Credit Constraints and Distress Sales in Rural India:
An Econometric Analysis

**GAGAN BIHARI SAHU, S. MADHESWARAN AND
D. RAJASEKHAR**[*]

Abstract

The literature on rural credit market has generally assumed that farm households are rationed in their access to subsidised formal credit. Due to lack of infrastructure and poor access to institutional credit, exploitation of farmers in interlocked credit market is expected to be high. The distress amount in product selling is more likely to be influenced by the bargaining capacity of the farmer borrower. Underfinance, intensity of the additional liquidity to meet the cost of production and household consumption, and the monopsony nature of paddy market also force the farmers to get into interlocked credit market. This further leads to distress sale of paddy. The empirical analysis from Kalahandi district of Orissa, India shows that the access to formal credit is limited in rural areas although there exist a high demand for it. This suggests a high degree of credit rationing by the formal lender in Kalahandi. The study also suggests that minimisation of underfinance for crop loan and proper implementation of regulated price by the government can be helpful to reduce the distress sale.

Keywords: Credit, Formal, Informal and Distress Sale
JEL Classification: G20, C51, O17, Q14

Introduction

It is highly evident in the literature that relatively backward regions have less access to institutional credit than others [Reddy, 2001]. However, a number of studies on the flow of credit to different size-group of farms and regions reveal that this flow is far from uniform. Importantly, inadequate and untimely credit are the other two important factors which force farmers to depend on unorganised sector irrespective of the extent of hidden cost involved in it.

These hidden costs generally relate to tied lending - tied to land, labour, input or output. These costs could be noticed usually in the form of undervaluation of labour and output of the borrowers and overvaluation of inputs supplied by the lenders. Thus, given the

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unequal bargaining power between borrowers and lenders, the degree of hidden costs varies in the informal market, and in turn, the degree of distress sale.

Empirical observation reveals that pure credit transactions[1] hardly take place in the case of rural credit markets [Gangopadhyay and Sengupta, 1987]. In particular, the loan may be given in cash or kind but the repayment usually takes place through transferring the borrower's crop at a price lower than that prevailing in the open market. The possible reason for this could be the inaccessibility of farmers to either product market or formal credit market. Hence, one can expect that, given the worse access to organised credit market, a lender may offer a lower price for the peasant's product. In this context, one can hypothesise that if the demand for additional liquidity to meet the working capital is relatively inelastic in nature, the borrower may stand at the receiving end of the bargaining process. Alternatively, the terms and conditions go in favour of the lender. This, in turn, may lead to distress sale.

The other important factor for distress sale could be poor implementation of Minimum Support Price (MSP). Although, there is a strong intervention by the government through regulated price, monopsony[2] nature of the product market can be observed in the case of backward agriculture. In this context, can we say that farmer receives a fair and remunerative price for their products, in general, and paddy, in particular? Do all categories of farmers access the same regulated price for their product?

Against this backdrop, an attempt has been made to analyse the factors what makes some borrowers to access institutional credit and others do not. Besides, this paper also examining whether the demand or supply side factors play an important role in access to credit. An attempt has also been made to analyse the factors, which contribute to the low price for paddy in Kalahandi district. As the district is known for its economic backwardness and poor access to institutional credit, exploitation of farmers in interlocked credit market is expected to be high. Thus, the district has been chosen to examine the gravity of the problem of distress sale of paddy.

The organisation of this paper proceeds as follows. Second section describes intended and visible impact of directed agricultural credit policy. Third section focuses on data base and rational of sample selection as well as econometric methodology. Fourth section is

examining the factors determining the access to formal credit and issues relating to distress sale have been discussed in fifth section. The last section concludes with policy implications.

Intended and Visible Impact of Agricultural Credit Policy in India

A majority of the cultivators find borrowing necessary, as their own farm savings are inadequate to meet the various agricultural activities. It has been argued that credit provides command over resources and facilitates needed liquidity to farmers [Lipton, 1976]. Credit is assumed to be helpful for changing the composition and distribution of production in favour of deficit producers. Improved access to formal credit is supposed to shift rural borrowing from informal market to formal institutions, increasing the use of improved variety inputs and technology, leading to increased production and higher income for the rural poor [Donald, 1976; Sarap, 1990]. Thus, the availability of formal credit to agriculture to a greater extent was largely felt. Taking the above into account, the Reserve Bank of India [1954] and many other committees recommended an improvement in the outreach of the formal financial institutions in favour of rural areas, and small and marginal farmers.

Undeniably, the policy incentives have enabled a very wide network of rural financial institutions to develop banking culture among rural and semi-urban people. It may be pointed out here that the rural banking system in India has made tremendous quantitative achievement by neglecting qualitative aspects of credit delivery system [Shivamaggi, 2000]. A perusal of empirical studies reveals that credit is being accessed more and more by the well-to-do among the rural people and have seldom benefited poorer farmers [Rao, 1975; Lipton, 1976; Adams and Vogel, 1986]. Some other studies suggest that a small proportion of the total number of farmers in rural areas access loans from financial institutions, and among those with access to formal credit, a small group engrosses a lion's share of the net volume of credit disbursed [Lele, 1981; Gonzalez-Vega, 1984; Braveman and Guasch, 1986; Egger, 1986]. Sarap [1990] is of the view that there is a larger gap in the supply of overall credit to small and marginal farmers in relation to their needs.

The question of why formal credit is used to a lesser extent by small and potential borrowers is adequately explained in the literature. McKinnon [1973] and Shaw [1973] are of the view that the ceiling on interest rates does not permit banks to incorporate the additional administrative costs that are involved in advancing small loans and supervise them. The formal borrowers basically ration credit to the small borrower in order to reduce their

transaction costs [Gonzalez-Vega, 1984; and Anderson and Khambata, 1985], which is high for servicing small borrowers. Consequently, banks advance loans to those who offer lower risk and better security. Besides, the ceiling level of interest rates imposed by the government restricts financial institutions from charging higher interest rates on lending, on the one hand, and induces higher demand for credit by large number of borrowers, on the other hand, ultimately compelling formal lenders to ration credit [Gonzalez-Vega, 1984]. As a result of this, access to credit is denied for some borrowers from formal lenders. Nevertheless, the higher borrowing costs incurred by small potential borrowers compared to large borrowers discourage them to approach the formal credit institutions [Adams and Nehman, 1979; Aron, 1981; Timberg and Aiyar, 1984; Sarap, 1990].

In the case of India, it has been argued that the Indian policy-makers have not been able to arrive at a banking structure and operational system which is suitable for the credit needs of agriculturists [Shivamaggi, 2000]. Appropriation of benefits by the richer and large size farmers has been an important problem of directed credit policies [Besley, 1994]. The greater the credit subsidy, the higher the chances that the small farmers will be rationed out of the institutional credit facility [Gonzalez-Vega (1984), describes this as the 'iron law of interest rate restrictions']. The evidence on this exclusion of small farmers is quite strong [see, for example, Adams and Vogel, 1986]. In the case of exclusion, issue relating to accessing credit facility, Shylendra [1996] argues that the policy of collateral-based lending restricts the commercial banks and co-operatives to bring the rural poor under their network. It is also argued that the bank follows direct and indirect form of collateral based lending except in the case of poverty alleviation schemes under which it is compelled to lend without insisting on any collateral [Shylendra, 1996].

This suggests that the directed agricultural credit have two kinds of impact. The first type of impact can be observed in the access to credit by different category of borrowers and the second one can be observed in the flow of credit.

Background: Orissa Past and Present

Historically, the area in eastern India, some of which is now Orissa, has been characterised by distinctive geographies and a corresponding variety in tenure arrangements: tributary states in the hills; permanently settled estates towards the coast; and flat, fertile rice-growing areas (*Mughalbandi*). Following the Rajput conquest of Orissa, the latter tract became the demesne (*khalsa*) of the Raja, who granted portions of land under his control to military chiefs,

courtiers, ministers and priests. Over succeeding centuries, hereditary officials with fiscal duties became landlords in their own right, exercising *de facto* ownership rights over pasture lands, fisheries, jungles, and forests.[3] This diverse tenure pattern – comprising, amongst others, small landlord estates, revenue-free holdings, and village heads who became proprietors – was consolidated by the British during the period of colonial rule.[4] An important consequence of this late nineteenth century consolidation of property rights and the land revenue policy at the centre of the colonial administration was that poor peasants in Orissa became increasingly indebted to landlords. As the twentieth century began, therefore, they were trapped in a vicious cycle of borrowing and distress sales, leading to the enforced commercialisation of their crops, land and labour.[5] In short, because the source of credit in rural Orissa was informal, and thus controlled by landlords, moneylenders and rich peasants, the distress sale of one or other kind of commodity (land, labour, crops) was the usual fate awaiting those who engaged in this kind of borrowing.

Protective legislation passed by the Orissa Congress Government in the late 1930s attempted to improve the position of smallholders (*ryots*), most of whom possessed no title to the land they cultivated, and were thus deemed a credit risk by formal lending institutions.[6] This not only fixed rents, forbade eviction, and penalised illegal landlord extractions, but also extended occupancy rights to tenants, permitted hereditary or transferable rights in land, and granted them ownership of standing crops they had grown on leased land.[7] After Independence, the need to secure formal (i.e., non-interlocked) sources of credit for agricultural production by peasant proprietors was identified by the 1949 All-India Congress Agrarian Reforms Committee as a major priority.[8] Despite an avowed intention to answer the question 'why does land come onto the market?', however, an influential series of ethnographic studies conducted in rural Orissa during the early 1950s failed to address the interconnectedness of credit constraints and distress sales.[9] What these ethnographies do reveal, interestingly, is two things. First, the continuing opposition by landowners to legislative attempts to protect tenants; as was the case elsewhere in India, one effect of such laws was the resumption of direct cultivation by landlords, who preferred hiring labourers to leasing their holdings to sharecroppers.[10] And second, the persistence in rural India of interlinked markets, a phenomenon confirmed by subsequent studies conducted in Orissa [Sarap, 1987; 1991] and elsewhere [Bharadwaj, 1985a, 1985b; Bardhan and Rudra, 1986; Srivastava, 1989a, 1989b].

Kalahandi district, located in western part of Orissa, has attracted worldwide attention for poverty, widespread illiteracy, under development, starvation deaths, recurring droughts[11], etc. The present backwardness of the district could be traced to the historical processes of land revenue settlements leading to the emergence of bipolar classes. *Gountias*, at one end of the agrarian structure, were village headmen who collected land revenue for the State during the pre-colonial period, and the colonial government legitimised their role. The *gountias* wielded considerable influence in the villages as they have occupied best lands, gained control over the village wasteland, etc. The *gountias* were leasing out the land on behalf of the rulers; and thus, each village historically had a large number of peasants lacking ownership rights on the land that they were cultivating, unable to meet the livelihood needs, completely dependent on *gountias* for land and credit. The land revenue settlements during the colonial period found widespread indebtedness among agriculturists [Das B S, 1932; Das J, 1962], and the *gountia*-cum-moneylender was the principal source of credit [GOO, 1980]. The credit market was linked with the product market; "The crop in the field was usually purchased by the moneylender himself during the harvest time at a nominal rate and the price was adjusted against the loan including the interest" [Ibid].

It is not that the backwardness has been uniform in all the parts of the district. The areas endowed with flat-fertile paddy fields receiving irrigation from Indravati river (presently through irrigation project constructed across the river) have been historically more advanced as compared to the hilly tracts pursuing rain-fed agriculture. Of 13 blocks in the district, six fall in the advanced region, while the rest in the backward region. The study blocks of Jaipatna and Narla represent advanced and backward regions, respectively. The differences in the two blocks are borne out by the following. While the proportion of irrigated area to gross cropped area in Jaipatna varied between 50 to 58 per cent across the seasons, the corresponding figures in Narla block were 13 to 31 per cent. Similarly, the fertiliser consumption was 6 kgs per ha in Narla block as compared to 15 kgs in Jaipatna block. These differences in agricultural inputs lead to differences in the density of paddy cultivation and yield rates of paddy. The paddy cultivation was widespread (with almost 100 per cent in Kharif season) in Jaipatna block as compared to about 61 per cent in Narla for the same season[12]. The yield rates of paddy were 6 and 14 quintals per ha in the backward and advanced regions, respectively. Further, there were differences in communications (measured in terms of length of durable roads, and population covered by post office and banks), number of industries and development of non-farm opportunities.

Although the two blocks were different in terms of resource endowment, agricultural technology, cropping pattern, yield rates, communications and development of industries, the agrarian structure was by and large the same. In both the blocks, *gountias* and large landholders were at one end of agrarian structure owning considerable extent of agricultural land, having control over credit, labour markets and political institutions. Through their influence on the labour market by practising patron-client relationship, they obtained cheap agricultural labour for most part of the year. There is, however, one difference in the social background of *gountias*; while upper caste Brahmins were *gountias* in most of the villages in Jaipatna block, those in Narla block belonged to both Brahmin and other upper castes. The influence of *gountias* was strong in the advanced block. At the other end of the agrarian structure, a large number of small and marginal farmers belonging mostly to depressed castes depended on tiny landholdings without much access to institutional credit. They, therefore, depended on the informal credit market located at both village and town levels for their production and consumption needs. The small and marginal farmers, especially from the backward region, are unable to adopt high yielding varieties of seeds largely on account of limited risk bearing capacity, low access to inputs and isolation from information, etc. A large proportion of them was found to be depending on weekly sandies, and purchasing essential items through exploitative barter.

Sources of Data and Econometric Methodology

Data Base and the Rationale of Sample Selection

There is a tendency for formal credit to flow more to agriculturally developed regions and to relatively larger farmers leaving the backward regions and small farmers to the informal market. Therefore, data from the service area of four different bank branches for two such regions have been extracted to analyse access to credit and distress sale. In the present study, the level of technology[13] used has been considered as a proxy variable to define the advanced and backward regions. Based on the above indicator, the blocks of the Kalahandi district have been categorised into two different groups. Two blocks have been randomly selected (one from the advanced group of block and the other from a backward group) for this purpose. From each block, one Commercial Bank (CB) and one Regional Rural Bank (RRB) have been randomly selected. From the service area of each bank, on the basis of the number of borrowers in the last three years, the villages have been grouped. Among these groups, one village group has been randomly selected from which a sample of fifty borrower households

(the farmer who has borrowed at least once for the period 1999-2001) has been randomly selected. In order to avoid the problem of under or more representation, the population size of each group of villages has been kept approximately the same. Furthermore, to analyse the distress sale, the rationale of crop selection (Paddy) is given in Appendix 1. Since farmers in the study area hardly get crop loans during the Rabi session, the analysis restricts to only Kharif crop for the year 2001-02. The per acre paid-out cost of production for all categories of farmers has been worked out in relation to the existing technology to ascertain the extent of the cost met by formal and informal sources.

Econometric Methodology

The use of probability models is conceptually preferable to conventional linear regression models when the dependent variable is dichotomous, because parameter estimates from the former overcome most weakness of linear probability models, namely, they provide parameter estimates which are asymptotically consistent and efficient. In this paper, a Probit model has been employed to study the determinants of access to credit. The general model is a binary choice model involving estimation of the probability of access to credit (y) as a function of a vector of explanatory variables (x). It is assumed that there is an underlying response variable y^*_i defined by the regression relationship

$$y^*_i = \boldsymbol{b}'x_i + u_i \qquad (1)$$

In practice, y^*_i is unobservable, what we observe is a dummy variable y defined by

y= 1 if y^*_i>0   (access to credit)
=0 otherwise (not access to credit) $\qquad$ (2)

From the above relations, we get

*Prob (y_i = access to credit) = Prob (u_i > -**b**'x_i)*

$$= 1-F(-\boldsymbol{b}'x_i) \qquad (3)$$

Where F is the cumulative distribution function for u. In this case the observed values of y are just realisations of a binomial process with probabilities given by equation (3) and varying from trial to trail (depending on x_i). Hence the likelihood function is

$$L = \prod_{y=0} F(-\boldsymbol{b}'x_i) \prod_{y=1} [1 - F(-\boldsymbol{b}'x_i)] \qquad (4)$$

taking the logarithm of L and maximising with respect to β, which gives

the ML estimator of slope coefficient.

Sample selection bias: Basically determinants of credit equations are estimated using a sub-sample of farmers who have access to credit. This may lead to the sample selection bias. Heckman [1979] developed Joint maximum likelihood procedure to correct this selection bias. This procedure involves estimating probability of access to credit and amount of credit obtained simultaneously. This approach requires the credit equation to be identified. The appropriate identifying variable is actual size of land holding. For example, the farmers who have access to credit are not a randomly selected sample of all farmers in the population. Heckman [1979] developed a solution (two-step procedure) to this problem and this solution variable (inverse mills ratio) will be added as an explanatory variable in the credit function to tackle the selectivity bias. To formalise the above explanation, let the equation that determines the sample selection be

$$I_i^* = \boldsymbol{g}' Z_i + u_i$$

and let the equation of primary interest (determinants of credit) be

$$y_i = \boldsymbol{b}' x_i + \boldsymbol{e}_i$$

The sample selection rule is that y is observed only when I is greater than

zero. Suppose as well that ε and u have a bivariate normal distribution with zero

mean and correlation ρ, then we may write the model as

$$
\begin{aligned}
E[y_i \mid y_i \text{ is observed}] \quad &= \quad E[y_i \mid I_i^* > 0] \\
&= E[y_i \mid u_i > -\boldsymbol{g}'Z_i] \\
&= \boldsymbol{b}'x_i + E[\boldsymbol{e}_i \mid u_i > -\boldsymbol{g}'Z_i] \\
&= \boldsymbol{b}'x_i + \boldsymbol{r}\boldsymbol{s_e}\boldsymbol{l}_i(\boldsymbol{a}_u) \\
&= \boldsymbol{b}'x_i + \boldsymbol{b_l}\boldsymbol{l}_i(\boldsymbol{a}_u)
\end{aligned}
$$

Where $\alpha = \gamma' Z_i / \sigma_u$ and $I(a_u) = \dfrac{f(g'Z_i / s_u)}{j(g'Z_i / s_u)}$

$$Y_i \mid I_i^* > 0 = E[Y_i \mid I_i^* > 0] + V_i$$

$$= b'x_i + b_1 I_i(a_u) + V_i$$

Least square regression using the observed data, for instance, the OLS regression of determinants of credit using only data for farmers who have access to credit- produces inconsistent estimates of β. We can view this problem as omitted variable. So least squares regression of y on x and λ would produce consistent estimates, but if λ is omitted, the specification error of an omitted variable is committed. Based on this observation Heckman proposes a two stage procedure. In the first stage, the discrete choice model is estimated by probit on the entire sample. Using the estimates, the lambda has been estimated and included in the second stage estimates of the structural relationship on the selected sample of non-censored observations.

Access to Institutional Credit

Emerging Patterns in Rural Credit Market

Of the 200 sample considered in the study it is observed that 86 per cent of farm households depend on credit (i.e. in both formal and informal) to meet their production cost. However, only 56 per cent of cultivator households had borrowed from formal credit institutions during the reference year (Table 1). The proportion of households who had borrowed was as low as 20.6 per cent in the case of marginal farmers and as high as 81 per cent in the case of medium and large size farmers. It shows that the proportion of households borrowing from formal institutions increases with an increase in the size of land holding. Table 1 also reveals the extent of farmers' depending on informal credit market. It shows a positive association between size of landholding and the proportion of households depending in informal sector except the large size farmers. Importantly, the proportion of formal borrower taken informal loans also increases with respect to size of landholding except the large category. Based on the information given in Table 1, the following inference can be drawn:

      (1) the credit rationing goes in favour of larger farm households that are economically sound and in turn the access to formal credit;

(2) even if farmers who are accessing credit from formal sources, the obtained amount is inadequate to meet their requirement, and thus depending on informal sector.

Table 1. Distribution of Borrowers by Farm Size, Kalahandi District, Orissa (2001-02)

	Farm Size (in Acres)				Total
	0.01 – 2.50 (Marginal)	2.51 – 5.00 (Small)	5.01 – 10.00 (Medium)	10.01 and Above (Large)	
All Households**	68 (34. 0)	49 (24. 5)	47 (23. 5)	36 (18. 0)	200 (100)
All Borrowers	42	48	47	35	172
% to total households	(61. 8)	(98. 0)	(100)	(97. 2)	(86. 0)
Formal Borrowers	14	31	38	29	112
% to total households	(20. 6)	(63. 3)	(80. 9)	(80. 6)	(56. 0)
Informal Borrowers	36	38	43	22	139
% to total households	(52. 9)	(77. 6)	(91. 5)	(61. 1)	(69. 5)
No. of formal borrower taken informal loan	8 (57. 1)*	21 (67. 7)*	34 (89. 5)*	16 (55. 2)*	79 (70. 5)*

Note: 1. The figure in the parenthesis in row (**) is percentage of farm households in each category from total sample of 200.
   2. The figure in the parenthesis in each cell is the percentage of the farm households from the respective group total.
   3. The figure in the parenthesis as indicated by (*) represents the percentage of formal borrowing households also taken informal loan with respect to the farm size category. This gives us the percent of formal borrowers in each farm size category depending on informal credit market.
Source: Field Survey

Table 2 reveals variation in the share of total institutional credit among different categories of farmers. In the case of marginal farmers, who constituted 34 per cent of total sample of farm households obtained 4.2 per cent of the total credit disbursed. The medium size farmers consist of 23.5 per cent of the sample households have obtained 30.4 per cent of total formal credit. It is interesting to note that 47.2 per cent of the funds made available through formal credit had gone to the large size farmers. The above evidence suggests that formal credit tends to concentrate amongst the better-off farmers. This finding also corroborates with some of the studies as revealed in earlier literature [see Adams and Vogel, 1986; Sarap, 1990; and Basu, 1997]. Thus, the expansion of the institutional lending in the rural areas has failed to reach marginal and small farmers. It seems, even with the policy of deregulation of lending rate[14], and the suggested measures by Gupta Committee[15] [1998]

aimed at improved quality of credit delivery system by CBs have failed to cover marginal and small farmers, in general, and increasing flow of credit to agriculture sector, in particular. In this context, what make some farm households to access to institutional credit and others do not? This issue has been discussed in the subsequent section.

Table 2. Distribution of Loans (%) by Farm Size, Kalahandi District, Orissa (2001-02)

	Farm Size (in Acres)			
	0.01 – 2. 50 (Marginal)	2.51 – 5. 00 (Small)	5.01 – 10.00 (Medium)	10. 01 and Above (Large)
Proportion of formal loans to total loan borrowed	45. 5	68. 6	55. 3	72. 5
Proportion of formal credit obtained by the group to total formal credit	4. 2	18. 2	30. 4	47. 2

Source: Field survey

Table 3 explains the level of dependency on credit to meet the cost of production. The study has adopted Cost A_2 process[16] (the method given by the Reports of the Commission for Agricultural Costs and Prices) to estimate the cost of cultivation. It can be seen that per acre paid-out cost shows a positive association with the size of holding. This can be attributed to the extent of dependence on wage labour force, use of fertiliser and pesticides, type of crop grown, and technique of production.

Table 3. Region-wise Extent of Dependency on Credit Per Acre of Gross Cropped Area, Kalahandi District, Orissa (2001-02)

Size of holding (in acres)	Per acre paid-out costs (in Rs.)	Level of dependency on credit (in per cent)	
		Total	Formal
Advanced Region			
0.01- 2.50	1,823	64.95	26.04
2.51 – 5.00	2,722	69.45	44.84
5.01 – 10.00	3,543	68.36	35.92
10.01 – Above	3,514	52.80	38.33
Backward Region			
0.01- 2.50	1,662	58.66	26.19
2.51 – 5.00	2,161	74.47	54.41
5.01 – 10.00	2,242	64.01	38.60
10.01 – Above	2,622	48.91	35.34

Source: Field survey

Given the paid-out cost of production, the large size farmers have depended less on credit. Between the first two categories, the marginal farmers were depending less on credit as proportion to their cost of production compared to the small farmers. It is interesting to note that among all the categories, only small size farmers were covering a relatively higher proportion of their cost of production through formal credit in both the regions. This suggests that the medium and large size farmers might be obtaining larger amounts of credit in

absolute terms but relatively less with respect to the proportion of their cost of cultivation. It is to be emphasised here that, the flow of credit in absolute term might be positively associated with the size of holding but it was inversely related as a proportion to per acre paid-out cost of production in the study area. It seems bankers were fixing a maximum credit limit irrespective of the cost of production and the credit need by medium and large size farmers.

A close observation on the credit flow reveals that these farmers could manage to cover in the range of 26 to 54 per cent of their paid-out cost of production through formal sources in both the regions. To meet the remaining cost they might have depended either on self-finance or informal market. The foregoing analysis, therefore, suggests that the flow of credit seems to be far away from the required amount to meet the cost of cultivation.

Determinants of Access to Formal Credit

Since credit generally involves a time gap between the point when credit is given and the future point when credit is repaid with interest, anything may happen in-between these two time points. If a credit transaction is looked from a lender's perspective, one can anticipate pre-contractual (at the point credit is given), and post-contractual problems (at the point credit is repaid). The former case includes adverse selection (i.e. the fear of selecting a bad borrower), creditworthiness and screening of the borrower. In the later case a lender face the problem of wilful and non-wilful default. Given these problems what make certain households to access institutional credit and others do not?

It should be stressed that access to credit is both influenced by the farmer's capacity[17] to take a loan and the lender's willingness to extend it. This usually involves a signalling and screening procedure in order to communicate information about the riskiness of the loan (Petrick and Latruffe 2003). In this context, farmers' access to institutional credit is estimated by using a Probit model where the dependent variable Y_i is a dichotomous (1, 0) variable indicating whether the *i*-th farm household has access to credit or not. So, the dummy dependent variable = 1, if the farm households has access loan from formal sources and = 0, otherwise.

Credit access is assumed to be explained by the following farm characteristics. Loans are advanced to farmer borrowers on the basis of ownership of land, and it works as collateral

from the lender's point of view. Hence, the actual size of land holding can be taken as one of the important factors in the case of access to institutional credit. A better land quality can also improves the farm household's prospects of access to loan. Value of assets excluding land particularly, agricultural implements, and proportion of income excluding own farm activities to total income can be used as an indicator to judge the creditworthiness capacity of the borrower. Bankers may prefer the borrower who has other than agricultural income to minimise the non-repayment risk. Irrigation facility can help for the certainty of a particular crop. Thus, percentage of irrigated area to gross cropped area is expected to be positively associated with access to formal credit. The credit-disbursing officials may discriminate against lower caste and tribal households because they have fewer outside connections and higher caste decision-makers predominance in the credit institutions. The caste variable is expected to be negatively correlated with access to credit facility. Conversely, formal education may have a positive influence on access to credit. The definition and descriptive statistics of the variables used in the analysis is reported in the Table 4.

Table 4: Definition, Measurement, Descriptive Statistics and Expected Sign of Variables used in the Probit Equation.

Variable	Description	Mean & Standard Deviation	Expected sign
Dep.Var	Access to Credit =1; 0 otherwise	0.560 (0.50)	
ASLH	Actual size of landholding (in Acres)	6. 25 (6.20)	+ ve
LANDQ	Land quality { = 1, for good land quality * = 0, otherwise	0.505 (0.50)	+ ve
ASSET	Value of assets excluding land (in Rupees)	1547. 18 (47362.02)	+ ve
IEOFA	Income excluding own farm activity as proportion to total family income (in Rupees)	35. 64 (32.11)	+ ve
PIAGCA	Percentage of irrigated area to gross cropped area	22. 92 (36.29)	+ ve
CASTE	Caste status { = 1, if the borrower belong to Scheduled Caste or Scheduled Tribe = 0, otherwise	0.38 (0.49)	- ve
EDU	Educational qualification of the borrower { = 1, for 10th or more standard = 0, otherwise	0. 21 (0.41)	+ ve
Number of Observations =200			

Note: (i) * In survey land particulars was collected from each and every farmers in terms of area (in Acres) under Low, Medium, and High land. It was found that the high land is completely rain-fed and the probability of crop failure is more. In the case of low land the possibility of crop failure is minimal. Under this assumption, if the area under low land is covering at least one third to total land owned, it has been considered as the farmer is having good quality land.

(ii) Figures in parentheses indicates Standard Deviation

Table 5: Access to Formal Credit: Probit Results.

Variables	Coefficient	t-values	Marginal effect
Constant	0. 33221 *	2. 12	0.19000
ASLH	- 0. 03491	- 0. 92	- 0. 01149
LANDQ	0. 75417 *	3. 08	0. 24510
ASSET	0. 00005 **	1. 97	0. 00001
IEOFA	- 0. 02188 *	- 5. 19	- 0. 00724
PIAGCA	0. 00321*	2. 05	0. 00105
CASTE	- 0. 10025	- 0. 77	- 0. 03323
EDU	0. 32436 ***	1. 60	0. 10001
Log-likelihood	- 91. 35		
Restricted log-likelihood	- 137. 19		
Chi square (7 df)	91. 68		
Pseudo R-square	0. 36		
Number of Observations	200		

Note: *1% level significance; **5% level significance; ***10%level significance

The determinant of access to formal credit is estimated by using Probit method, which is given in Table 5. The Probit model assumes that probability of borrowing from the formal sector is determined completely by the bank, which decides whether a farm household should get a loan, or not. This model also assumes that all households demand formal credit at the existing interest rate, and that the formal sector is the cheapest source of credit for farm households. This probability is represented by a univariate normal distribution representing the access equation, which is specified in the methodology. The result shows that actual size of land holding (ASLH) is negative but not significant, which is contradict to the earlier findings that larger the size of land holding by the household, the greater is the probability of its access to the formal sector [Kochar, 1997 and Swain, 2002]. The negative sign in our study could be attributed to uncertainty of crop income given the poor infrastructure facility in the study area. Importantly, quality of land (LANDQ) has a positive and significant effect on the access to formal credit. This implies that it is not the size of landholding but the quality of land matters for the bankers to select a borrower, and in turn access to institutional credit. It is quite interesting to note that the marginal effect of land quality increases the likelihood of access to credit by about 24 percent. Coefficient of ASSET is positive and significant at 5 percent level, which implies that higher the value of asset excluding land, higher the probability of access to formal credit. *Ceteris Paribus*, if the farmer is well equipped by agricultural implements, there is a possibility of getting more income from farm activity, which in turn give indication of credit worthiness capacity of the borrower. From this we can infer that the farmers who are having less asset value excluding land may have

poor access to institutional credit. A farmer who is having higher non-farm income as proportion to total income is less likely to access to credit. This is evident from the fact that IEOFA coefficient is negative and highly significant. This result indicates that farmers having other than agricultural income to meet their working capital may not approach the bank for crop loan. Opposite to this, bankers may not be having proper information on sources and amount of non-farm income to judge the creditworthiness capacity of the borrower. This suggests that bankers prefer tangible collateral (like land or quality of land) to select the borrower.

A better irrigation facility also improves the farm household's prospects of access to formal loan and hence borrowing. This explanation is confirmed by the positive and highly significant coefficient of PIAGCA. As expected scheduled caste and scheduled tribe farmers are less likely to access formal credit whereas this coefficient is surprisingly not significant. Higher the formal education, higher the probability of access to credit. This coefficient is positive and significant at 10 percent level. In this context, it can be argued that education gives better information regarding available banking facility. It is evident from the marginal effect that one percent increase in education which increases the likelihood of access to credit by 10 percent. In summary, the results are quite in line with theoretical expectation and draw a plausible picture of farm household's credit access in Kalahandi district. The highly significant chi-square and Pseudo R-square (33 percent) clearly shows that the estimated model is having good fit. The model predicts a high degree of rationing by the formal sector. Evaluating the probability of access at the mean levels of the explanatory variables, 74 percent of the households are credit rationed by the formal sector[18].

Determinant of Credit Obtained by the Farmer

Directed agricultural credit system assumes all farm households have a positive demand for formal credit and it is a cheaper source for borrowing. It is further assumed that both revealed and potential demand for credit far exceeds supply. Under this assumption many countries and financial institutions rely on supply-leading approach to extend their credit facility. Irrespective of supply-leading approach, most theoretical and empirical studies explain the perception that demand far outweighs supply persists. This lead to adopt wide scale credit rationing[19] by the formal sector.

Credit rationing exists in two forms *viz*. price and non-price credit rationing. In the case of former, irrespective of all terms and condition being fulfilled by the borrower he is denied to access credit by the formal sector. In the later case the farmer borrower can access to credit but not to the extent of amount demanded. The first system of credit rationing explains about variations in the access to credit i.e. what make some farm households to access formal credit and others do not. The second system explains on variations in the amount of credit flow from the formal sector. Alternatively, what could be the possible factors through which bankers determine the credit limit to the borrower? In our previous model on access to credit it was found that the farm characteristics like quality of land, value of assets excluding land, income excluding own farm activity as proportion to total family income, percentage of irrigated area to gross cropped area, and educational qualification of the borrower determine whether to access credit or not. The second model specifies the factors that determine the amount of credit given to the farmer borrower by the formal sector. The variables included in the model and its definition is reported in Table 6.

Flow of credit can be looked at the two different angles. From the supply side, flow of credit can be said to be depend upon the security offered and the lender's assessment as regards the repayment capacity of the borrower. Land assets can reasonably serve as indicators of the degree of security for loans offered. Besides, the general perception by the bankers is that more land under cultivation enhances the probability that enough output will be produced for the farmer, which in turn can help the farmer to repay the loan without difficulty. Thus, given the self-finance capacity the operated area[20] should be positively related to the demand for credit. Production surplus[21] can approximates most closely the repayment capacity of the farm. Because of difficulty in calculating the production surplus, value of output of farm household has been used to assess the creditworthiness capacity of the farmer. On the demand side, percentage of irrigated area to gross cropped area, expenditure on fertiliser and pesticides, educational qualification of the borrower can be expected to have positive association with the flow of credit. Caste and ratio of workers to family members can also influence the demand for credit.

It can be predicted from the foregoing discussion that the actual flow of credit depends not only upon the factors governing the supply of credit but also on the factors influencing the demand for it. Between different farm size-groups, disparities in the flow of credit can, therefore, be viewed in terms of the relative strength of demand and supply

factors. In the financial situation characterised by the absence of credit rationing, the factors influencing the demand for credit will obviously determine the quantum of credit supply. But, in the financial system, where credit rationing (either price or non-price) exists, the factors influencing the demand for credit cannot be considered as ultimate determinant of supply of credit. It would, therefore, be interesting to examine whether the demand or supply side factors, which account for the flow of credit. The factor that determines the credit limit by the formal lender is discussed in Table 6.

Table 6: Definition, Measurement, Descriptive Statistics and Expected Sign of Variables used in the OLS Equation.

Variable	Description	Mean and Standard Deviation	Expected sign
Dep. Variable	Amount of Credit given to farmers (in Rupees)	11653. 17 (10972. 91)	
PIGCA	Percentage of irrigated area to gross cropped area	31. 68 (38. 81)	+ve
CASTE	Caste status = 1, if the borrower belong to Scheduled Caste or Scheduled Tribe = 0, otherwise	0. 28 (0. 45)	-Ve
EDU	Educational qualification of the borrower = 1, for 10th or more standard = 0, otherwise	0. 29 (0. 45)	+ve
INEOFA	Income excluding own farm activity (in Rupees)	17789. 54 (31660. 67)	+ve
WFM	Workers to family members (ratio)	0. 43 (0. 17)	-ve
OA	Operated areas (in Acres)	8. 02 (6. 65)	+ve
EXPFP	Expenditure on fertiliser and pesticides (in Rupees)	7188. 20 (7432. 64)	+ve
VAO	Value of farm output produced in the year (in Rupees)	43947. 21 (43309. 81)	+ve
IMR	Inverse Mills Ratio (λ)	0. 4594	
Number of observations = 112			

Note: Figures in the parentheses indicates standard deviation

As we expected, most of the parameters have the expected sign and significant at 5 per cent level, except the coefficients of INEOFA, WFM and OA (Table 7). The coefficient of PIAGCA is positive and highly significant, which implies that a unit (1 percent) increase in proportion of irrigated area to gross cropped area, on the average, leads to increase 47.55 rupees (0.1292 percent) of credit.   This is true and conformity with earlier studies that irrigation facility is an important factor to determine amount of credit disbursed by the bankers. Non SC/ST farmers enjoy more credit compared to Scheduled Caste and Scheduled Tribe (SC/ST) farmers. This reflects in the negative and significant coefficient of CASTE.

The positive and significant coefficient of human capital variable (EDU) clearly shows that the farmers who has possessed 10th standard level of education and above are enjoying more credit compared to less educated farmers. More the expenditure on fertiliser and pesticides insists the bankers to provide more credit. It is observed in the field that large and medium size farmer's per acre expenditure on fertiliser and pesticide is very high. This in turn enhances per acre productivity and facilitates them to show their credit worthiness. One percent increases in EXPFP, on the average, leads to 0.5329 percent increase in amount of credit. The observed negative and insignificant operated area (OA) and significant coefficient of value of agricultural output conform that value of output rather than size of operational holding is an important factor to influence bankers to fix up the credit limit. One percent increases in value of agricultural output, which increases the amount of credit by 0.2715 percent. As we have mentioned in the methodology section, analysing the determinants of credit considering the sample of farmers who has obtained the credit is not a random sample of all the farmers in the population. In order to correct this selectivity bias problem, the IMR (λ) variable has been calculated from the above probit equation and introduced as an additional explanatory variable in the determinants of credit equation. The result shows that IMR is positive and significant and the resultant equation is unbiased. The R-square value is 0.69, which means 69 percent of the variations in amount of credit explains by the included variables. Further the whole significance of the model also highly significant at 1 percent level, which rejects the hypothesis that all the slope parameters are zero.

Table 7: Determinants of Formal Credit: Selectivity Corrected OLS Result

Variables	Coefficients
Constant	1844. 540 (0. 70)
PIAGCA	47. 548 * (2. 63)
CASTE	- 3595. 320 * (- 2. 50)
EDU	3166. 493 *** (1. 89)
INEOFA	0. 002 (0. 06)
WFM	- 1291. 389 (- 0. 34)
OA	- 197. 011 (- 0. 79)
EXPFP	0. 864* (3. 57)
VAO	0. 072 ** (1. 86)
Inverse Mills Ratio (λ)	2464. 128 (2. 00)
R – squared	0. 69
Adjusted R – squared	0. 66
F(9,102 df)	25.39*
Rho	0. 39
Standard error corrected for selection	6000. 81
Number of observations	112

Note: Figures in parentheses indicate t-values
*1% level significance; **5% level significance. ***10%level

The ordinary least square regression is inappropriate when the dependent variable is discontinuous [Pindyck and Rubinfield, 1997]. Logit and Probit models are appropriate when the dependent variable is discrete, usually taking two values, 0 or 1. These models are useful if the question is whether to access to credit or not. But are not appropriate when it is important to measure the intensity of credit obtained. The Tobit model which better handles censored dependent variables (continuous between some lower and possibly upper bound) [Pindyck and Rubinfield, 1997] is superior to the Logit and Probit. It measures both the probability of access to credit and intensity of credit obtained. In this study, the Tobit model was, therefore, used to achieve the stated objectives. The results of the Tobit model are given in the Table 8. The sign and significance level of the coefficients are almost the same as we have discussed in the OLS model, except INEOFA and OA, which are positive and negative in OLS model. The education variable is significant in OLS whereas surprisingly it is not significant in Tobit equation. The Tobit results are again confirm that PIGCA, VAO, EXPFP, CASTE are important variables to determine the intensity of credit obtained.

Table 8: Determinants of Formal Credit: Tobit Results

Variables	Coefficient		Marginal Effect
Constant	- 1305. 28		- 816. 78
PIAGCA	68. 63 *	(3. 40)	42. 94
CASTE	- 3874. 82**	(- 2. 50)	- 2424. 67
EDU	2341. 17	(1. 25)	1464. 98
INEOFA	- 0. 001	(- 0. 04)	- 0. 007
WFM	- 5819. 59	(- 1. 38)	- 3641. 60
OA	15. 53	(0. 05)	9. 72
EXPFP	0. 87 *	(2. 99)	0. 55
VAO	0. 062 ***	(1. 61)	0. 04
Sigma	8659. 41*	(14. 28)	
Log-likelihood	- 1224. 72		
R – squared	0. 63		
Number of observations	200		

Note: 1. Figures in parentheses indicate t-values
2. *1% level significance; **5% level significance. ***10%level
3. Marginal Effect – Partial derivative of expected value with respect to vector of characteristics. They are computed at the means of the explanatory variables.

Type of Contracts in Informal Credit Market

Given the status of self-finance and inadequate availability of institutional credit, the farmer borrowers take loan from four different sources in informal credit market with different terms and conditions. They are: farmer lender, trader, middleman, and relatives. Under the types of contracts agreed upon by the borrowers and lenders the degree of variability in the level of

interest rates can be as high as 120 per cent per annum or as low as zero per cent per annum [Rudra, 1982]. Bhaduri [1977] argues that usurious interest rates are the result of monopoly power of the lender. Bottomley [1975] maintains that high interest rate reflects the risk of default faced by the lender in the rural credit market of the less developed countries. The other studies[22] claim that the presence of interlocked contracts can explain the existence of a wide spectrum of interest rates. It has to be emphasised here that the interest rates in the informal market depend on the kind of contracts with or without collateral. For a loan with collateral, the farmer has to pay at some interest, which is higher than the bank rate. In the case without collateral, the farmer borrower can obtain credit from the interlocked market. The credit can be inter-linked with either labour or product where the prices are predetermined. The different forms welfare loss of borrowers is important in the present context given that inter-linked contract allows the lender to extract full surplus attributable to the inter-linked markets [Bardhan, 1984 and 1989; Gangopadhyay, 1994].

In the study area, the interlocked credit and product market is common phenomenon where the farmer borrowers used to sell their product after harvest at the predetermined price. Since paddy is the major crop (it covers almost 100 per cent gross cropped area in the advanced region and around 61 per cent in the case of backward region), credit against future production of paddy is commonly practised.

The predetermined exchange rate in the interlocked credit market is given in Table 9. It is observed that in the case of input-output interlocked credit market the exchange rate is fixed irrespective of the size of land holding. However, given the strength of the bargaining power of the borrower and lender the exchange rates differ in the case of credit and output interlocked market. If the intensity of additional liquidity requirement is relatively inelastic in nature, the terms and conditions go in favour of the lender. Therefore, the level of price for paddy may go in favour of the lender (less price for the farm product), and in turn, the extent of distress sale. This issue has been discussed in the subsequent section. To calculate the extent of distress sale the kind repayment has been converted to nominal terms.

Table 9: Predetermined Exchange Rate of Paddy in Interlocked Market, Kalahandi District, Orissa (2001-02)

Lenders	Set exchange rate (cash/kind)	Type of interlocked market	Approximate distress amount in Rs.
Trades/shopkeeper	1 bag Urea = 1 bag paddy	Input-output	150/-
	1 bag Potash = 1 bag paddy	Input-output	140/-
	1 bag super = 1 bag paddy	Input-output	150/-
	1 bag DAP = 2 bag paddy	Input-output	155/-
Rice mill owner/businessman/ big farmers	Advance Rs. 230 – 280/-	Credit-output	150 to 100/-

Source: Field survey

Note: The approximate distress amount per bag of paddy selling has been calculated as the difference between MSP and respective fertiliser price. The MSP for per bag of paddy (75 Kg) is Rs. 380/-. One bag fertiliser consists of 50 Kg.

Distress Sale of Paddy

Distress sale of Paddy occurs due to the operation of two sets of factors. First, selling of Paddy at a predetermined price due to interlocked markets. Second, due to the poor implementation of the Minimum Support Price (MSP), announced by the government to provide fair price to the farmers. Janvry and Subbarao [1986] show that largest gains to the poor with the greatest growth effects occurred when output increase was achieved through flexible prices of agricultural commodities. The paper, therefore, takes MSP as an important indicator not only to measure the extent of income loss through distress sales but also to reach important policy implications in this regard.

The amount of paddy sold at the distress price and the income loss due to such a situation is measured under different scenarios. In the first hypothetical scenario, we estimate the income loss by obtaining the quantity sold at interlocked price as against the hypothetical scenario of selling the quantity in the Open Market Price and the MSP. In the second scenario, the quantity sold at the Open Market Price is obtained as against selling at the Minimum Support Price. Here too the exercise is carried out for all categories of farmers in both the advanced and backward regions.

Table 10 shows that the proportion of quantity sold at predetermined price is relatively less in the advanced region compared to the backward region. It is also observed that the proportion of quantity of paddy sold at predetermined price is inversely related with

the size of landholding. This indicates less access to open market by marginal and small farmers in both the regions.

Table 10. Region-wise Average Quantity of Paddy (in bags) Sold by the Farm Households, Kalahandi District, Orissa (2001-02).

Size of landholding (in acres)	Total quantity sold	Proportion of quantity sold at pre-determined price (in %)	Proportion of quantity sold at open market price (in %)
Advanced Region			
0.01- 2.50	13	46.15	53.85
2.51 – 5.00	38	31.58	68.42
5.01 – 10.00	101	27.72	72.28
10.01 – Above	207	11.59	88.41
Backward Region			
0.01- 2.50	4	75.00	25.00
2.51 – 5.00	6	66.67	33.33
5.01 – 10.00	22	46.67	53.33
10.01 – Above	70	24.29	75.71

Source: Field survey

The estimated income loss due to distress selling either due to the interlinkages in the markets or due to the poor implementation of the MSP is shown in Tables 11 and 12. The second and third column of Table 11 shows that both the interlocked price and the open market price differ across the farmers of different size holdings. It is seen that the medium and large farmers have better bargain in fixing not just the interlocked price but also in obtaining a favourable price in the open market. This seems to be happening for two reasons. The first factor is the difference in the time of selling of paddy in the open market by the marginal and small farmers as against the medium and large farmers. The higher intensity of the need for liquid cash forces the marginal and small farmers to sell the products immediately after the harvest when the open market prices are generally low. The large farmers, on the other hand, sell their product when the prices rule higher at the time of scarcity. Secondly, the monopsony nature of the paddy market with few buyers and large number of sellers leaves with less choice to sell in the open market for the marginal and small farmers. These farmers are thus forced to sell at the price offered in the open market, which is generally less compared to the price received by the large farmers. Besides, poor bargaining capacity due to high intensity of credit need compel them to sell at low price in the interlocked credit market.

Table 11. Regions and Landholding-wise Estimated Income Loss Per Bag of Selling Paddy due to Interlocked Credit Market, Kalahandi District, Orissa (2001-02).

Size of holding (in acres)	Inter-locked price in Rs/bag	Open market price in Rs/bag	LP_1 In Rs. (A)	LP_2 in Rs. (B)	Proportion of income loss in situation A (in %.)	Proportion of income loss in situation B (in %.)
Advance Region						
0.01- 2.50	252.07	283.48	31.41	127.93	12.46	50.75
2.51 – 5.00	246.27	308.08	61.81	133.73	25.10	54.30
5.01 – 10.00	257.91	320.05	62.14	122.09	24.09	47.34
10.01 – above	264.35	325.18	60.83	115.65	23.01	43.75
Backward Region						
0.01- 2.50	250.65	264.92	14.27	129.35	5.69	51.61
2.51 – 5.00	251.23	274.61	23.38	128.77	9.31	51.26
5.01 – 10.00	252.80	280.39	27.59	127.20	10.91	50.32
10.01 – above	270.0	298.91	28.91	110.00	10.71	40.74

Source: Field survey
Note: MSP = Rs. 380 /bag (1 bag = 75 Kgs)
   A = Difference between Open Market Price and interlocked price per bag of paddy.
   B = Difference between MSP and Interlocked price per bag of paddy

It is noticed that the medium and large size farmers being the largest sellers of paddy also face a huge income loss due to a relatively higher price difference between interlocked and open market price (shown in Table 11). The price difference is much higher when we compare the interlocked price to that of the MSP. This larger income loss depends on the extent of dependency on informal credit to meet the working capital and the quantity of paddy to be sold at predetermined price. Hence, the inadequate supply of formal credit to farmers in both the regions, in general, is thus ascertained.

Table 12. Regions and Landholding-wise Estimated Income Loss Per Bag of Selling Paddy due to Poor Implementation of MSP, Kalahandi District, Orissa (2001-02).

Size of holding(in acres)	LP_3 in Rs. (C)	Proportion of income loss (in %)
Advanced Region		
0.01- 2.50	96.52	34.05
2.51 – 5.00	71.20	23.11
5.01 – 10.00	59.95	18.73
10.01 – Above	54.82	16.86
Backward Region		
0.01- 2.50	115.08	43.44
2.51 – 5.00	105.39	38.38
5.01 – 10.00	99.61	35.53
10.01 – Above	81.09	27.13

Source: Field survey
Note: MSP = Rs. 380 /bag (1 bag = 75 Kgs), C = Difference between MSP and Open Market Price per bag of paddy

It is shown in Table 12 that in the absence of interlocked market too there is an income loss due to the difference between the Open Market Price and the MSP. This is happening mainly due to the poor implementation of MSP programme in both the regions. Interestingly, the extent of distress selling keeps on declining with the size of landholding. This shows that parties with equal bargaining power are likely to minimise the level of price discrimination. Secondly, the MSP is less targeted towards the weaker class of farmers since the difference in the open market price and the Minimum Support Price is large in the case of small and marginal farmers. Table 12 also reveals that the implementation of MSP is worse in the case of backward region as against the advance region. In this context, one can argue that the purpose of Minimum Support Price gets defeated when it fails to reach the needy class of farmers. The forgoing descriptive analysis described the situation of distress sale in study area and it explains one to one relationships. If we look at all the variables effect together using OLS, we have obtained interesting result. The OLS results are reported in Table 13. The dependent variable in the model is total income loss due to distress sale in rupees. The explanatory variables includes total informal credit taken in rupees (TICT), dummy variable of household has borrowed formal loan (DBL), dummy variable of effort to wait for a higher price (DEW), distance to the market (DISTANCE) and dummy variable of caste status (CASTE). The results are reported in Table 13.

Table13: Determinants of Distress Sale: OLS Results
 Dependent variable= Total Income loss due to distress sale (in rupees)

Variables	Coefficient
Constant	1989.68
TICT	0.62*
	(10.09)
DBL	-3658.38*
	(-3.61)
DEW	-1914.76***
	(-1.75)
DISTANCE	-209.11
	(-1.25)
CASTE	-433.05
	(-0.46)
R-square	0.442
F-value	23.44
N	154

Note: 1. Figures in parentheses indicates t-values
      2. *1% level significance; **5% level significance. ***10%level

As we expected all the varaibles are having expected sign and the variance inflation factor is less than 10 confirms there is no multicollineraity in the model. The coefficient of informal credit taken is positive and significant, which implies that one rupee increase in informal credit leads to 62 paise increase in distress sale. The household borrowed from formal sources have less distress sale, which is evident from the negative and significant coefficient of the variable. This reflects that farmers who are having access to formal credit are in a position to minimise their income loss due to distress sale by Rs.3658. It is also clear from the model that the farmers who have effort to wait can reduce income loss, which is evident from the negative and significant coefficient. With the existence of transaction cost, higher the distance to the market, higher will be the distress sale. Surprisingly this coefficient is negative but not significant. The scheduled caste and scheduled tribe farmers have less access to the product market and hence sell their product at much lower price.

Other Contributing Factors for the Distress Sale of Paddy

A few factors are prominently evident from personal field observations for the existence of distress selling of paddy in the study area. Other than two dominant factors explained in the last section (*viz.*: poor access to institutional credit and poor implementation of the MSP), higher transaction costs faced by mill owners for selling of rice to Food Corporation of India (FCI), the monopsony nature of paddy market, unfavourable import of rice to the district without proper estimations of domestic supply and demand, can also be attributed to such a situation.

First, the rice mill owners (the major buyers of paddy at the regulated price) affirm that the higher transaction costs[23] (TC) for selling of rice to FCI compared to the allotted price for meeting the transaction charges forces them to buy paddy at the lower price than the regulated. To minimise the burden of additional TC, the rice mill owners shift this burden to the farmers by offering a lower price.

Second is the monopsony nature of buyer who controls the entire process of procurement from the farmers. In this type of the product market the terms and conditions goes in favour of the buyer, and the seller accepts the price of the monopsony market. Given the need of money, farmers are ready to sell the produce at whatever the best price is offered to them. Besides, it is also realised that higher the number of day's gap between selling paddy and in receiving payment, higher will be the received price level and *vice-versa*. So, only the

farmer with alternative income source or self-finance can wait for a relatively longer time and fetch a better price which might be closer to MSP. May be because of this the difference between MSP and actual received price shows an inverse relationship with respect to the size of landholding as seen earlier in Table 12.

Third, the FCI is forced to purchase 75 per cent of the rice after milling from the given target of paddy purchased by each rice mill. The remaining 25 per cent the millers are supposed to sell in the local market. However, the larger price gap between the regulated and open market price reduces the demand for rice from the rice mills. In turn, the current stock of unsold rice gets shifted to the next crop and the millers reduce buying of paddy by corresponding quantity. This adjustment processes adversely affects the demand for paddy and, in turns, the price. Finally, the excess imports of rice from outside the district/state without considering the extent of home production contribute to lower procurement of paddy in the district. Also, the problem on interstate movement of paddy restricts the farmers to sell paddy outside the district/state during excess production.

Conclusions

In this paper, an attempt has been made to analyse the determinants of access to formal credit and distress sales in an Indian region historically characterised by iniquitous agrarian structure and the presence of inter-linked product and credit markets. The analysis suggests that the inadequate and poor access to institutional credit forced the farmers to depend on the informal credit market to meet the costs of agricultural production. Such a dependence not only led to distress sales of paddy but also resulted in substantial income loss to small peasants. The income loss was also due to the poor implementation of Minimum Support Price policy by the government. In addition to the poor implementation of government policies, factors such as shifting of transaction costs by millers in the form of low prices, the monopsony nature of the paddy market and rice imports without proper estimation of local supply and demand contributed to the income loss. These factors, in turn, created a huge gap between regulated and open market prices. The paper suggests that the policies relating to improving access to institutional finance including providing adequate credit, effective implementation of support price policies and rice imports based on realistic assessment of local supply and demand need to be reviewed in the light of the findings.

The prime-contributing factor to the income loss of small peasants through distress sales was inadequate access to institutional credit and inter-linked credit and product markets. Thus, the paper shows that iniquitous agrarian structure and inter-linked markets continue to be the principal problems faced by the small farmers.

In the Econometric specification, we assumed that the access to credit from the formal agencies is determined by bank's decision, and hence, univaraite probit model was estimated. However, one can also generalise the situations; (a) where the probability of borrowing from the formal sector is jointly determined by the bank decision on access as well as the farm household's demand for loans, and (b) where the households may have zero demand for formal credit and they are free to choose between informal and formal sectors. This generalisation can respectively be estimated using bivariate probit and multinomial logit models. Further attempts in this direction will hopefully lead us to an in-depth exploration of the two alternatives.

NOTES

[1] Cash loaned out against cash repayment.

[2] A small number of buyers with a large number of sellers for the same product.

[3] Rental yielded by sub-letting these resources was eventually divided between the landowner and the revenue appropriated by the British [*Baden-Powell*, 1909].

[4] The development of the land tenure system in Orissa up until late the nineteenth century is set out in some detail in Section VIII of Baden-Powell [1892: 561ff.].

[5] During the first two decades of the twentieth century this involved the enforced sale by indebted peasants in Orissa of three things: first of the crops they grew, then of the land itself, and finally of their labour [*Chaudhuri*, 1985]. The final resort of those who were now landless was to leave the village and migrant to Assam, where they worked as indentured labour in the tea-gardens. A strictly legal definition of a distress sale in India at that time took the following form [*Dutt*, 1915: 4]: 'A "Compulsory Sale" then is a sale which is *forced* upon an *unwilling* vendor and in which neither the *purchaser* is a man of *his* choice nor the *terms* of the sale including the *price* are fixed by any *contract* with *him*…the owner's right is confined merely to the *sale-proceeds*' (original emphasis).

[6] Not surprisingly, the issue of peasant creditworthiness remained central to the first post-Independence rural credit survey conducted by the Reserve Bank of India [1954: 180ff.]. An equally unsurprising finding to emerge from that same survey was the need by peasants for low-interest agricultural loans decoupled from the sale of their various commodities (crops, labour, land). In other words, a desire on the part of the cultivator to delink borrowing from distress sales.

[7] The legislative ordinances were *The Orissa Tenancy Amendment Bill (1937)*, *The Orissa Smallholders Bill (1938)*, and the *Madras Estates Land (Orissa Amendment) Bill (1938)*, on the substance of which see Bhatia and Chopra [1940]. A decade later, the All-India Congress Agrarian Reforms Committee [1949: 39] concluded that in Orissa these laws were 'more often evaded than obeyed'.

[8]   See the All-India Congress Agrarian Reforms Committee [1949: 99ff.], which based its conclusions about credit provision and land reform on witness statements obtained in the course of visits to many Indian provinces, including Orissa, in 1948.

[9]   The ethnography in question was by Bailey [1955; 1957; 1963], who undertook fieldwork in Orissa, first in Phulbani district over the period 1952-54, and subsequently in Phulbani and Kalahandi districts (the constituencies of MLAs interviewed) during 1959. Ironically, the claim that in Orissa no bonded labour existed was to be found alongside the observation that among rural employers a strong demand existed for ploughmen [*Bailey*, 1957: 81, 121]. The irony stems from the close connection between bonded labour and the demand for permanent workers (or servants) to undertake ploughing.

[10] On this point, see Bailey [1963: 74ff.], who indicates the centrality of this issue to the 1957 election in Orissa.

[11] Largely because of the worldwide attention for poverty and backwardness in the district, the Prime Minister's Office keeps a close monitoring of the development activities in the district, and a senior official has been posted to look after the development in the region.

[12] The other important crops in Narla block are cotton and banana.

[13] The consumption of fertiliser per acre of gross cropped area has been used as the proxy for the level of technology used.

[14] Since the interest rate charged was unable to cover the cost of lending (i.e. financial, transaction, and risk costs), lending rate of RRB was deregulated for all sizes of credit limit from August 1996. Prior to this lending rates of CBs were also deregulated for credit limit of over Rs. 2 lakh since August 1994.

[15] The Gupta Committee was set up in 1998 to look into the quality of credit delivered by the banking system, to identify the constraints faced by CBs in increasing the flow of credit, introduce new product and services, and simplify procedures to enable rural borrowers to access adequate and timely agricultural credit from CBs.

[16] Cost A_2 = All actual expenses in cash and kind incurred in production by owner (Cost A_1) + rent paid for leased-in land. Since the objective of this study is not to highlight the cost of production, other methods which include imputed value of family labour, interest on value of owned capital assets (excluding land), rental value of owned land etc. have not been taken into account in the cost of production.

[17] Capacity to take a loan refers to the household's capacity to meet formal selection criteria and banker's expectation on repayment capacity.

[18] Based on similar assumption as our model, Kochar [1997], and Swain [2002] finds in their respective study that 81 per cent and 71 per cent of the households were rationed by the formal sector.

[19] It refers to a situation where at the going rate of interest in the credit transaction, the borrower likes to borrow more money but it is not permitted by the lender [Basu, 1997; Ray 1998). Fried and Howitt [1980] are of the view that credit rationing exists as a part of an equilibrium risk sharing arrangement between formal financial institutions and the borrower. Credit is invariably rationed in terms of ability to offer collateral [Rudra, 1982; Binswanger and Sillers, 1983; Von Pischke et al., 1983; and Sarap 1991]. For a more detailed discussion on the impact of interest rate ceiling and credit rationing, see Gonzalez-Vega [1984], Anderson and Khambata [1985], and Basu[1997].

[20] Operated area = Land owned + Lesed in – Leased out. In the case of financial system, where the formal creditors insist on collateral (ownership rights of the land) credit extended to the farmer can assume to be negatively influenced under the tenancy system. Given the poor irrigation facility and uncertainty of crops, share tenancy contract operates in the study area. In this type of contract the gross output is divided equally between the landlord and tenant after deduction of cost of production. Generally, the landowner only bears the cost of production and later he takes it out in terms of output from total production. In this type of tenancy system the tenant only invests his labour force and not responsible for all aspects of cultivation.

From the total sample we had 15 cases like this. To avoid the double counting we have not included area under share tenancy in the operated area of the tenant farmer.

21   It can be defined as the difference between total income from production and expenses incurred by the farm.

22   For more detailed discussion, see, Braveman and Srinivasan [1981], Basu [1983] and Mitra [1983].

23   The transaction cost includes commission to the official, politician, bribe to FCI staff, transport cost, management cost and so on.

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