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# Identifying Credit Constrained Farmers: An Alternative Approach

*Manojit Bhattacharjee*
*Meenakshi Rajeev*

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# IDENTIFYING CREDIT CONSTRAINED FARMERS: AN ALTERNATIVE APPROACH

**Manojit Bhattacharjee* and Meenakshi Rajeev****

## Abstract

*In this paper, we offer an alternative methodology to detect credit constrained households among farmers and seek to identify the determinants of the same. In order to detect credit constrained households we use the marginal approach to arrive at the optimal expenditure requirement for production for each household, and if expenditure of a household is found less than the optimal level , we consider that household as credit constrained. After classifying a household as constrained or otherwise, the paper then seeks to identify the determinants by undertaking a probit regression analysis. Interestingly, the empirical exercise shows that the likelihood of being constrained is higher for a person better endowed in terms of level of education and economic resources. Indeed the optimal level of output per unit of land for a better endowed person is much higher due to his having access to cheaper formal sector loan and thereby facing lower marginal cost of production. This observation is also valid for the higher social category of households (general category) vis-a-vis other classes. Thus, differences in sources of loan make significant difference in the level of demand for credit and in turn the rationing faced by the households.*

## Introduction

Problems pertaining to *accessibility to credit* are not limited to non-borrower or poorer households; even solvent borrowers may face constraints in accessing credit. If a household needing credit is unable to avail it, such household is considered as suffering credit inaccessibility. This could be either due to excess demand in the credit market or a perceived credit-risk, i.e., when a lender considers a borrower as risky (see Fapchamps and Pender, 1997). Once a household gets access to credit, the issue of the extent to which the household could borrow arises. The next aspect is the issue of *adequacy of credit*. If a household is unable to obtain the optimal amount of credit, then it is a case of credit constraint, i.e., a household has access to less credit than what it demands. Constraints in availing credit can have important consequences on a household; particularly it can affect its investment behaviour (Eswaran and Kotwal, 1990; Rosenzweig and Wolphin, 1993; Fafchamps and Pender 1997). In this paper, we attempt to understand the problem of credit constraint across households of different characteristics and the factors that influence it, by offering an alternative methodology to detect credit constraint.

Earlier studies have used several approaches in detection of credit constraint. The first is an indirect approach, which seeks to detect presence of credit constraint from observed violations of the assumptions of life cycle and permanent income hypothesis, i.e., that current income does not influence current consumption[1] (see Hall and Mishkin, 1982 and Zeldes, 1989). Other studies (Japelli, 1990; Feder et al., 1990; Zeller, 1994; Diagne et al; 2000) have detected existence of constraint by directly asking the households.

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* Faculty, St. Joseph's College, Bangalore.

** Professor , CESP, ISEC, Bangalore – 560 072. E-mail: meenakshi@isec.ac.in

[1] The life cycle and permanent income hypothesis, which argues that individual smoothes consumption over lifetime, is based on the assumption that current consumption is not a function of current income.

The above-cited studies suffer from certain limitations. For instance, current income would not influence current consumption if the households adopt precautionary behaviour (see Diagne et al, 2000). On the other hand, the flaw inherent in studies collecting information on credit constraints directly from households is the implied assumption that demand for credit is synonymous with the amount of credit a household wants to borrow. It is important to note that demand is defined as desire to purchase goods or services backed by paying capability, but the existing studies have used information based on what the households have reported as their demand to detect credit constraint. In such cases, there are chances of biasedness. It is hardly possible to distinguish desire from demand for credit, if information on demand as reported by households is taken. Therefore, it is judicious to define demand based on the desire and repayment capability of a household.

As far as empirical studies in India are concerned, the issue of credit constraint in recent years has mainly been addressed using data relating to firms (see Banerjee A and Duflo E, 2001; 2004). Household level studies have tried to relate credit constraint with investment decisions (see Binswanger and Sillers, 1983; Pender 1996; Fapchamps and Pender 1997), however, constraint in availing credit was mainly kept in the explanatory part. Studies that have addressed the issue of credit rationing in formal sector (Kochar, 1997; Swain, 2002) have presumed that if a household has availed loan, it is not credit constrained.

Based on the limitations of the earlier research papers, this paper tries to identify the determinants of the likelihood of being credit constrained. The issue is addressed using working capital expenditure of farmer households producing paddy, which is one of the major crops in India[2]. As a first step, the optimal amount of expenditure required for farming by each household is estimated by assigning a production function, which we have assumed as a function of the expenditure incurred. A household is considered credit constrained if the level of expenditure the household incurs is below this optimal level of expenditure. After classifying a household as credit constrained, the determinants of the likelihood of being credit constrained is analyzed. Our analysis shows that farmer households of comparatively developed states have a lower likelihood of facing constraint in credit market.

The empirical part of the paper uses the 59th Round data of the NSSO on 'Situation Assessment Survey' of Farmers, in India. *This is the latest macro level data that provide information about both formal and informal credit at the household level, which makes it possible to arrive at macro level findings based on micro foundation* (see also Rajeev et al, 2012; 2013). The current analysis is restricted to six states, namely, Punjab, Haryana, West Bengal, Karnataka, Chhattisgarh and Madhya Pradesh. Specifically, we consider Punjab and Haryana as developed states, Chhattisgarh and Madhya Pradesh as less developed states and West Bengal and Karnataka as middle performing states. The classification of the states are done based on the percentage of people living below the poverty line, food grain production per acre of land and number of commercial banks present per 1000 population. A detailed profile of the states selected for analysis is given in the appendix.

The rest of the paper is organized as follows. The second section provides the theoretical framework for the study. This is followed by a section on empirical methodology. The penultimate section provides the results. A concluding section is presented at the end.

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[2] Other crops can be dealt with using exactly similar procedure.

## Theoretical Framework

Suppose a household tries to maximize earning (Y) from farm activity, which is defined as the difference between the value of the farm output produced [p. f (E, $\overline{L}$,$\overline{K}$)] by the household and the cost of production[3].

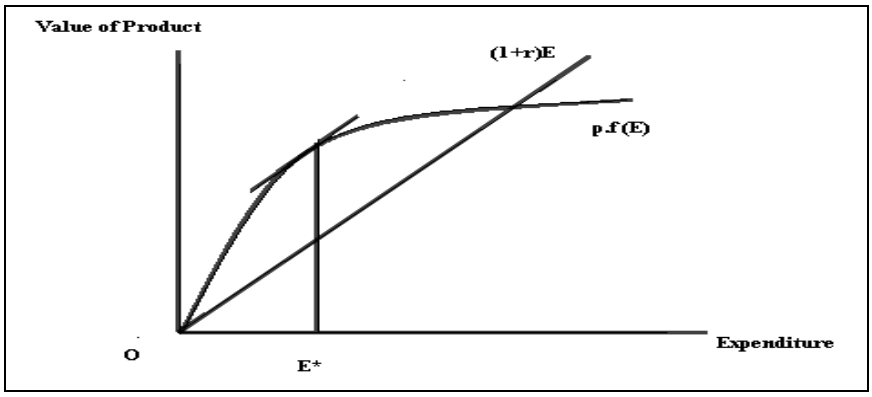
$$Y = p.\ f(E, \overline{L}, \overline{K}) - E(1+r) \quad \ldots\ldots\ldots\ldots\ldots (1)$$

In equation 1, E is the sum of all expenditure incurred for producing paddy; p is the price of paddy; r is the interest rate, and f is the production function. It is assumed that there is no scarcity of labour ($\overline{L}$) and capital ($\overline{K}$), if the household is able to obtain funds through loan. The condition for maximization of earning is then obtained by differentiating (1) with respect to E and equating it with zero (see Fig. 1). This is given as follows:

$$p.\ f'(E, \overline{L}, \overline{K}) - (1+r) = 0 \quad \ldots\ldots\ldots\ldots\ldots (2)$$

$$\text{or, } f'(E) = (1+r)/p \quad \ldots\ldots\ldots\ldots\ldots (3)$$

**Figure 1: Optimal Amount of Expenditure**




Equation 3 shows the condition for maximization. In the absence of credit constraint, the household would incur an expenditure E* where marginal return from expenditure would equal to marginal cost of availing money. A household incurring expenditure more than E* could also be termed as being not constrained in amount. On the other hand, in the presence of credit constraint, f ' (E) would be greater than (1+r)/p (consider any point in the production function before the optimal point).

## Empirical Methodology

As mentioned while defining credit constraint, the paper mainly focuses on working capital expenditure of farm households producing paddy. More precisely, since the likelihood of being constrained may vary from one crop to the other, the empirical estimation has been done only for paddy. Moreover, paddy is

[3] p may also change with E, but for simplicity we assume away such complications.

produced in all states selected here for analysis. A household is considered credit constrained if it has incurred expenditure below the optimal amount of expenditure required for producing paddy in a particular region. The detailed explanation for detecting credit constraint is given below.

To detect credit constrained households empirically, one requires two estimated values: f'(E) and (1+r)/ p. If f '(E) < (1+r)/p, a household could be considered as having no constraint to credit. On the other hand, if f '(E) > (1+r)/p, a household could be termed as constrained. Information on r was obtained directly from the data we have used. Since expenditure incurred could have been made either by availing loan or by using deposited money, information on both lending rate and deposit rate has been used in the empirical analysis. In other words, savings rate of interest is used if the household has made use of money from its own savings. If the household has availed loan, rate of interest on loan has been considered. For simplicity, we have considered the average informal sector rate of interest in the district as savings rate of interest for a household. This is because households in rural areas have the option of lending money in informal market to earn interest income. The table given below provides information on lending rate faced by farmer households in three regions.

**Table 1: Distribution of Interest rate across farm loans in three different Regions**

| Interest Rate | Developed | Middle Performing | Less Developed |
|---|---|---|---|
| 0 | 17.8 | 18.2 | 6 |
| 12 | 6.8 | 7 | 7 |
| 13 | 7.5 | 1.5 | 2.1 |
| 14 | 17.6 | 1.1 | 9.4 |
| 18 | 1.8 | 0.4 | 2.8 |
| 24 | 18.4 | 0.5 | 11.8 |
| 30 | 1.8 | 0.5 | 4 |
| 36 | 5.2 | 1.1 | 12.1 |
| Other values | 23.1 | 69.7 | 44.8 |
| **Total** | **100** | **100** | **100** |

**Source:** Computed using 59$^{th}$ round Situation Assessment Survey of Farmers Data

Information on p was obtained by dividing the value of output produced by the quantity of output. Price of any particular variety of paddy in rural market may vary depending on the type of deal. If a farmer is a member of a cooperative society, he/she can sell output the government declared support price, which is equal throughout a state. On the other hand, if the farmer does not have access to government declared support price, he/she sells output in informal market. In the informal market, the farmer can sell output in open market where price fluctuates on a daily basis (see Bhattacharjee, 2012). If the farmer has borrowed loan from a trader he/she would have to sell the output either at a fixed price decided before known as *fixed price credit product interlinked deals*, or if the deal is *fixed commission credit product interlinked deals,* the farmer has to pay certain amount as commission to the trader (see Chaudhuri, 2004). In fixed commission interlinked deals, a farmer realises a price less than the market price. Table 2 provides information on prices faced by farmers in the three regions.

**Table 2: Price of output per kg of rice in three kinds of regions**

| Region | Mean Price | Standard Deviation |
|---|---|---|
| Developed | 9.27 | 35.32 |
| Middle Performing | 9.13 | 32.55 |
| Less Developed | 7.65 | 29.53 |

**Source:** Computed using 59th round Situation Assessment Survey of Farmers Data

For computation of f'(E), the following production function (Cobb Douglas) has been considered (see Bardhan, 1973).

$$\text{Log } Y = \log C + \beta 1 \log E + \beta 2 \log L + \beta 3 \log N \quad \ldots\ldots\ldots\ldots (4)$$

Where Y is the output (measured in Kg) per acre of land, E is the expenditure incurred for producing paddy per acre of land, L is the land size and N is the household size. Let us now focus on each one of these items. In equation 4, E is the expenditure on input while the coefficient of E, i.e., β1 provides the elasticity of output with respect to input expenditure. In mathematical terms, β1 is equal to f '(E). E/Y. Thus, if β1 is multiplied with Y/E for a household, estimate of f '(E) for that household, can be obtained.

Two other variables are also included in equation 4, i.e., land size and number of members in the household. Land size is included because cost of supervision and cost of hiring machinery varies according to size of the land[4]. If land size is large, a household is required to incur more expenditure on cost of supervision and less expenditure for hiring agricultural machinery, on the assumption that they themselves possess it. Similarly, more the number of household members, less would be cost of hiring labour and cost of supervision. In other words, it is assumed that for a given land size with given number of household members, there is a definite relation between expenditure on input and output.

Since production function may differ from one region to another, our analysis considers separate regression for each NSSO region[5]. Using the above criteria, households are classified either as constrained or not.

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[4] Land size here means gross cropped area.

[5] Planning commission segregates the whole country into 15 agro climatic zones as follows: Western Himalayan Region, Eastern Himalayan region, Lower Gangatic Plains, Middle Gangatic plains, Upper Gangatic Plains, Trans Gangatic Plains, Eastern Plateau and Hills region, Central Plateau and Hills region, Western Plateau and Hills region, Southern Plateau and Hills region, East Coat Plains and hills region, West Coast Plains Hills region, Gujarat Plains and Hills regions, Western Dry Region and the Island Region. However, within each of this agro climatic region, soil quality, irrigation system and rainfall vary to a large extent (see Indian Agricultural Statistics and Research Institute (IASRI), 2006). In our regression analysis of production function, therefore we have undertaken separate regressions for each NSSO region, which further segregates the agro climatic zones into different zones. The NSSO regions are akin to the sub zones classified by IASRI (2006), based on soil quality, irrigation and rainfall.

Table 3 provides the regression results. It is observed that land size has a negative relationship with output per acre, implying that there may be lack of scale economics possibly due to difficulty in supervision and hence productivity of smaller land size is seen to be higher. Using the values of β1 along with output and expenditure per acre of land, the value of f '(E) is computed for each household, which is then equated with (1+r)/p to classify a household as constrained or not.

**Table 3: Regression Coefficients obtained from the production function for different regions**

| Region (1) | Constant (2) | LN Expenditure (3) | LN Land (4) | LN household Size (5) |
|---|---|---|---|---|
| Northern Punjab (216) | 3.06*** | 0.54*** | -0.03 | 0.02 |
| $R^2$ = .212, F= 18.959 *** | (4.79) | (7.53) | (-0.7) | (0.15) |
| Southern Punjab (219) | 5.53*** | 0.27*** | -0.06* | 0 |
| $R^2$ = .072, F= 5.537 *** | (8.96) | (3.77) | (-1.59) | (0.02) |
| Eastern Haryana (153) | 4.54*** | 0.33** | 0.01 | -0.03 |
| $R^2$ = .041, F= 2.05* | (3.65) | (2.6) | (0.08) | (-0.16) |
| Himalayan Plains (WB) (334) | 4.99*** | 0.29*** | -0.05** | 0.08 |
| $R^2$ = .217, F= 30.454*** | (20) | (9.22) | (-2.14) | (1.29) |
| Eastern Plains (WB) (779) | 4.68*** | 0.3*** | -0.07*** | 0.04 |
| $R^2$ = .167, F= 51.507*** | (21.27) | (12.28) | (-3.84) | (0.89) |
| Central Plains (WB) (1177) | 4.29*** | 0.34*** | -0.09*** | 0.05** |
| $R^2$ = .271, F= 145.182*** | (27.06) | (20.01) | (-8.48) | (1.83) |
| Western Plains (WB) (901) | 5.24*** | 0.23*** | -0.08*** | 0.1*** |
| $R^2$ = .203, F= 75.910*** | (36.19) | (13.78) | (-7.27) | (3.56) |
| Coastal & Ghats Karnataka (100) | 4.28*** | 0.25*** | -0.11 | 0.15 |
| $R^2$ = .099, F= 3.487*** | (5.28) | (2.58) | (-1.17) | (0.91) |
| Inland Eastern Karnataka (126) | 4.27*** | 0.27* | -0.23* | 0.16 |
| $R^2$ = .090, F= 3.916*** | (3.36) | (1.75) | (-1.86) | (0.61) |
| Inland Southern Karnataka (139) | 3.95*** | 0.3*** | -0.19** | 0.31* |
| $R^2$ = .10, F= 4.623*** | (3.67) | (2.51) | (-2.14) | (1.61) |
| Inland Northern Karnataka (147) | -0.05 | 0.85*** | -0.13* | 0.07 |
| $R^2$ = .476, F= 31.733*** | (-0.06) | (9.37) | (-1.72) | (0.37) |
| Chattisgarh (1038) | 3.08*** | 0.45*** | -0.14*** | 0.13*** |
| $R^2$ = .256, F= 110.333*** | (16.1) | (17.53) | (-4.84) | (2.35) |
| Vindhya ( MP) (310) | 3.41*** | 0.37*** | -0.03 | 0.07 |
| $R^2$ = .192, F= 22.701*** | (10.68) | (7.83) | (-0.61) | (0.88) |
| Southern MP (274) | 2.91*** | 0.49*** | 0.07 | -0.14 |
| $R^2$ = .278, F= 34.397*** | (8.25) | (9.84) | (1.41) | (-1.73) |
| South Western MP (235) | 1.99*** | 0.5*** | -0.22*** | 0.32** |
| $R^2$ = .420, F= 13.251*** | (2.55) | (5.18) | (-2.78) | (1.95) |

**Note:** ***, **, * mean significant at 1%, 5% and 10% respectively. The figure in parenthesis in the first column gives the number of observation; in other columns, it provides the respective t values. Regression analysis has been done using the 59th Round Situation Assessment of Farmers data (NSSO)

## Model Specification

A probit model has been employed in the present analysis to identify the determinants of being credit constrained. Probit model assumes that there is a latent variable which is determined by certain explanatory variables, such that larger the value of this variable in the equation, greater would be the probability of being credit constrained. One can express the latent variable as

$Yi = \alpha + \sum \beta i Xi$, where Xi's are the explanatory variables representing the $i^{th}$ family.

Now there is a critical/threshold value of Yi, such that if Yi exceeds Yi*, a household experiences credit constraint. The latent variable is assumed as being normally distributed. Based on this assumption, probabilities are given as follows

$Pi = P(Y = 1 \mid X) = P(I^*i \leq Ii) = P(Zi \leq \alpha + \sum \beta iXi) = F(\alpha + \sum \beta iXi)$

$1\text{-}Pi = P(Y = 0 \mid X) = P(I^*i > Ii) = P(Zi > \alpha + \sum \beta iXi) = 1\text{-}\ F(\alpha + \sum \beta iXi)$

The parameters of the model are estimated using a maximum likelihood procedure, according to which, if β is positive, it implies that the probability of being constrained is high.

## Likelihood of Becoming Constraint

After classifying each household as constrained or unconstrained, a regression analysis was carried out. The dependent variable is dichotomous in nature, which assigns a value of 1 if the household is constrained; a zero value is assigned otherwise. The following explanatory variables were considered in the analysis.

## Explanatory Variables

A household is considered as constrained if supply of loan is less than demand. Thus factors that affect demand and supply of credit would impact the likelihood of being constrained.

## Supply Side Factors

Generally, a household would get less credit if it is considered risky by the lender. To capture the extent of risk faced by a lender, the following variables are considered.

A lender is likely to face less risk if income of the household is high. Since income of the household is not readily observable, value of output produced per acre is taken as a proxy for income. If the value of output produced is more, chances of insolvency decrease, and vice versa. Apart from the value of output, the worth of land owned by a household may determine the risk faced by moneylenders. Larger the size of land lesser is the likely credit risk to the lender as land is usually the collateral for obtaining loan.

In addition to the above factors, accessibility to credit from formal sources also increases supply of credit to a particular household. A dummy variable is used to capture the size of formal credit supply. In the present analysis, households that have availed formal loans have been assigned the value 1; other households have been assigned the value zero.

Households engaged in more than one activity (due to existence of inter-linkages between different markets) are likely to have larger access to credit compared to households engaged in a single activity/linked to a single market.

Supply of loan is likely to vary corresponding to the caste affiliation of the household concerned (see Jodhka, 1995). Loans are generally availed from households belonging to the same caste and therefore, general caste households are likely to have greater access to credit.

Educational status of the household is also important; educated households are likely to have larger supply of loans for having more information about the different loan schemes announced by the government and comparatively easier access to formal sector.

## Demand Side Factors

A household may deliberately avail a lower size loan even though a higher loan is available, due to risk aversion. Generally, low level of income (see Ray and Sengupta, 1989) coupled with a higher rate of interest may make a household cautious or risk averse. In order to assess both these factors in borrower's decision-making, the size of land owned by the household (as proxy of income) and rate of interest payable are used as variables. In regard to households that have not availed loan, the average rate of interest in the district is used.

In addition to this, households that derive income from non agricultural sources, apart from farming, have less probability of being constrained, as they can divert funds from non agricultural activities to finance agricultural production and therefore they require smaller size loans. However, the opposite phenomenon may also happen. In our analysis, households that derive income from other source have been included as a dummy variable. Number of (adult) members in the household is used as a variable as a higher number of members in a household points to larger income.

Region-specific dummy variables are considered as both demand and supply of loan are likely to vary from one region to the other. For example, developed regions are likely to have both larger demand and supply for credit. Table 4 provides information about the variables that are used along with their notation, mean values and standard deviation. The table also reveals certain other important features, notably that credit-constrained farmer households are around 14 percent – a figure significantly lower than what most studies had estimated. Secondly, average rate of interest charged (formal and informal agencies together) is 17.38. Since agricultural credit form formal banking sector in India is available at interest rates lower than 17 percent, an average interest rate above 17 percent implies considerable lending by informal lenders. In addition, it is also evident that around 44 percent of households are engaged in nonfarm activities apart from farming.

**Table 4: Variable description**

| Variable Notation | Variable Description | Mean | Standard Deviation |
|---|---|---|---|
| Dependent Variable | Constrained Household = 1, others =0 | 0.14 | 0.34 |
| General Caste | General Caste = 1, others = 0 | 0.44 | 0.50 |
| Non Cultivators | Also earn income from nonfarm activities =1, others =0 | 0.40 | 0.49 |
| Amount Outstanding | Amount of loan required to repay as on date of survey | 4146.78 | 19571.81 |
| Formal | Formal loan = 1, others =0 | 0.30 | 0.46 |
| Less Developed | Chhattisgarh and M.P = 1, Others = 0 | 0.28 | 0.45 |
| Developed | Punjab and Haryana =1, others =0 | 0.10 | 0.30 |
| Interest Rate | Average interest rate faced by the household | 17.38 | 64.03 |
| Secondary Education | Secondary Education =1, others =0 | 0.33 | 0.47 |
| Household Size | Number of members in the household | 5.70 | 2.90 |
| Output per Acre | Output in quintals per acre of land produced | 1552.68 | 3545.50 |
| Land Owned | Size of the land owned by the household | 1.4 acres | 2193.86 |

## Results

As can be seen from Table 5, some of the variables have shown expected signs. For instance, value of output per acre and accessibility to formal credit reduce likelihood of being constrained. Households belonging to general castes are found facing more constraints compared to other households.

Some of the observed results are interesting. Our analysis reveals that households owning larger size lands are more constrained per acre of land than households with smaller holdings. It seems that households with smaller holdings could meet their optimal level of expenditure (even with loans of lower size) due to smaller demand for credit, unlike the case of households with larger holdings. This is primarily because these households usually access loan from informal sources at a much higher rate of interest and hence face higher marginal cost of production. This in turn makes their optimal output computed in terms of marginal revenue and cost comparisons higher, and therefore demand for loan lower. They also use family labour instead of hired labour. Exactly opposite is the case for the richer farmers whose optimal output level due to accessibility to low cost formal loan is higher. As the formal sector exercise rationing[6] especially for agriculture loan they are faced with constraint more often.

Similar logic appears to hold for educationally advanced borrowers who are also seen to have much better access to formal loan (see Bhattacharya and Rajeev, 2009; 2010). It is clear that educated borrowers (having secondary education and above) avoid availing loan from informal lending market probably due to the unfavourable terms of informal credit. Therefore, it is safe to assume that they are more likely to be credit-constrained. Social category-wise also, general category borrowers appear to be more constrained.

[6] Formal sector is supposed to allocate 18% of their disbursed credit to agriculture but they often fail to meet this norm.

**Table 5: Probit Regression for determinants of being Constrained Households**

**Number of observations = 5862, Wald chi2 (11) = 424.73, Prob > chi2 = 0.00, Pseudo R2 = 0.3382**

| Explanatory Variables | Coefficient | Robust Standard Error | Z Value | P>\|z\| |
|---|---|---|---|---|
| General Caste | 0.13 | 0.06 | 2.07 | 0.038 |
| Non Cultivators | 0.04 | 0.05 | 0.8 | 0.423 |
| Land Owned | 0.0000397 | 1.48E-05 | 2.68 | 0.007 |
| Household Size | -0.01 | 0.01 | -1.15 | 0.252 |
| Formal | -0.41 | 0.08 | -4.83 | 0 |
| Less Developed Dummy | 0.51 | 0.09 | 5.57 | 0 |
| Developed (Punjab and Haryana =1, others =0) | -0.81 | 0.18 | -4.6 | 0 |
| Output per Acre | -0.0005 | 0.0001 | -4.67 | 0 |
| Interest Rate | 0.0170 | 0.0017 | 10.24 | 0 |
| Secondary Education | 0.1887 | 0.0578 | 3.26 | 0.001 |
| Amount Outstanding | -6.79E-07 | 1.85E-06 | -0.37 | 0.714 |
| Constant | -1.12 | 0.15 | -7.59 | 0 |

It is further observed that probability of being constrained is higher in less developed regions than in middle performing and developed regions. After computing the probability of becoming constrained at the mean value of the explanatory variables, it is observed that in less developed regions, around 20.83 percent of the households are constrained, while in developed and middle performing regions, corresponding figures are 1.99 percent and 10.4 percent respectively. Owing to the poor economic conditions of most of the households in less developed regions, credit market in these regions would be less developed and comprising of fewer lenders. From a perusal of the unit record data of NSSO (All India Debt and Investment Survey, 59th Round), it becomes clear that in Chhattisgarh and Madhya Pradesh, while 0.5 and 0.7 percentage of the households have obtained loans, the corresponding figures for Punjab and Haryana are 2.8 and 2.2 respectively (see table 6).

**Table 6: Percentage distribution of lender households (LS), Incidence of Indebtedness (IOI), and ratio of LS to IOI in rural areas of different states**

| State | LS | IOI | LS/IOI (%) |
|---|---|---|---|
| Chhattisgarh | 0.5 | 19.8 | 2.5 |
| Madhya Pradesh | 0.7 | 26.2 | 2.7 |
| Punjab | 2.8 | 25.7 | 10.9 |
| Haryana | 2.2 | 27.3 | 8.1 |
| West Bengal | 3.1 | 21.8 | 14.2 |
| Karnataka | 1.2 | 31.3 | 3.8 |
| India | 1.5 | 26.5 | 5.7 |

**Source:** computed by authors using 59th round NSSO (AIDIS)

## Conclusions

What is proposed in this paper is a methodology to detect credit constrained households and identify the determinants of being constrained. As far as detection of credit constrained households is concerned, previous studies have mainly used two approaches: The first approach detects the existence of credit constraint from evident violations of the assumptions of life cycle or permanent income hypothesis. The second approach seeks to identify credit constraint households by collecting direct information from households regarding their experiences in the credit market. However, both the approaches have several limitations. Violations of the assumptions of life cycle or permanent income hypothesis could be found even when the households practice precautionary behaviour. On the other hand detecting credit constraint by directly asking household suffers from the lacunae of often eliciting the respondent's subjective judgment about how much credit he/she deserves and how much he/she actually gets. The methodology outlined in this paper is somewhat free from some of the shortcomings of earlier two methods as identification is done by fitting a production function, which is assumed as a function of the expenditure incurred by the household. A household is considered as credit constrained if the level of expenditure the household incurs is below this optimal figure. After classifying a household as credit constrained, we analyze its determinants. The proportion of credit-constrained households estimated through this method is significantly less than the number estimated by previous studies (see Kochar, 1997; Swain, 2002). Further, it is revealed that the likelihood of being constrained increases with increase in size of the land and it is inversely related with economic development of a region. These observations have important policy implications for the formal credit institutions. Reaching out to the self-employed households in less developed regions and poorer class remains a major challenge to the financial inclusion drive initiated by RBI in recent times.

## Limitations and scope for further research

No doubt, the methodology proposed and adopted has certain limitation, in that credit-constraint is detected here by assuming that there is no difference in expost price and exante price that the farmers face in the output market. In practice, a farmer household may find no difference between expost and exante price if it sells its produce to cooperatives at previously announced support price. In the informal market, the expost and the exante price do not differ in case of fixed price credit product interlinked deals (see Chaudhuri, 2004). However, in case of fixed commission credit product interlinked deals and non- interlinked deals, a farmer would face uncertainty. Future research can take note of these problems on availability of data.

## References


Banerjee A and E Duflo (2001). *The Nature of Credit Constraints: Evidence from an Indian Bank*. http://www.chicagobooth.edu/research/workshops/AppliedEcon/archive/WebArchive20012002/duflo.pdf (accessed 25.01.2012)

———— (2004). *Do Firms Want to Borrow More? Testing Credit Constraints Using a Directed Lending Program*. http://econ-www.mit.edu/files/509 (accessed 25.01.2012)

Bardhan, P (1973). Size, productivity, and returns to scale: An analysis of farm-level data in Indian agriculture. *Journal of Political Economy*, 81 (6): 1370-86.

Binswanger, H and D Sillers (1983). Risk Aversion and Credit Constraints in Farmers' Decision-Making: A Reinterpretation. *Journal of development Studies*, 20: 5–21.

Bhattacharjee, M (2012). *Indebtedness in the Household Sector: A Study of selected States in India*. Institute for Social and Economic Change, Bangalore, University of Mysore. (Unpublished Thesis)

Bhattacharjee M and Meenakshi Rajeev (2010). Interest Rate Formation in Informal Credit Market: Does Level of Development Matter?. *Brooks World Poverty Institute Working Paper No. 126*, University of Manchester, UK, http:// www.bwpi.manchester.ac.uk/resources/Working-Papers/bwpi-wp- 12610.pdf

Bhattacharjee M, Meenakshi Rajeev and B P Vani (2009). Asymmetry in Information and Varying Rates of Interest: A Study of Informal Credit Market in West Bengal. *Margin*, 3: 339-64.

Chaudhuri, S (2004). *Some aspects of Agricultural Credit in Developing Country*. New Delhi: Serial Publications.

Diagne, A, M Zeller and M Sharma (2000). *Empirical Measurements of Households' Access to Credit and Credit Constraints in Developing Countries: Methodological Issues and Evidence*. Food Consumption and Nutrition Division, International Food Policy Research Institute.

Eswaran, M and A Kotwal (1990). Implications of Credit Constraints for Risk Behaviour in Less Developed Economies. *Oxford Economic Papers*, 42: 473-482.

Fapchamps M Pender J (1997). Precautionary saving, credit constraints, and irreversible investment: Theory and evidence from semiarid India. *Journal of Business and Economic Statistics*, 15 (2): 180-94.

Feder G, L J Lau, J Y Lin, and X Luo (1990). The relationship between credit and productivity in Chinese agriculture: A microeconomic model of disequilibrium. *American Journal of Agricultural Economics,* 72 (5): 1151–57.

Hall, R E and F S Mishkin (1982). The Sensitivity of Consumption to Transitory Income: Estimates from Panel Data on Households. *Econometrica, Econometric Society*, 50 (2): 461-81.

Jappelli, T (1990). Who is credit constrained in the U.S. economy?. *Quarterly Journal of Economics*, 5 (1): 219–34.

Jodhka, S (1995). *Debt Dependence and Agrarian Changes*. New Delhi: Rawat Publications

Kochar, A (1997). An empirical analysis of Rationing Constraints in Rural Credit Markets of India. *Journal of Development Economics*, 53: 339-71.

Pender, J L (1996). Discount rates and credit markets: Theory and evidence from rural india. *Journal of Development Economics, Elsevier*, 50 (2): 257-96.

Rajeev, M, Manojit Bhattacharya and B P Vani (2013). *Nature and Dimensions of Farmers' indebtedness in India, in P K Shetty edited Innovations in Rice Production.* NIAS Publications.

Rajeev, M and Manojit Bhattacharjee (2012). Household's accessibility to credit: Regional variations. *Indian Economic Journal*, 59 (Oct-Dec issue).

Ray, D and K Sengupta (1989). Interlinkages and pattern of competition. In P Bardhan (eds), *The Economic Theory of Agrarian Institutions*. Oxford: Clarendon Press.

Rosenzweig, M R and K I Wolpin (1993). Credit market constraints, consumption smoothing, and the accumulation of durable production assets in low-income countries: Investments in bullocks in India. *Journal of Political Economy,* 101 (2): 223-44.

Swain, R (2002). Credit Rationing in Rural India. *Journal of Economic Development*, 27 (2): 1-20.

Zeldes, Stephen P (1989). Optimal Consumption with Stochastic Income: Deviations from Certainty Equivalence. *The Quarterly Journal of Economics*, MIT Press, 104 (2): 275-98.

Zeller, M (1994). Determinants of credit rationing: A study of informal lenders and formal groups in Madagascar. *World Development*, 22 (12): 1895–1907.

# Appendix

**Ranking of different states in India based on selected indicators**

| STATE | HDI VALUE (2001) | HDI RANK | PCI VALUE (2002-03) | PCI RANK | Percentage Below Poverty (2004-05) | Poverty Rank |
|---|---|---|---|---|---|---|
| *AP* | 0.416 | 10 | 17486 | 9 | 15.8 | 4 |
| *ASSAM* | 0.386 | 14 | 13233 | 10 | 19.7 | 6 |
| *BIHAR* | 0.367 | 15 | 6634 | 15 | 41.4 | 14 |
| *GUJRAT* | 0.479 | 6 | 19509 | 6 | 16.8 | 5 |
| *HARYANA* | 0.509 | 5 | 24676 | 2 | 14 | 2 |
| *KARNATAKA* | 0.478 | 7 | 18011 | 7 | 25 | 10 |
| *KERALA* | 0.638 | 1 | 21699 | 4 | 15 | 3 |
| *MP* | 0.394 | 12 | 10880 | 12 | 38.3 | 13 |
| *MAHARASHTRA* | 0.523 | 4 | 23939 | 3 | 30.7 | 11 |
| *ORISSA* | 0.404 | 11 | 10575 | 13 | 46.4 | 15 |
| *PUNJAB* | 0.537 | 2 | 26065 | 1 | 8.4 | 1 |
| *RAJASTHAN* | 0.424 | 9 | 12043 | 11 | 22.1 | 7 |
| *TAMIL NADU* | 0.531 | 3 | 19628 | 5 | 22.5 | 8 |
| *UTTAR PRADESH* | 0.388 | 13 | 9657 | 14 | 32.8 | 12 |
| *WEST BENGAL* | 0.472 | 8 | 17515 | 8 | 24.7 | 9 |
| *INDIA* | 0.472 | | 17075 | | 27.5 | |

**Note:** HDI: Human Development Index, PCI = Percapita Income

**Source:** 1. HDI: National Human Development Report, 2001, 2. PCI: Directorate of Economics & Statistics of respective State Governments, and Central Statistical Organisation, Poverty: Planning Commission

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Dr V K R V Rao Road, Nagarabhavi P.O., Bangalore - 560 072, India
Phone: 0091-80-23215468, 23215519, 23215592; Fax: 0091-80-23217008
E-mail: lekha@isec.ac.in; Web: www.isec.ac.in