1 Methodology

The demand for borrowing suffers from two problems namely truncation bias because of external borrowing; and implicit interest rate. In order to address these problems Iqbal, 1986 showed a procedure for imputing interest rate for non responsive respondents from an interest rate function regressed over personal and binary variables. However, in estimating such functions the data on households reporting interest rate might create problem. The econometric literature provides an opportunity to adjust for selection bias which is well reflected in the seminal work of Heckman (1979). Thus, the present chapter was an extension of Heckman's procedure.

The problem, simply stated, there was some underlying selection process that warranted explicitly accounted for in the econometric framework when estimating from the data on economic agents who already opted to behave one way or the other. The data available for analysis were after the fact i.e. after some underlying process of selection already took place. This implied that some households decided to transact in the credit market for their borrowing and others did not. The underlying selection process in this case postulated on the basis of presence or absence of a credit constraint.

The elements of the Heckman approach were laid out as follows.

The model was:

$$y_i = \beta' x_i + \varepsilon_i \, if \, \beta' x_i + \varepsilon_i > 0$$
$$= f \, \beta' x_i + \varepsilon_i \leq 0 \tag{1}$$

Where:

y_i = the dependent variable and the x_i were regressors. In addition, there was a censoring indicator, $z_{i \, which}$ was as follows: $z_i = 1$ if $y_i > 0$ and : $z_i = 1$ if $y_i \leq 0$. It was expressed that:

$$E\left[y_i | z_i = 1\right] = \beta' x_i + \sigma \lambda_i \tag{2}$$

Where λ_i is the inverse Mill's Ratio defined as:

$$\lambda_i = \frac{\phi\left(\frac{\alpha + \beta' x_i}{\sigma}\right)}{\Phi\left(\frac{\alpha + \beta' x_i}{\sigma}\right)} \tag{3}$$

Where: ϕ and Φ were, respectively, the probability density function (p.d.f.) and cumulative density function (c.d.f.) of the standard normal distribution. Here value of the λ_i depends on β and σ. However, information was available about the censoring indicator:

$$P\left[z_i = 1\right] = \Phi\left(\frac{\beta' x_i}{\sigma}\right) = \Phi\left(\gamma' x_i\right)$$
$$P\left[z_i = 0\right] = 1 - \Phi\left(\frac{\beta' x_i}{\sigma}\right) = 1 - \Phi\left(\gamma' x_i\right) \tag{4}$$

Where: $\gamma_i = \frac{\beta_I}{\sigma}$ This was precisely the Logit model so γ can be estimated by Logit procedure. The estimated value of, γ, $\hat{\gamma}$ can then be substituted into the definition of : λ

$$\hat{\lambda}_i = \frac{\phi(\hat{\gamma}' x_i)}{\Phi(\hat{\gamma}' x_i)} \tag{5}$$

The second step was to estimate OLS on:

$$y_i = \beta' x_i + \sigma \hat{\lambda}_i + \xi \tag{6}$$

For non-limit observations, i.e. $y_i > 0$. It should be noted, however, that the estimator found from the Heckman procedure was consistent and asymptotically normal, it was not efficient.

Furthermore, "the replacement of λ_i with $\hat{\lambda}$ led to hetroskedasticity and, therefore, to biased and inconsistent calculated standard errors".

In applying the Heckman approach to the problem, firstly define the censoring indicator INT as follows:

$INT = 1$ if interest > 0

$= 0$ otherwise.

From this indicator one can define a variable *MAXINT* as follows:

$MAXINT = \beta' X_i + U_i$ if $INT = 1$

$= 0$ otherwise

Where *MAXINT* was the highest nominal interest rate reported by a household from among its current loans.

The following three step procedure was followed. *First*, a Logit regression of *INT* was run on the following variables:

(i)   Land owned: Acres of land owned by the household

(ii) Education of males: The maximum educational level among male members of the household

(iii) Dependency ratio: The ratio of the household size to the number of adult males

(iv) Source dummy: A dummy variable for the source of the loan, which was specified as one if the source was an official lending agency otherwise zero

(v)   Transitory income: A measure of transitory income, defined as a difference between estimated food expenditure and the value of farm production

Secondly, the Inverse Mill's Ratio was computed and added as the explanatory variable in the regression of *MAXINT* on the explanatory variable listed above. Thirdly, the demand for borrowing *(BORR)* was estimated by using the predicted interest rate from the second stage as additional regressors, together with the variables given above, with the exception of the dummy variable for source of loan.

$$BORR_i = \alpha_1 X_i^a + \alpha_2 \text{ (Predicted } MAXINT_i) + \varepsilon_i$$

Where: variables included were (i) to (v) with the exception of (iv) and *BORR* was defined as external borrowing minus external lending plus or minus change in assets which were obtained as the sum of net deposits in financial institutions; expenditure on the furniture; appliances and other durables; less receipt from the sale of property.

Ultimately there were two systems of equations, the borrowing equation and the interest rate equation, and two endogenous variables (*BORR, MAXINT*) and three sets of exogenous variables (X_i, X_i^a). Both equations were exactly identified.

2.2. Determination of Credit Constraints

In order to estimate the constraints, Heckman (1979) technique was used to estimate a Logit model for the probability that the households was constrained as a first stage and then using the inverse of Mill's Ratio from the first stage as a right hand side variable in the regression to explain the borrowing behavior of farm households as the adjustment factor to adjust for selectivity bias. The dependent variable in the second stage was the total amount borrowed per farm households.

The Logit model was used to estimate the probability that a household was constrained includes the following variable:

(i) Land value: Value of land owned.

(ii) Value of farm implements: This includes value of owned farm tools, livestock; tube well, tractor and tractor drawn implements

(iii) Number of dependents: Number of family member under sixteen years of age

(iv) Farm experience: Years of farm experience of head of households.

(v) Initial liquid assets: This includes total value of grain in store, value of assets and

earning from sale of assets and property.

(vi) Previous year's income: Previous year's income.

      The inverse Mill's ratio were estimated from the above analysis and introduced as an explanatory variable to estimate borrowing behavior of farm households. The dependent variable in this equation was the gross amount borrowed by a household from all sources and for all purposes over the previous year i.e. without deducting any repayments. The additional variables used in the second stage were as follows:

(i) Operational holding: Total operational holding in acres.
(ii) Dependency ratio: Ratio of family under sixteen to total household size.
(iii) Education level: Maximum level of education of male family members.
(iv) Savings: Net deposits in financial institutional.

2.3. Household Total Consumption Expenditures

The simple regression model was used to estimate the impact of credit constraints on household total consumption by regressing on following variables; Education Level, Value of Implements, Operational Holding (Acres), dependency Ratio, Tehsil dummies, predicted probability of being constrained

3. Results and Discussion
3.1 Perception and attitude to institutional credit

Before presenting a formal definition of constrained households and carrying out the analysis along the lines suggested above, a detailed examination of perception of and attitudes to institutional credit was necessitated to gain some understanding of how households was being constrained in the institutional credit market.

3.2. Constraints from formal institutions

The respondents were asked to state the most important reason for not applying for loan from a formal institution. Of the eight reasons listed, five were classified as reasons that affect the demand side, namely: i) do not need; ii) involves paying bribe; iii) inadequate collateral; iv) private sources sufficient; and v) do not want to pay interest ("Riba")

      The additional three reasons were categorized as affecting the supply side. These were: i) cumbersome procedure; ii) lenders too far away; and iii) expensive procedures. The third category was used to capture cases where the respondent felt that there was more than one reason or the reason not listed in seven discussed above. The analysis revealed that on supply side, 9 percent of respondents pointed out cumbersome procedure and nearly 29 percent narrated that they do not need credit. The results were consistent with Carter, (1988); Carter and Weibe (1990). Stiglitz and Weiss (1981).These are issues that can be quite easily addressed by policy. For instance effective publicity coupled with further simplification of method especially security would help remove such constraints. This would increase wakefulness among the farmers and also reduce concealed operational costs.

      On the demand side, nearly 28 percent reported unacceptable or inadequate collateral, and 29 percent indicated no need and disliked borrowing (religious reasons) as the most important reasons. Nearly five percent stated that private (non institutional) sources were sufficient. The inadequate collateral also covered a large number of cases of 'unacceptable' collateral. Land was the most readily acceptable form of collateral and this prevented a large number of tenants and land less people from participating in the formal credit markets. There were large regional differences in the ordering of the various credit constraint reasons which reflected the relative poverty of the different regions. The results were consistent with Boucher, et. al., (2005) and Zeller, et. al., (1997).

      The results further showed that in Cotton-Wheat Sindh, Low intensity Punjab; and Cotton-Wheat Punjab zones, 52 percent, 44 percent and 42 percent respondent cited inadequate collateral as

the most constraining factor in obtaining credit from the formal sources respectively. In NWFP province, 63 percent of the farmers indicated that they do not want to pay interest.

3.3. Collateral used by the respondents for the agricultural loan

Inadequate collateral or lack of it implied that some individuals were denied credit. In this regard, the farmers were asked about the collateral used by them for the credit. Among the all possible options for collateral include but not limited to: i) none; ii) agricultural land; iii) residential or commercial property; iv) other ornaments/utensils/consumer durables; v); Gold; vi) guarantee by landlord; vii) guarantee by relative/friend/neighbor; viii) guarantee by employer; and ix) any other source. It was evident from the analysis that about 77 percent farmers used agricultural land as collateral for the loan which was acceptable by the all institutional sources. This showed how much farmers were bound to use land as collateral and the others have negligible share. The results were consistent with Banerjee (2001). This can also be seen across the regions that farmers were highly dependent upon land. It was obvious that alternative forms of collateral were imperative to increase the access of the tenant and poor rural households to institutional credit. One of the often-suggested ways to get around the problem of adequate collateral was through group borrowing and lending. This also enabled the enforcement repayment. Unfortunately, Pakistan experience with cooperatives was dismal.

3.4 Purpose of the loan

The respondents were asked to cite the purpose of the loan taken. The purposes of loan were: i) agricultural production; ii) purchase of agricultural land; iii) purchase of tractor; iv) purchase of thresher; v) purchase of tube well; vi) purchase of other livestock; vii) other agricultural costs; viii) food/clothing; ix) medical expenses; x) marriage/death or other ceremonial expenses; xi) marriage/death or other ceremonial expenses; xii) purchase of consumer durables; and xiii) purchase or improvement of family dwelling; xiv) to pay off old loans; and xv) for non-agricultural production. Among all the purposes, the agricultural production was found as 45.8 percent. It was followed by purchase of tractor 8.5 percent and purchase of land 6.1 percent all other have share less than six percent. Across the agro-climatic regions, most of the loans were for the agricultural production only but in Balochistan 50 percent of the loan was for the purchase of agricultural land. The results were consistent with Malik (1999), Irfan, et. al., (1999) and Qureshi, et al. (1996)

3.5 Formal institutions for credit

The respondents were asked about the formal institutions that they used for formal loaning. The formal institutions were: i) Commercial Banks; ii) Zarai Tarqaiti Bank (ZTBL) (defunct Agricultural Development Bank); iii) Women's Bank; vi) Non-governmental organizations; v) House Building and finance corporation vi) others (Cooperatives). The entire share in this regard was covered by ZTBL which was 86.3 percent. ZTBL was providing most of the loan to the farmers for their agricultural needs. This was not only in one region, it was found more than 70 percent loan provided by ZTBL. So there is a dire need to strengthen this institution for the proper agricultural loaning.

3.6 Interest rate and the response of the farmers

The most important issue related to decision making of the farmers for the loan was interest rate. It represented the cost of borrowing at margin of the household from the data; the average interest rate was calculated for all the agro-climatic regions. The interest was floating between 10 to 20 percent. But amazingly it was found higher in Barani Punjab to the extent of 20 percent which was followed by Balochistan 17 percent. The results were consistent with Malik (1999). In order to check the response of the farmers and their ability to re-pay loan, following two interesting questions were asked; i) if you were offered a higher interest rate, would you borrow less? ii) if you were offered a larger loan at the same interest rate, would you borrow more? For the first question more than 50 percent respondents

replied positively which showed that the farmers have the ability to repay even at the higher rate of interest. Duca and Rosenthal (993) argued that a farm household was credit constrained only when it would like to borrow more than lenders allow or if its preferred demand for credit exceeds the amount lenders are willing to supply. Stiglitz and Weiss (1992), on the other hand, described credit constraints in two terms -- redlining and credit rationing. Therefore, they must be treated as customer not a beneficiary. For the second question farmers' response was negative that showed that the farmers were not able to exhaust all their resources and they were not diversifying agriculture.

3.7 Time Lag in disbursement of loan
There was one probable problem that could arise even if a loan was granted by an institution. Was the loan became available in time and what was the time lag? This affected the eventual productivity of such loan especially where short run loans were concerned. A fertilizer loan, for example, if not made available on time would be useless to the farmer. The main reason for the delayed disbursement of loans was as non-cooperation and lengthy procedure. It was inferred from the analysis that most of loans were sanctioned and disbursed in a period of 1-3 months. Across the agro-climatic regions, more than 75 percent credit was disbursed in one quarter except Balochistan. Though the figures were acceptable but in Pakistan majority of loans were for short-term production with a per acre upper limit.

3.8 Distance of the Bank
Education, health condition, fixed assets holding and distance from household to formal bank branch were among the most impor¬tant factors affecting household's credit activities. In the present study, the distance of the formal bank was measured in the form of kilometers from the community. It was found that the distance of the formal bank was more than 20 Kim's in 28.8 percent of area. The percentage of more than 20 Kim's was 81.3 percent in Balochistan which was clear indication of backwardness and poverty stricken. The government must develop policies for these remote areas to exploit the resources and to increase productivity of agriculture sector.

4. Demand for Borrowing and Interest Rate Function
Before discussing the results, first there was a need to explain the rationale for using these explanatory variables as discussed above. X_i is a vector of all personal variables. The vector X_i includes variables that influence the opportunity, administrative and risk costs of borrowing. These three types of cost determine the normal interest rate. The variable associated with opportunity cost was the presence of government regulated lending agencies in villages. Such agencies provided loans at below market rates of interest. Their presence in the village reduced the average interest rate. The dummy variable for the source of a loan was used to capture this effect. Village population could have been used as a proxy for the administrative *cost* of lending because the larger the loan, the smaller the unit cost of administrating it, but unfortunately this information was not available. The *risk cost* was explained by income earning and loan repayment ability of a farm household. These were determined by, for example, total land owned, maximum educational level of households males, dependency ratio, transitory income. Land owned is a measure of the household's endowments; the educational level of male household is a measure of the investment opportunities available to the household, as well as its ability to cope with the cumbersome paperwork and administrative details required for getting loans from official agencies; the dependency ratio is a measure of the household's stage in its life cycle, and therefore of its need for current consumption; and finally (v) transitory income variable, was indented to capture variations in the demand for credit arising out of windfall gains and losses. From the permanent income hypotheses, if a household was not on its optimal consumption path, perhaps because it was credit constrained, it treated such windfall gains as a substitute for credit, where as household (e.g., of large landlords) treated such gains as a complement to credit.

4.1 Model Results

The results were obtained in Table 1 which revealed that most of the coefficients were having expected signs but were not significant except source dummy(p=0.01). This showed that institutional sources were active in loaning, thus likely to pay interest. On the demand side it will reduce the transaction cost of the farmer. The results were consistent with Carter (1988); Carter and Weibe (1990), Stiglitz and Weiss (1981), and Malik (1999).

After estimating the above Logit model, the inverse Mill Ratio's were computed and added as an independent variable in the above mentioned logit model. The results were revealed in Table 2. Again most of the parameters showed expected sign but not really significant. However, it was interesting to note that source dummy was not significant in the interest rate equation. This showed that borrowing from institutional sources was not important in lowering the overall mark up. The respondents mostly banked on informal sources (i.e. commission agents; money lenders, input suppliers, etc.). The Inverse Mill's Ratio was calculated to control the selection bias in the subsequent analysis and thus, introduced in the model as an explanatory variable. The coefficient was having expected sign but the coefficient was not significant... The results were consistent with Malik (1999) who used a panel data from International Food Policy Research Institute to prove above assertions.

Later on the borrowing function was estimated with Ordinary Least Square (OLS) and the results were shown in Table 3. The results showed that the coefficients of transitory income, education level, and predicted interest rate were significant with expected sign. The transitory income was anticipated to capture variations in the demand for credit arising out from the windfall gains and losses. As envisaged from the permanent income hypothesis, if a household is not on its optimal consumption path because of its credit constraints, it will treat such gains as a substitute for credit, whereas households (e.g., of large landlords) will treat such gains as complement to credit. The results were supporting the same phenomenon in Pakistan credit market. The coefficient of maximum education of household males, which measures the household's ability to cope with the procedure required for getting loans, has expected sign and significantly different from zero which implied that education played a significant role in borrowing decision and reducing the transaction cost of the credit. Most importantly and encouraging was that predicted interest rate showed expected sign (negative) and was significant (p=0.10).

However, the model can predict the price for the credit which has an overall effect on the demand for credit. The land owned found with expected sign but statistically non-significant. This was consistent with the behavior of Pakistan credit market, where land was most important form of collateral, but which was never seized in reality by the lending agency in the event of default. The land title merely provided an entry into the credit market and nothing else. The interest rate charged and the amount borrowed depended upon other considerations. The coefficient of wage rate was as expected positive but non significant. Intuitively with higher wage rate there was more ability to pay high interest rate and more liberty in borrowing. But in Pakistan's labour market, the wage rate was too low to provide the liberty to households for additional borrowing. Since wage rate was a good proxy for ability to repay. In these circumstances it was why such households should be charged a higher interest rate. This was mainly due to monopoly power of informal lender, who charged at their own will. The coefficient of dependency ratio showed expected sign but insignificant. If the ratio of the adult males to household size was greater, the household will borrow more but in Pakistan the households mainly depend upon sole earner which reduced the ability to pay interest rate and borrowing. The tehsil dummies were found significant which implied that all the revenue units have good quality of land and thus same pattern of borrowing was followed in all the areas.

The important contribution of the estimated model was the confirmation that household and loan characteristics and area effects can be used to predict the price of credit... Therefore, the results of the study must be carefully interpreted because of underlying assumptions of the model. The assumptions were the credit market was dichotomous, however in reality there are several segments of the credit market. Furthermore, the analysis does not explicitly include differential borrowing behavior

of the respondents due to credit constraints. Similarly, the imputed interest rate assumed consistent behavior across the respondents and this may not hold true due to credit constraints.

4.2. Determinants of Credit Constraints

In this section, differential behavior of respondents due to credit constraints was analyzed through the estimation of a logit model. The results revealed (Table 5) that the probability that household was constrained by land value, value of farm implements, farm experience, dependency ratio, operational holding, educational level and savings. As expected, the probability being constrained was dependent negatively on value of land, farm experience, savings, and educational level. Among all these variables, the value of land was found significant which showed that the probability of being constrained reduced as the value of land increased and this was a common characteristic of Pakistan credit market. The land was acceptable collateral and credit amount assessed on the basis of its value. The value of farm implements depicted positive sign and significant which was counter-intuitive. All other variable were not significantly different from zero. These were the results of Logit estimation (First Stage).

This led us to estimate the Inverse Mill's Ratio which was included as independent variable in the borrowing function along with other independent variables. The interest rate was not included among the independent variables. Thus, Heckman two steps procedure was applied to estimate the parameter. The dependent variable was gross amount borrowed from all the sources over the previous year without deducting any repayments. The results revealed that land value and savings in the financial institutions was a negative function of total amount borrowed. The results found counter intuitive. The results were consistent with Malik (999). Total borrowing per household was positively and significantly dependent upon initial liquid assets. One can expect that higher the initial liquid assets, lower tends to be the borrowing. The results suggested that higher level of initial liquid assets leads to higher borrowing. This could be the result of characteristics of Pakistan credit market which was dominated by large farmers. It was interesting to note that the educational level in the household, its operational holding and the dependency ratio have seemingly no impact on its aggregate borrowing behavior. Tehsil dummies were also found significant showing the same borrowing pattern. Most importantly the Inverse Mill's Ratio found positive and significant which suggested that coefficients of the model were reliable and unbiased. The results of the study were consistent with Malik (1999) and Nguyen (2007). However, some of the variables were at variance with this study.

4.3. The credit constraint and household consumption Expenditure

How does the credit constraint affect the total consumption expenditure of the farm household? In order to aforementioned, total consumption expenditure was regressed with educational level, value of implements, operational holdings, dependency ratio, tehsil dummies. The results were presented in Table 6. The probability of being constrained was positively and significantly determined by operational holding and value of implements. It was negatively determined by dependency ratio which was unexpected. It was negatively determined by probability of being constrained but not significant in the estimated results.

5. Summary and Conclusions

The agricultural credit programmes through institutional sources has checkered history. In spite quantum increase in credit, its impact on farm productivity was not well documented. There were conflicting views on the performance of agricultural credit schemes. The farmers were facing a lot of constraints. This paper highlights the credit constraints and identifies the determinants of these constraints. The result revealed that collateral was one of the major constraints. Land was only collateral acceptable to institutional sources of credit. Thus, the tenants and share croppers were left out of the credit programmes.

Lastly Heckman two steps procedure was followed to estimate interest rate and borrowing functions of the respondents. In summary, three step procedures was followed, first logit regression was estimated to ascertain the probability that positive interest was charged. Secondly the interest rate was regressed with several explanatory variables coupled with inverse mill ratio from the first stage. Thirdly, the demand for borrowing was regressed on predicted interest rate coupled with second stage while including some other explanatory variables. The land coefficient was not significant. The coefficient of education of male household was significant showing that education function as a facilitator to enter into credit market and reducing transaction cost. Transitory income also played a significant role in borrowing behavior. In the total amount borrowing model, initial liquid assets significantly impacted the amount of borrowing. Operational holding was significantly affecting the total household consumption expenditure.

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