An Institutional Economics Approach to the Problems of Small Farmer Credit in India

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Abstract

This paper applies the tools of institutional economics – especially those pertaining to informational asymmetry and transaction costs - for studying the credit problems of small farmers in India, who, in spite of a vast network of credit institutions developed over a long period of time under government ownership and/or control, are alleged as not getting a share of formal sector credit commensurate with their statistical dominance. It uses data collected by the Agro-economic Research Centers and Units under the Ministry of Agriculture, Government of India from a carefully selected sample of 700 borrower households across the country over a period of three years (1997-1998 to 1999-2000) to provide a preliminary explanation of the various dimensions of a credit package in terms of variation in borrower's village, household and other loan attributes.

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Section 1: Introduction

All available evidence seems to indicate that the formal rural financial system in India is currently trapped in a vicious circle of stagnant or even declining credit-deposit ratio and abnormally high cost of credit and default rate. While the borrowers are confronting high interest rates, high transaction costs and other impediments to access credit, the banks and other formal lending institutions are complaining of low demand besides high default rates, which seem to be further restricting their credit operations. Although credit through self-help groups (SHGs) seems to be offering a ray of hope, such credit still constitutes a small and insignificant part of the total credit system. Informal credit, on the other hand, in spite of reported decline in its share of total credit as per official records, seems to be too resilient to face any serious problem. In fact, informal credit appears to be going quite strong in several parts and pockets of the country (see, for example, Gulati and Bathla, 2002 and NABARD, 2001)[1].

The problems of credit are even more severe for small farmers (inclusive of marginal farmers) and other vulnerable sections (especially, the landless people) of the rural community, who often lack marketable collateral, credit-worthy projects and even political clout to access formal sources of credit. In spite of governmental stipulations in the form of priority sector credit and targets therein, the formal lenders are often not too keen to lend to the large number of borrowers belonging to the landless and small farming communities. In this situation, not only the landless and small farmers, but also medium and large farmers, who are not especially favored by formal lending institutions because of government stipulations, tend to turn to informal sources for meeting their credit needs.

Against this background, the paper has attempted to achieve two things. First, it applies the tools of institutional economics – especially those pertaining to informational asymmetries and transaction costs – to develop a conceptual framework

[1] Datta, Sriram, Gandhi and Parhi (2003) provide a detailed account of these stylized features.

to capture the broad features of the prevailing credit scenario in India, which can facilitate empirical analysis. The second objective of this paper is to perform at least a preliminary analysis of the credit package being used by Indian rural households on the basis of a fairly large size data recently collected by the Agro-economic Research Centers and Units under sponsorship of the Directorate of Economics and Statistics, Ministry of Agriculture of the Government of India from across the country. By looking upon credit as a package of services with multiple dimensions, this paper uses at this stage only single-equation regressions to demonstrate how these various attributes of credit are related to borrower village and household characteristics, besides bringing out some of the interrelationships across loan attributes.

The paper is organized as follows. The next section provides the conceptual framework together with its theoretical underpinnings. Section 3 describes the nature and broad features of the data used for empirical analysis. Section 4 performs single-equation regression analysis to bring out the major findings of this paper. The final section attempts to bring out the significance of this analysis, besides pointing out the limitations of this paper.

Section 2: Conceptual Framework

The conceptual framework of this paper is summarized in Table 1, which highlights the nature of problems a contract (including a credit contract) faces both before (*ex ante)* and after *(ex post facto)* the contract is made. Since credit is not an instantaneous contract like a spot market transaction, the contractual parties and especially the lender faces both adverse selection and moral hazard problems.[2] If the lender cannot successfully eliminate bad borrowers ('lemons' in this context), willful default would rise. So, to minimize such risks, the lender would take resort to screening. He would try to ration credit (leading to larger demand-supply gap in credit), ask for more documents and visits from the borrower (resulting in high borrower transaction costs), demand good (i.e., marketable) collateral, would favor production loan over consumption loan, and may even insist on upfront interest payments. After a credit is made, moral hazard on the part of the borrower would lead

to the same willful default problem. So, the lender has to spend more resources on monitoring and counseling of the borrower in order to minimize such risk of default. *Ex post facto* default may also be of a different kind – namely, non-willful default (due to asset-specificity or locking-in effect): the borrower may not be in a position to repay the loan due to unforeseen contingencies beyond his control. The lender can undertake monitoring and counseling function to avoid the impact of such unforeseen contingencies, and may even grant flexibility in repayment of loan to his borrower to absorb the impact. But as long as the impact of such unforeseen events cannot be totally eliminated, some non-willful default is unavoidable.

Table1: Common Problems of a Credit Contract

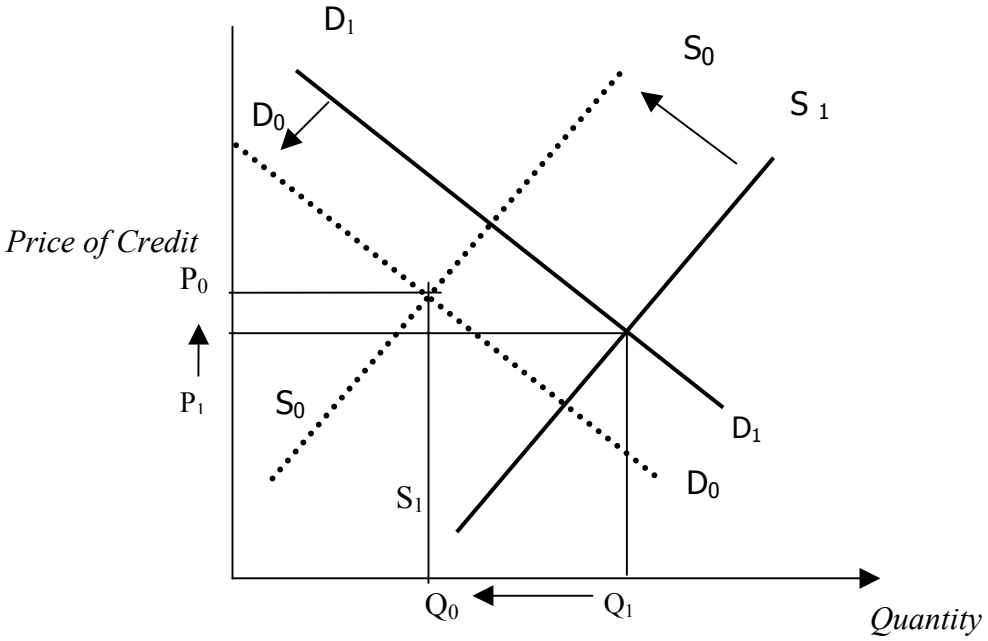
Pre-contractual problems	***Post-contractual problems***	***Steps taken by lender***	***End result***
1. Adverse selection of borrower	-	(i) ration credit, (ii) ask for more documents & visits from borrower, (iii) discourage consumption loan, (iv) ask for marketable collateral, (v) insist on upfront interest payments.	(i) less credit use, especially on consumption loan, (ii) larger demand-supply gap, (iii) higher borrower transaction cost, (iv) higher willful default, (v) higher lender transaction cost (=> higher interest rate).
-	2. Moral hazard of borrower	(i) monitor & counsel the borrower.	(i) higher lender transaction cost (=> higher interest rate), (ii) higher willful default.
-	3. Asset-specificity problem	(i) monitor & counsel the borrower, (ii) impart greater flexibility in loan repayment.	(i) higher lender transaction cost (=> higher interest rate), (ii) higher non-willful default.

Obviously, the above-stated problems would be more severe in most parts of the formal sector lending institutions, especially when these institutions are publicly owned and there is no incentive contract for the office-bearers of such institutions.

[2] The borrower too faces adverse selection and moral hazard problems with respect to lenders. In the absence of any data on the lender side, this paper is leaving out those problems.

Thus, in overall terms, when the three above-stated problems (as depicted in Table 1) are fairly widespread (as believed to be the case in India), one would expect the demand curve for loans would move down, whereas the supply curve of credit would move up, leading to a lower level of credit intake and a higher cost of credit (in real terms) in equilibrium, as shown in Figure 1 below.

Figure 1: A Demand-Supply Perspective on Credit



The above-stated framework has two clear implications. First, credit has to be a package of services, which must include such dimensions as size, possible gap between its demand and supply, composition, transaction costs (both monetary and non-monetary of the borrower as well as the lender), explicit interest rate, provision for upfront interest payments, repayment schedule as well the permissible flexibilities therein, provision for monitoring and supply of extension service by the lender etc. Observed default rate is clearly another important (though *ex post facto)* feature of credit. Obviously, these are some of the important endogenous features of a credit package, which need to be explained if a credit contract has to be understood in details. Thus, to appreciate credit, a system of equations determining these endogenous variables as well as their interrelationships has to be identified and estimated. The present papers will attempt to make only a modest beginning in that direction.

The second point to make at this stage is that, many of the features of credit like willful and non-willful default or willful default due to adverse selection vis-à-vis moral hazard cannot be separated out *ex post facto*. This means the impacts of adverse selection, moral hazard and asset-specificity cannot be easily separated out *ex post facto.* There is yet another dimension of the problem. Under the general presumption that medium and large farmers are in a better position as compared to the landless and small farmers to signal their credit-worthiness to the lenders, the adverse selection problem from a lender's perspective would be more severe for the latter group than for the former. The asset-specificity problem due to unforeseen contingencies can again be assumed to be more severe for the landless and small farmers as compared to the cases of larger farmers on the presumption that the former are exposed to more contingent circumstances and have lesser capability to cope with such contingencies as compared to the latter. But no such presumption can be made with respect to the incidence of opportunism or moral hazard. It may be much higher for the larger rather than the smaller landholding group. So, one cannot be so sure that the value of a parameter in the credit package will be higher or lower for one group as compared to the other. In this situation, therefore, instead of groping in the dark in the look out for clear and testable hypotheses, we would rather like the facts as captured in our dataset to speak for them. With this background we, therefore, try to highlight the nature and features of the dataset being used in this paper, before we proceed to see how the credit package differs for small farmers as compared to the same for their larger counterparts.

Section 3: Nature and Features of the Dataset Used

The paper makes use of a fairly large size data collected by Agro-economic Research Centers of the Directorate of Economics and Statistics of the Ministry of Agriculture, Government of India from a carefully selected sample of 700-borrower households spread over 12 states. The sample households are selected following a multi-stage stratified random sampling process. In the first stage, two representative villages are purposively selected from each of the selected states – one where micro finance has made a beginning and the other where micro finance is yet to make a mark. In the next stage, information on landholding status of each household within these villages is collected from local *panchayat* bodies to facilitate drawing of a

random sample of 25 households as per the following stratification: 5 landless households, 5 medium and large farming households (these two groups acting as two separate control groups), and 15 households spread between the two categories of marginal and small farmers in the same proportion as they occur in the population of selected villages.[3] At a later stage, while collecting detailed household data, the actual landholding pattern of some of these households is found to be different from what is recorded by the *panchayats*, resulting in slight deviation of the actual size distribution of sample households from the one aimed at by the sampling design. Borrower side data on borrower's village attributes, household attributes and credit experiences has been collected for three consecutive years: 1997-1998 to 1999-2000. Average annual figures for each variable are arrived at to get rid of white noise, so that the data can be taken as representative for the three-year period of 1997-1998 to 1999-2000. Out of the 700 borrower households, as many as 130 are found to be not borrowing at all during this 3-year period. Out of the 570 households with positive borrowings of loan, 505 households are found to have access to formal credit institutions, while the rest 65 have access to only informal credit. These 570 households include 121 landless households, 184 marginal farmer households, 145 small farmer households and 120 medium and large farming households[3]. Although an attempt was made to collect data from lending institutions corresponding to these borrower households, it could not succeed due to reluctance of lenders to share data. As a result, the dataset contains only detailed borrower side information.

Data collected from borrower households pertain to their village characteristics, their education and demographic characteristics, their agricultural production characteristics, and their asset holding status and income, besides the details of their credit experiences with respect to both formal and informal sources. As mentioned earlier, as many as 130 households have no credit transaction during the period under consideration. Performance of a t-test on the difference in average values of the attributes of borrowers with and without loans (see, Appendix 1) reveals that the households with positive loan amounts are in a significantly better-off position as compared to those without loans in terms of their location in micro-finance villages, proximity to *pucca* roads (district/state roads), bus routes and *panchayat* office,

[3] As per Government of India stipulations, a marginal farmer holds 0-1 ha of land, whereas small farmers hold 1-2 ha of land. Landholdings of larger size are held by medium and large farmers.

availability of formal credit institutions, number of bovine animals per head, percentage of upper caste population and percentage of male literacy in their villages. Incidence of male education, incidence of irrigated land, cropping intensity, percentage of land under cash crops, incidence of ownership of transportation, irrigation and other modern agricultural equipments, annual expenditure on purchased agricultural inputs, value of agricultural production per unit of land, per head annual income and expenditure on provisions, ownership of milch and other animals per head, ownership and access to various intangible resources in the local economy – all are found to be significantly higher for households with credit than those without credit. In terms of their observed village and household characteristics, a very similar pattern is observed for borrowers with access to formal sector credit vis-à-vis those without. The loan characteristics too seem much more favorable to borrowers with access to formal sector credit than those without access. This is true with respect to the total size of loan, % share of production loan, demand-supply gap in delivery of loan, interest cost, flexibility in loan repayment, incidence of lender's monitoring and extension service, default rate on loans, use of tangible collateral and relative comfort and recommendation indices. The former group definitely bears significantly higher monetary and non-monetary transaction costs (the latter measured in terms of number of days of delay between application for and approval of loans)(see, Appendix 2).

Table 2 displays the loan as well as loanee portfolio of all major sources of credit across borrowers of different landholding size. It displays the following pattern:

- About 81% and 58% of borrower households have accessed formal and informal sources of credit, respectively, to claim respectively 71% and 29% of credit shares[4] (last column of Table 2).
- In terms of numbers, local informal lenders have maximum clientele group among the borrowers (58%), followed by cooperatives (52%), commercial banks (34%) and SHGs (21%). The corresponding loan shares of these four major sources are 29%, 35%, 32% and 4%, respectively. Obviously, average loan size per borrower is the largest for commercial bank group, moderate for cooperative group and relatively small for informal lenders and SHGs.

[4] Total percentage of households accessing the two broad sources of credit is 139%, thus meaning that about 39% of households have accessed both sources.

- When the overall performance of lending institutions (i.e., the last column) is compared to their performance vis-à-vis the four size groups of borrowers (i.e., the preceding columns), one can see the nature of their concentration in the portfolio of borrowers. The commercial bank group, as expected, has a bias in lending in favor of the two largest size groups of borrowers. This bias persists even in terms loan shares.

- The loan portfolio of cooperative group of lenders has a strong bias in favor of the two largest land holding groups of borrowers and also a mild bias in favor of marginal farmers, in terms of numbers. In terms of loan shares, this favorable bias of the cooperative group persists for marginal and small farmers, but not with respect to the largest size group of borrowers. The landless group of borrowers is clearly discriminated against by cooperatives in terms of both percentage share of customers and percentage share of funds.

- Local informal lenders seem to be concentrating more on the landless group in terms of both loanees entertained and loan share allocation.

- SHGs (fourth row) seem to be emphasizing more on landless and marginal farmer groups than others in terms of their loanee and loan portfolios.

- Even though there are clear biases in loanee and loan portfolios of the four major lending institutions in the countryside, these organizations are nevertheless lending to all borrower groups. Among these lenders, however, the SHGs seem to have a sharper focus in their loan portfolio as compared to others.

With this brief description about the dataset being used in this paper and its broad features, we shall now turn to see how the multifarious dimensions of the credit package being used by the sample borrowers vary in response to their various attributes. More precisely, the main objective of statistical analysis below is to see whether and in which respects the credit package being used by landless and small farming households is different from the same for households belonging to the larger landholding group.

Table 2: % Shares of Various Lending Institutions in Total Value of all Loans to Sample Borrowers across Borrower's Landholding Status

	Borrower's land holding status				
Source of loan	**Landless (n=121)**	**Marginal (n =184)**	**Small (n=145)**	**Medium & large (n =120)**	**All (n =570)**
1.Commercial banks & RRBs	31.72 (16.15)	19.74 (28.85)	37.10 (38.75)	33.17 (53.13)	32.22 (33.71)
2. Cooperatives	8.94 (24.82)	41.04 (54.81)	38.50 (61.57)	34.31 (67.08)	34.62 (52.24)
3. Traditional informal lenders	38.74 (73.08)	26.42 (53.37)	21.65 (55.00)	31.10 (53.25)	29.21 (57.83)
4. SHG s	20.04 (25.46)	12.35 (27.88)	2.25 (16.87)	0.36 (8.50)	3.94 (21.25)
5. NBFCs	0 (0.00)	0.24 (0.43)	0.29 (0.58)	0.60 (0.08)	0.44 (0.43)
6. Chit funds	0.53 (1.35)	0.19 (0.43)	0.20 (0.58)	0.42 (2.05)	0.34 (1.00)
7. Total formal	60.71 (62.31)	73.38 (82.21)	78.14 (88.12)	68.47 (89.84)	70.79 (81.75)
8. Total informal	39.28 (73.08)	26.61 (53.99)	21.86 (35.00)	31.53 (54.70)	29.21 (58.15)

Note: Figures in parentheses in first four columns represent percentages of borrowers under each loan source (they add up to 100), whereas the same in the last column represent percentage of all borrowers (i.e. n = 570). Traditional informal lenders include friends, relatives, shops & local moneylenders, while total informal also includes chit funds. Total formal, on the other hand, includes the rest, which are under statutory control of one type or the other.

Section 4: Empirical Results

An attempt is made in this section to explain the multifarious dimensions of a credit package mainly in terms of village and family characteristics of borrower households. The dimensions identified for present analysis include the total size of loan received (TLOAN), its composition – especially its broad source-wise and purpose-wise break-up (namely, % of loan received from the formal sector, PCFOR, and % of loan received for consumption purpose, PCCONS), the extent (%) of shortfall between credit demand and credit supply (GAP), borrower's monetary and non-monetary transaction costs (various expenses incurred to get a loan as % of the total size of the loan, PTC, and the average time gap in days between the time point a loan is applied for and the time point when a loan is approved, DY, which is used as a proxy for the non-monetary costs incurred by a borrower to get a loan), average annual interest rate charged on formal, informal and both types of credit taken together (FORINT, NFORINT and INT, respectively), whether interest is charged upfront or not (UP, which is a 0-1 type binary variable), whether the lender monitors

and counsels the borrower after a loan is made (MONIT, another 0-1 type binary variable), whether terms and conditions of loan allows for flexibility clauses to facilitate repayment in cases of unforeseen contingencies (FLX, a variable constructed out of subjective assessment of borrowers, which varies from 1 in case of perfect flexibility and 5 in case of perfect inflexibility), and the default rate (PCDEF, defaulted amount of loan as percentage of lender's demand). Although a few other dimensions could be added to the credit package, in view of the static nature of the underlying conceptual framework and also to simplify matters to some extent, those attributes are treated as historically pre-determined. The list of such pre-determined variables include whether or not a borrower has access to formal and informal credit (FOR and NFOR, both of which are 0-1 type binary variables), number of years of attachment of the borrower to formal and informal sources of credit (WEXP), whether or not the borrower is able to offer a tangible item as collateral against loan (TANGI, a 0-1 type binary variable), relative comfort level and relative recommendation index of the borrower for formal source of loan (RCOM and RREM, respectively, which are constructed as ratio between comfort/recommendation level for formal credit to the same for informal credit)[5]. As variables belonging to the above-stated last group are treated as given in the present analysis, these are grouped as part of the given characteristics of borrower households in Appendix 3, which provides minimum, maximum as well as average values of the variables found relevant for the regression analysis that follows.

The other characteristics of borrower villages and borrower households, which are found to have some explanatory power, are also listed in Appendix 3. The relevant village characteristics include: MICRO (whether or not micro-financing has made a beginning in the borrower's village), PCNBS (% of working population engaged in non-farm business and services), MARKET, PUCCA, BUS and PANCH (distance in kilometers of the village from nearest market, *pucca* road, bus route and *Panchayat* office), PBOVINE (number of bovine population per head in the village), UCASTE (% of upper caste population in the village), and MLIT (% male literacy of the village). The household characteristics found relevant in regression analysis are:

[5] As comfort/recommendation levels, based on borrower's subjective notions, vary from 1 in case of most satisfactory experiences and 5 in case of worst possible experiences, these ratios vary from 0.20 to

HSIZE (household size), EXT (index of extension of borrower household), PCWORK (% of working population in the household), PCCCLD (% of child labor in 6-12 age group), PY (per head annual income in Rs.), PCTSR (% of household income from trade and services), AREA (operational size of household's agricultural land in hectares), PCIR (% of irrigated land held by the household), PCCASH (% of gross cropped area under cash crops), PVPROD (value of agricultural output per hectare in Rs.), PCOUT (% of household loan adjusted against sale of borrower's output), PTINPUT (value of purchased inputs applied per hectare of agricultural land), DEPO (whether or not the borrower has any savings deposit; 0 or1), EXTEN (whether the borrower has access to local extension service; 0 or 1), INTAN (whether the borrower is involved in any local level organization; 0 or 1), INTAN1 (the extent of borrower's involvement in local organizations; 0-6), FAM (household's familiarity with important local personalities; 0-5), PPROVI (per head annual expenditure of household in Rs. on purchase of provisions), and LL, MG, and SM (0-1 type dummy variables for landless, marginal farmer and small farmer households, respectively to measure shift in intercept term of a regression relative to the same for the largest size group of borrowers).

Table 3 attempts to explain four major quantitative attributes of loan – TLOAN, PCFOR, PCCONS and GAP. Proximity of borrower's village to *Panchayat* office (PANCH), the grass root level political body in the Indian context, seem to be boosting up the share of formal sector loan in the borrower's portfolio, besides bringing down the gap between borrower's loan demand and loan supply to him. Both these effects are found to be statistically significant, and given the fact that *Panchayats* do have a say in the granting of loans, especially from the formal sector credit institutions, this is quite expected. Proximity of borrower's village to the market place (MARKET) and bus route (BUS), too, as expected, has positive and significant effects on total loan size (TLOAN). PUCCA, proximity of the borrower's village to *pucca* road (district/state highways) has, however, a dampening effect on the share of formal credit (PCFOR), a strengthening effect on the gap between demand and supply of credit (GAP), and a discouraging effect on the share of consumption loan (PCCONS). This is plausible due to prevailing regulations on formal sector credit to

6. These ratios are looked upon as decided over long years of experience and hence treated as given for

meet the credit needs of target groups of people in interior villages. The above-stated discouraging effect on share of consumption loan may also be due to lesser dependence on consumption loan of borrowers living in close proximity of *pucca* road. Borrowers villages with larger potential for employment in non-farm business and services (PCNBS) seem to have attracted a smaller size of loan on average (TLOAN) and a smaller demand-supply gap in loan (GAP), but a larger share of consumption loan (PCCONS). Villages with high incidence of upper caste population (UCASTE), who are generally associated with greater economic affluence and political clout, seem to have attracted a larger share of formal credit (PCFOR) and a smaller share of consumption loan (PCCONS), as expected. Villages with higher male literacy rates (MLIT) have however attracted a smaller share of consumption loan (PCCONS).

Among the household attributes, a larger family size (HSIZE) is found to have ended up with a larger demand-supply gap in loan (GAP). Households with a larger percentage of working population (PCWORK), as typically found in poorer households, are found to have enjoyed a smaller share of formal credit (PCFOR), but a larger share of consumption loan (PCCONS). Borrowers with a larger size of operational holding (AREA), those incurring higher expenditure on purchase of agricultural inputs (PTINPUT) and those involved in local level organizations (INTAN) have captured, as expected, a larger loan size (TLOAN). Borrowers with a larger incidence of cash crops on their agricultural land (PCCASH) seem to have ended up having a larger demand-supply gap in loan (GAP) and a larger share on consumption loan (PCCONS). This is expected as putting more land on cash crops tends to increase demand for loan proportionately more than increase in supply (due to built-in inflexibility of stipulated scale of finance for crop loans), besides increasing demand for consumption loans to meet consumption expenses before such crops are marketed. While familiarity with important local personalities (FAM) is found to have increased borrower's share of formal credit, it has increased the gap between credit demand and credit supply – apparently because FAM has increased credit demand proportionately more than credit supply. The borrower family's access to official extension service channel (EXTEN) seem to have helped reduce demand-supply gap

purpose of present analysis.

in credit (GAP) and increase the family's share in consumption loan (PCCONS). As expected, PCTSR, borrower families having a larger share of income from trade and services (which is generally more stable as compared to agricultural income), are found to have enjoyed a larger share of formal credit (PCFOR) and a larger share of consumption credit (PCCONS), as compared to an average borrower. A longer period of association with lending institutions (WEXP) has similarly contributed to achieving a larger loan size (TLOAN) and a larger percentage of consumption loan (PCCONS). Borrower families having comparatively larger (relative) comfort/recommendation levels based on their past experiences for formal sources of credit (i.e., with lower values of RCOM and RREM, as they are defined) have naturally got a larger share of formal credit (PCFOR). While access to either source of credit (FOR and NFOR) has positive effect on the total size of loan enjoyed by the borrower (TLOAN), it is interesting to note that this impact coefficient is larger and statistically significant for the informal source (NFOR), while it is smaller and far from statistically significant for the formal source of credit (FOR). Similarly, while access to both sources of credit tends to increase share of consumption loan (PCCONS), the impact is larger and statistically significant only for the informal source of credit. Exactly the opposite is observed for these access variables with respect to demand-supply gap in loan – the impact is negative, larger in absolute terms and statistically significant only in case of access to formal source of credit. The dummy variables, LL, MG and SM, too, provide interesting insights. Positive and significant coefficients for all these three variables in the equation for total loan size (TLOAN) indicates that the intercept term in total loan size equation shifts up for all these three size groups of borrowers, as compared to the same for the largest size group. Coefficients for LL, MG and SM are all negative for the equation of PCFOR, the share of formal credit, but it is statistically significant only for LL. The same coefficients for the equation for GAP, the demand-supply gap, are all positive, but none of them is statistically significant. Thus, the share of formal credit, while it tends to be less for all three smaller landholding groups of borrowers as compared to the largest group, it is significantly only in case of landless borrowers. The demand-supply gap in credit, on the other hand, has a tendency to be larger for all three smaller landholding groups (as compared to the same for medium and large farmer households), but it is statistically significant in none of the cases. These dummy variables have however all positive and significant coefficients (as expected, this coefficient is much larger for the landless

group as compared to the same for the other two groups) in the equation for PCCONS, the share of consumption loans.

Table 3: OLS Regressions to explain Quantitative Attributes of Loan

	TLOAN	PCFOR	PCCONS	GAP
INTERCEPT	-118570 (9.45)**	0.82 (15.71)**	1.50 (0.17)	18.41 (3.77)**
Village Attributes				
PANCH	-	-0.04 (4.41)**	-	2.45 (3.51)**
MARKET	-1365.75 (2.20)	-	-	-
PUCCA		0.037 (4.10)**	3.63 (4.02)**	-1.046 (1.56)
BUS	-2000.25 (1.41)	-	-	-
PCNBS	-697.33 (2.83)**	-	0.97 (6.54)**	-0.196 (2.77)**
UCASTE	-	0.0012 (3.49)**	-0.19 (3.26)**	-
MLIT	-	-	-0.15 (2.13)*	-
Household Attributes				
HSIZE	-	-		0.518 (2.01)*
PCWORK	-	-0.00091 (2.20)*	0.10 (1.81)*	-
AREA	41812 (25.55)**	-		
PCCASH	-	-	0.070 (1.67)*	0.0676 (2.66)**
PTINPUT	0.10 (1.80)*	-	-	-
INTAN	2401.99 (1.56)	-	-	-
FAM	-	0.027 (3.79)**	-	1.80 (2.44)*
EXTEN	-	-	7.97 (2.52)*	-5.556 (2.49)*
PCTSR	-	0.000863 (2.77)**	0.08 (1.77)*	-
WEXP	741.11 (2.70)**	-	0.36 (2.15)*	-
RCOM	-	-0.11 (9.97)**	-	-
RREM	-	-0.049 (4.08)**	-	-
FOR	10905 (1.44)	-	4.21 (0.97)	-5.725 (2.31)*
NFOR	13610 (2.58)**	-	16.56 (5.58)**	-2.55 (1.47)
LL	120109 (12.40)**	-0.09 (3.08)**	36.33 (8.84)**	0.83 (0.34)
MG	92860 (11.37)**	-0.04 (1.61)	7.79 (2.27)*	1.88 (0.93)
SM	64762 (8.60)**	-0.017 (0.63)	7.97 (2.24)*	0.89 (0.43)
Loan Attributes				
TLOAN	-	-	-	-0.000022 (2.44)*
INT	64.23(0.25)	-	-	-
FORINT	-	0.0067 (4.55)**	-	-
NFORINT	-	-0.0074 (13.10)**	-	-
PFORTC	-89373 (2.47)*	-	-	-
DY	22.45 (2.08)*	-	-	-
UP	-2484.85 (0.97)	-	-	-
FLX	-	-	-	-1.69 (3.98)**
MONIT	-	-	-17.88 (5.72)**	-4.35 (2.44)*
ADJ R^2	**0.61**	**0.64**	**0.39**	**0.12**
F VALUE	**57.52**	**80.34**	**25.24**	**5.99**

*Note: Coefficients with * and ** are significant at 1% and %% levels of significance, respectively, for one-tailed t-test.*

Though the intention of this paper is not to attempt simultaneous estimation of all the terms and conditions of credit – at least at this preliminary stage of analysis of the available dataset, an attempt is nevertheless made to include in single equation OLS exercises various endogenous loan attributes as explanatory variables and thus to get an idea about the interrelationships across various dimensions of the loan package.

For example, total loan size (TLOAN) is found to have a negative and significant effect on GAP, the demand-supply gap in loan. The overall interest rate (an weighted average of interest rates observed in various segments of credit), INT, is found to have a positive (but not significant) effect on total loan size, TLOAN. Formal sector interest rate (FORINT) has a positive and informal sector interest rate (NFORINT) a negative effect (and both significant) on share of formal sector credit (PCFOR). It appears the supply side effects on PCFOR are more stable as compared to the demand side effects in equilibrium. Moreover, the negative and significant sign of NFORINT in the equation for PCFOR seems to signify complementary rather than competitive relation between formal and informal - the two broad sources of credit. Percentage of monetary transaction cost for formal source of credit (PFORTC) has a natural negative and significant effect on the total size of loan (TLOAN), but overall non-monetary transaction cost (DY) has a positive and significant association with the same variable, TLOAN. Incidence of upfront interest payments (UP) has a discouraging effect on loan size (TLOAN), but it is not statistically significant. When more flexibility is imparted in loan repayments (i.e., the value of FLX falls), it tends to significantly increase demand-supply gap (GAP) in credit. Greater incidence of monitoring and counseling of loans by lender (MONIT) leads to significantly reduce the extent of demand-supply gap (GAP) and incidence of consumption loans (PCCONS).

Table 4 attempts to explain two different measures of overall transaction costs – monetary transaction cost as percentage of total loan size, PTC, and number of days' gap between application and approval of loan, DY, which being the most important determinant of the non-monetary efforts a potential borrower has to put in order to get a loan, is looked upon as a good proxy measure of non-monetary transaction costs. The location of the borrower's village in a place where micro-financing has made a beginning (MICRO) has a positive and significant effect on the measure of non-monetary transaction costs (DY) for the simple reason that micro-finance organizations generally follow a rigorous process of verification of the borrower's credentials between application for and approval of a loan. Proximity of *Panchayat* to borrower's village (PANCH) or higher incidence of upper caste population in borrower's village (UCASTE) are found to pull down borrower's

monetary transaction costs (PTC) in a significant way. Among the various household attributes, borrower's household size (HSIZE), annual household expenditure on purchase of provisions (PPROVI), incidence of use of tangible collateral (TANGI) and access to formal source of credit (FOR) are found to have significant negative

Table 4: OLS Regressions to explain Borrower's Monitoring and Non-monitoring Transaction Costs

	PTC	DY
INTERCEPT	0.0068 (0.56)	21.38 (4.21)**
Village Attributes		
MICRO	-	7.11 (3.65)**
PANCH	0.00300 (2.38)*	-
UCASTE	-0.000094 (1.48)	-
Household Attributes		
HSIZE	0.0025 (3.56)**	-
EXT	-	2.21 (1.47)
PCIR	-	-0.09 (3.48)**
PCCASH	-0.00023 (3.57)**	-0.07 (2.01)*
PPROVI	0.0000011 (1.57)	-
WEXP	-0.001 (4.62)**	-0.32 (2.50)*
TANGI	0.02 (3.46)**	14.28 (6.51)**
FOR	0.023 (3.73)**	6.82 (1.99)*
NFOR	0.019542 (4.28)	-14.30 (6.61)**
LL	-0.012 (1.94)*	-12.10 (3.45)**
MG	-0.0060 (1.15)	-7.68 (2.84)**
SM	-0.0050 (0.95)	-8.76 (3.11)**
Loan Attributes		
TLOAN	-0.000000076 (3.20)**	-
FLX	-0.0041 (3.87)**	-
MONIT	-0.15 (3.41)**	-
ADJ R^2	**0.22**	**0.29**
F VALUE	**11.78**	**21.79**

*Note: Coefficients with * and ** are significant at 1% and %% levels of significance, respectively, for one-tailed t-test.*

impact on monetary transaction costs (PTC), whereas incidence of cash crops being grown by the borrower household (PCCASH) and number of years' association of borrower family with credit institutions (WEXP) are observed to have significant negative effects. Monetary transaction costs (PTC) seem to be smaller for households with smaller rather than larger size of land holdings, but this effect is found to be significant for only landless group of borrowers. Among the household attributes, a larger order of extension of borrower household (EXT), a higher incidence of use of tangible collateral (TANGI), and greater access to formal source of credit (FOR) seem to have positive and significant impact on the measure of non-monetary transaction costs (DY), whereas a higher incidence of irrigation on borrower's agricultural land (PCIR), a higher incidence of production of cash crops by the borrower's household

(PCCASH), a larger number of years' association of borrower with credit institutions (WEXP) and a greater access to informal source of credit (NFOR), too, have significant but exactly the opposite effects. In the equation for non-monetary transaction costs, DY, all the three size of holding dummies, LL, MG and SM have significant and negative effects, thus meaning that these three smaller size group of borrowers incur significantly lesser non-monetary transaction costs as compared to their larger counterpart (and this is more so for the landless group of borrowers). None of the endogenous loan attributes is found to have explanatory power for the regression equation of DY, but this is not the case for the equation of PTC. While total loan size (TLOAN) and incidence of monitoring and counseling (MONIT) are found to have significant negative effects on monetary transaction costs, PTC, greater flexibility provided in loan repayment clauses (i.e., a smaller value of FLX) is found to have exactly the opposite effect.

Table 5 attempts to explain annual interest rates on loans, which are prevailing in different segments of the credit market – namely, FORINT, NFORINT and INT (an weighted average of the first two). While interpreting TFOR, the interest rate for the formal sector, however, one has to keep in mind the effect of governmental interest rate regulations undermining the working of market forces. Among the village attributes, proximity to nearby market (i.e., a lower value of MARKET) has the effect of significantly pulling down interest rate across the board, while villages with higher male literacy rates (MLIT) – apparently through influencing the term structure in favor of longer-duration loans - seem to have attracted statistically significant higher interest rate on formal credit (FORINT). Villages with larger bovine stock per head (PBOVINE) and a larger percentage of working population engaged in non-farm business and services (PCNBS) seem to have confronted significantly lower overall interest rate (INT).

Borrowers' household attributes seem to be influencing the interest rates in the following manner. Household size (HSIZE) has a positive and significant effect on formal sector interest rate. PCCASH, incidence of cash crop on borrower's agricultural land, has significant negative effect on both informal (NFORINT) and overall (INT) interest rates. Incidence of borrower's loan being adjusted against borrower's sale of output to the lender (PCOUT) – a prominent feature of informal

credit – has a significant negative effect on informal sector interest rate (NFORINT). Percentage of borrower family income arising out of trade and services (PCTSR) has significant and negative effect on both formal (FORINT) and overall (INT) interest rates. Borrower family's access to official extension services (EXTEN) – probably through its influence on size and term structure of loans - seems to have significantly raised interest rates across the board (i.e., FORINT, NFORINT and INT). Apparently for similar reason, incidence of deposit holding by borrower (DEPO) seems to have significantly increased interest rate on formal credit (FORINT). Incidence of use of tangible collateral by borrower household (TANGI) has for understandable reasons significant negative effect on interest on formal credit (FORINT). While longer duration of association between borrower and lending institution (WEXP) has a negative and significant effect on formal sector interest rate (FORINT), the relation is exactly the opposite in the informal credit sector (precisely, on NFORINT). Borrowing household's involvement in local level organizations (INTAN) – apparently through its influence on size and term structure of loans) – seem to have both positive and significant effects on informal (NFORINT) and overall (INT) interest rates. While annual per capita family income (PY) has a negative and significant effect on the interest rate on informal credit (NFORINT), incidence of child labor in borrower household (PCCLD) has exactly the opposite effect on the same variable. While access to both formal and informal credit (FOR and NFOR) tends to raise the overall interest rate on loan (INT), the effect is larger and statistically significant only in case of informal sector loan. Compared to the largest landholding group of borrowers, landless and marginal farmer households pay significantly higher interest rate on formal credit (the additional interest payment is again higher for landless group as compared to the case of marginal farmers), as reflected in the coefficients of LL and MG in the equation for FORINT. Even though SM too has a positive coefficient in the equation for FORINT, it is far from statistically significant. The overall interest rate is however consistently and significantly higher for the three groups of borrowers as compared to the case of the largest size group of borrowers. While this interest rate is on average 4.11% higher for the landless group, this difference is only 2.8% for marginal farmer group and 1.95% for small farmers (see the coefficients of LL, MG and SM in the equation for INT). Contrary to the common belief, interest rates are not significantly higher (as compared to the same for medium and large farmers) in the informal credit market for the

smaller landholding groups of farmers, nor is there any consistent hierarchy of interest rates, as can be seen from a look at the coefficients of LL, MG and SM in the regression equation for NFORINT.

Interrelationship across endogenous attributes of loan in the context of interest rate estimation can be seen in the bottom panel of Table 5. Total loan (TLOAN) has a positive but statistically insignificant effect on the overall interest rate, INT. Total formal sector loan (TFOR) has a negative effect on formal sector interest rate (FORINT), and total informal sector loan (TNFOR) has a positive effect on informal interest rate (NFORINT), but neither of them is statistically significant. A higher percentage of production loan, PCPROD (i.e., a lower percentage of consumption loan, PCCONS) has a negative and significant effect on the overall interest rate (INT). Less flexibility in loan repayment procedures (i.e., a higher value of FLX) is found to have generated a lower interest rate on formal credit (FORINT). In the informal market for credit, a greater incidence of upfront interest payment (UP), a larger incidence of monitoring by lender (MONIT) and a higher default on loans (PCDEF) are found to have led to a higher interest rate on informal credit (NFORINT).

We now turn to explain in Table 6 the other endogenous attributes of credit – namely, whether interest is paid upfront (UP= 0 or 1), whether monitoring and counseling of loans are done (MONIT= 0 or 1), the extent flexibility clauses are permitted in loan repayment provisions (FLX= 1 to 5) and the percentage of default on loans (PCDEF). To explain the first two attributes, single-equation logistic regressions have been tried, whereas regular OLS regressions are tried to explain FLX and PCDEF. It must be recalled that FLX varies from 1 to 5, with 1 in cases of perfect flexibility and 5 in cases of perfect inflexibility in repayment provisions.

The village characteristics, which have been found relevant in this context, are reported first. The incidence of upfront interest payments (UP=1) is found to be significantly less in villages, where micro-finance has made its appearance (MICRO=1). Proximity of borrower's village to local *Panchayat* office (i.e., a smaller value of PANCH) seems to have given a boost to the overall default rate (PCDEF), which is also found to be a statistically significant result. Distance of the borrower's village from the nearest market place, MARKET seems to have encouraged incidence

of upfront interest payment (UP), increased flexibility in loan repayments (i.e., a smaller value of FLX) – apparently under government policy influence, and reduced the default rate on loans (PCDEF). Villages with higher incidence of upper caste population (UCASTE) seem to have confronted a higher value of FLX – i.e., a lower order of flexibility in loan repayment, but exactly the opposite seems to have happened in villages with a higher percentage of male literacy rates (MLIT). Greater bovine stock per head in borrower's village (PBOVINE) has apparently increased the risks involved in loaning and consequently increased the incidence of upfront loan payments (UP) and loan monitoring (MONIT).

Table 5: OLS Regressions to explain Annual Interest Rates across Segments

	FORINT	**NFORINT**	**INT**
INTERCEPT	5.56 (3.25)**	9.32 (2.30)*	11.64 (4.79)**
Village Attributes			
MARKET	0.37 (3.88)**	1.00 (3.88)**	0.37 (3.02)**
PBOVINE	-		-1.83 (3.33)**
PCNBS	-	-	-0.11 (2.88)**
MLIT	0.08 (6.52)**	-	-
Household Attributes			
HSIZE	0.22 (2.40)*	-	-
PCCASH	-	-0.10 (2.85)**	-0.04 (3.12)**
PCOUT	-	-0.0003 (2.76)**	
PCTSR	-0.03 (3.62)**	-	-0.04 (3.35)**
EXTEN	3.40 (5.07)**	5.08 (2.55)**	3.15 (3.32)**
DEPO	2.57 (3.69)**	-	-
TANGI	-1.29 (2.28)*	-	-
WEXP	-0.11 (3.32)**	0.27 (2.47)*	-
INTAN	-	4.24 (2.24)*	3.91 (4.84)**
PCCLD	-	0.06 (2.90)**	-
PY	-	-0.0002 (1.64)	-
FOR	-	-	1.61 (1.18)
NFOR	-	-	4.88 (5.30)**
LL	3.09 (3.44)**	-0.81 (0.27)	4.11 (2.89)**
MG	1.92 (2.67)**	-1.75(0.64)	2.80(2.52)*
SM	0.22 (0.31)	-3.43 (1.27)	1.95 (1.72)*
Loan Attributes			
TLOAN	-	-	0.0000019 (0.39)
TFOR	-0.0000020 (0.46)	-	
TNFOR	-	0.000019 (0.83)	
PCPROD	-	-	-0.03 (2.24)*
FLX	-0.72 (4.85)**	-	
UP	-	14.74 (5.24)**	-
MONIT	-	5.12 (1.95)*	-
PCDEF	-	0.07 (5.24)**	-
ADJ R^2	**0.22**	**0.31**	**0.25**
F VALUE	**12.11**	**10.30**	**14.63**

*Note: Coefficients with * and ** are significant at 1% and %% levels of significance, respectively, for one-tailed t-test.*

The household attributes of borrowers are found to have the following effects. Household size (HSIZE) has significant and positive effect on percentage default (PCDEF) and flexibility in loan repayment (i.e., a smaller value of FLX), and it also significantly reduces the incidence of upfront interest payments (UP). Increase in size of operational land holding (AREA) significantly increases the incidence of monitoring and counseling of loan (MONIT) and decreases the extent of loan default, PCDEF (though not statistically significantly). Availability of greater irrigation facilities on borrower's land (PCIR) also significantly increases the incidence of loan monitoring (MONIT). Both greater incidence of cash crops on borrower's land (PCCASH) as well as greater borrower's access to official extension service channel (EXTEN) reduce the extent of loan default (PCDEF), but whereas the former significantly increase flexibility in loan repayment (i.e., produces a lower value of FLX), the latter does exactly the opposite – that is, borrowers enjoying government extension services confront lesser flexibility in loan repayment. Farmers with higher values of crop output per hectare (PVPROD) and with greater familiarity at local bureaucracy (FAM) enjoy greater flexibility in loan repayment (i.e., have lower values of FLX). Such familiarity index (FAM) also significantly reduces the incidence of upfront interest payments (UP) and monitoring of loans (MONIT). Longer association with credit institutions (WEXP) and breadth of involvement in local level organizations (INTAN1) have opposing effects on loan default rate (PCDEF) – while the former reduces the default rate (and significantly so), the latter raises it (though not statistically significantly). TANGI, capturing incidence of use of tangible collateral is found to be associated with lower incidence of upfront interest payments (UP), but lesser flexibility in loan repayments (i.e., a higher value of FLX) and a higher rate of loan default (PCDEF). Access to both sources of credit (i.e., FOR and NFOR) significantly reduces incidence of upfront interest payments (UP) and loan monitoring (MONIT). However, the reduction in values of both UP and MONIT is much higher for borrowers of formal rather than informal credit. Access to formal credit (FOR) reduces flexibility in loan repayment, whereas access to informal credit does exactly the opposite. Access to both sources has a tendency to raise the default rate, but this impact is statistically significant only for borrowers of informal loan. As coefficients of LL, MG and SM are all negative but far from statistically significant in the logistic regression for UP, one cannot claim that the incidence of upfront interest payments is consistently higher or lower for the smaller size groups of borrowers (as

Table 6: Regressions to explain Incidence of upfront Interest Payment (UP), Provision of Monitoring /Extension Service on Loan (MONIT), Extent of Flexibility permitted in Loan Repayment (FLX) and Percentage of Loan Default (PCDEF)

	UP	MONIT	FLX	PCDEF
INTERCEPT	-		4.74 (10.56)**	-
Village Attributes				
MICRO	-0.75 (8.93)**	-	-	-
PANCH	-	-	-	-1.02 (1.34)
MARKET	0.17 (18.34)**	-	-0.11 (-4.34)**	-1.42 (4.07)**
UCASTE	-	-	0.0114 (3.82)**	-
MLIT	-	-	-0.0093 (2.48)**	-
PBOVINE	0.87 (12.64)**	0.34 (7.19)**	-	-
Household Attributes				
HSIZE	-0.10 (5.03)*	-	-0.08 (3.26)**	2.00 (5.04)**
AREA	-	0.36 (9.93)**	-	-1.38 (1.21)
PCIR	-	0.0079 (12.23)**	-	-
PCCASH	-	-	-0.01 (3.99)**	-0.15 (3.80)**
PVPROD	-	-	-0.0000025 (2.04)*	-
EXTEN	-	-	0.41 (1.82)*	-5.42 (2.06)*
FAM	-0.26 (7.63)**	-0.19 (8.86)**	-0.25 (3.45)**	-
WEXP	-	-	-	-0.53 (4.10)**
INTAN1	-	-	-	1.16 (1.60)
TANGI	-0.68 (5.62)*	-	0.27 (1.71)*	5.50 (2.26)*
FOR	-3.73 (31.54)**	-2.13 (41.80)**	0.63 (2.60)**	1.80 (0.50)
NFOR	-2.24 (50.56)**	-1.40 (45.40)**	-1.11 (6.91)**	11.61 (4.42)**
LL	-0.55 (1.48)	1.78 (12.03)**	-0.02 (0.10)	-9.23 (1.71)*
MG	-0.32 (0.66)	0.73 (3.17)	-0.38 (2.01)*	-4.30 (1.01)
SM	-0.06 (0.02)	0.92 (7.38)**	0.01 (0.08)	-1.60 (0.43)
Loan Attributes				
TLOAN	0.000018 (5.69)*	-	-	-0.00000 (0.34)
PCCONS	-	-	-	0.14 (4.20)**
MONIT	-	-	-	-8.74 (3.28)**
Up	-	-	-	7.59 (2.16)*
FLX	-	-	-	-2.89 (4.34)**
INT	-0.11 (56.17)**	-0.032 (11.98)**	-	-
PCDEF	-	0.02 (24.94)**	-	-
ADJ R^2	-	-	0.30	0.32
F VALUE / -2 Log L	1176.79	2084.91	16.96	15.34

*Note: Coefficients with * and ** are significant at 1% and %% levels of significance, respectively, for one-tailed t-test.*

compared to the same for medium and large farmers). The incidence of loan monitoring is consistently and significantly higher for borrowers with smaller land holding size (as compared to the same for medium and large farmers), and other things remaining the same, it is the highest with the landless group, as it can be seen from the sign and size of coefficients of LL, MG and SM in the regression equation for MONIT. Only the marginal farmer group of borrowers enjoys (as compared to the largest group, which acts as the reference point for comparison) significantly greater flexibility in loan repayment (as only MG has statistically significant coefficient in the

regression equation for FLX). Similarly, only the landless group of borrowers has comparatively and statistically significantly lower default rate (as reflected by the only statistically significant coefficient of LL in the regression equation for PCDEF).

The various endogenous attributes of loan have the following impact on the four explained variables – UP, MONIT, FLX and PCDEF. TLOAN, the total loan size has a positive and significant effect on the incidence of upfront interest payments (UP), but negative and statistically insignificant effect on loan default rate, PCDEF. PCCONS, percentage of consumption loan has positive and statistically significant effect on loan default rate (PCDEF). Higher overall interest rate on loan, INT seems to have contributed to a lower (and significantly so) incidence of upfront interest payments (UP) and loan monitoring (MONIT). While incidence of upfront interest payments, UP has a positive and significant effect on loan default rate, PCDEF, exactly the opposite is the effect of monitoring variable, MONIT on PCDEF. Imparting greater flexibility in loan repayments (i.e., a lower value of FLX) seems to have an encouraging effect (and significantly so) on loan default rate, PCDEF.

Section 5: Concluding Observations

Credit, being a complex multidimensional package of services, demands a systems approach backed by an excellent two-sided dataset (i.e., capturing both borrower and lender side information) for perfect understanding and full-fledged analysis. Although there are limitations of both theory and data at this stage, the paper has nevertheless made a modest attempt to move in that direction. The beauty of institutional economics is that it is capable of providing a fairly exhaustive view of the underlying problems of credit and a comprehensive framework to explain the broad trends in the market for credit in the Indian context – namely, why the desired quantitative attributes of credit are suffering, while the price of credit has continued to be very high and almost out of line with the same in most developed countries. However, the conceptual framework confronts a limitation, as it is incapable of producing clear and sharp hypotheses for testing against *ex post facto* data. Similarly, while the dataset used in this paper is fairly large in terms of sample size and coverage of borrower side information, it lacks enough lender side data for full-fledged

application of the teachings of institutional economics.[6] However, in spite of these limitations, the used dataset and the underlying theory are good enough to attempt to understand variation in the credit package available to different groups of borrowers and thus to examine the popular allegation of discrimination in terms of credit availability against rural borrowers of smaller means (i.e., against landless and small farmer households).

The major findings of this paper can be summed up as follows;

- As the lender can easily and closely observe most of the attributes of a borrower and his village, he can achieve minute modifications of the credit package to suit his as well as the borrower's interests. Thus, the credit package tens to be virtually unique to each pair of borrower and lender, varying across multifarious attributes of their households. This is especially true for informal credit, which continues to escape various government regulations and stipulations for all practical purposes.
- While government policy has been attempting to control the number, size and composition of formal credit to target groups in rural communities with only a limited access, there are many other dimensions of a credit package, which remain outside of government control, but are quite relevant to the borrower. Given the high cost and even futility (for the reasons mentioned herein) of government control, the government might as well think in terms of further decontrol and competition in delivery of credit.
- Contrary to the official line of thinking, informal credit continues to play a major and useful role in meeting the credit needs of not only poorer households, but also richer households. So, the sooner the government realizes the complementary role of informal credit and allows its open and competitive functioning, the better.
- Not only economic variables, but also socio-political factors act as crucial determinants of the various dimensions of credit. This is especially true of the apparently invisible role of *Panchayats* and other local level organizations. It is necessary to streamline the role of these organizations in the context to minimize possible damages, especially through high default rates.

[6] More precisely, it lacks data to study the possible implications of adverse selection and moral hazard

As mentioned at the outset, this is only a modest attempt based on a rather preliminary analysis of the available dataset. Naturally, finer refinements are called for through simultaneous (rather than single-equation) analysis of the endogenous attributes of credit. Given a fairly large size data, it might be possible to go in for estimation of separate systems of equations to characterize credit for different groups of borrowers, for different sources and even for different purposes. Last but not the least, more comprehensive data inclusive of lender side information is needed in the future for a full-fledged analysis and understanding of credit.

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of lenders, which might be quite widespread in the developing economies like India.

Appendix 1: Average Characteristics of Borrower Households Classified by Nature of Household Access to the Market for Credit

	Households with/without positive loan amount	
Variables	**Yes (n=570)**	**No (n=130)**
a. Village characteristics		
a.1 % residence of borrower in micro-finance villages (MICRO)	48.2	38.5**
a.2 % of borrower households engaged in non-farm, business & service (PCNBS)	19.58	19.44
a.3 Distance in kms of nearest market from borrower's village (MARKET)	2.43	0.21
a.4 Distance in kms of *pucca* road from borrower's village (PUCCA)	0.64	2.85**
a.5 Distance in kms of bus route from borrower's village (BUS)	1.00	2.94**
a.6 Distance in kms of *Panchayat* from borrower's village (PANCH)	0.66	1.71**
a.7 No. of formal credit sources in borrower's village (CINST)	2.26	1.64**
a.8 Bovine animals per head in borrower's village (PBOVINE)	0.57	0.44**
a.9 % of households belonging to upper caste in borrower's village (UCASTE)	40.15	25.19**
a.10 % male literacy rate in borrower's village (MLIT)	56.71	46.39**
b. Household education and demographic characteristics		
b.1 Maximum level of male education (MEDU)	2.72	2.26**
b.2 Maximum level of female education (FEDU)	2.10	1.98
b.3 Nature of household extension (EXT)	1.45	1.34*
b.4 Household size in numbers (HSIZE)	5.91	6.29
b.5 % of actual working population (PCWORK)	73.20	71.89
b.6 % of children within 6-12 age group going to work (PCCLD)	21.80	19.88
c. Agricultural production characteristics		
c.1 Operational land area in ha (AREA)	1.51	1.26
c.2 % irrigated area (PCIR)	41.23	21.41**
c.3 Cropping intensity (in %) (CROPINT)	159.27	138.23**
c.4 % of GCA devoted to cash crops (PCCASH)	19.04	4.66**
c.5 Nature of ownership of landed property (SOWN)	1.40	1.75**
c.6 Nature of ownership of modern agricultural implements (MODO)	0.79	0.58**
c.7 Nature of ownership of irrigation equipments (IRRO)	0.78	0.42**
c.8 Nature of ownership of transportation equipments (TRANS)	0.93	0.58**
c.9 Annual expenditure in Rs. on purchased inputs per ha. of GCA (PTINPUT)	6398	3365*
c.10 Value of all produce in Rs. /ha of operational land (PVPROD)	20172	9428**
c.11 Value of produce in Rs./ha. of GCA (PVPROD1)	15559	6948**
c.12 % of credit adjusted against sale value of output (PCOUT)	9.36	23.03*
d. Household asset holding status		
d.1 Index of luxury items used (LUX)	0.46	0.41
d.2 Index of deposit holding with Post Office/Banks/Coops/NBFCs/Chit funds/ SHGs (DEPO)	0.79	0.50**
d.3 Index of familiarity with *gramsevak*/extension officer (EXTEN	0.76	0.68*
d.4 No. of milch animals per head (PMILK)	0.38	0.34
d.5 No. of goats, sheep, pigs & poultry birds per head (PMEAT)	0.38	0.22*
d.6 Index of ownership of intangible assets (INTAN)	0.62	0.48**
d.7 Extent of ownership of intangible assets (INTAN1)	1.52	0.86**
d.8 Extent of familiarity with important village personnel (FAM)	3.44	3.12**
d.9 Per head annual expenses on provisions in Rs. (PPROVI)	3590	2655**
e. Household income		
e.1 Annual per head income in Rs. (PY)	7920	6124*
e.2 % of income from trade & services (PCTSR)	22.10	22.96

Appendix 2: Average Characteristics of Borrower Households classified by Nature of Household Access to Formal Sector Credit

	Households with positive loan amount from formal sector	
Variables	**Yes (n=505)**	**No (n=65)**
a. village characteristics		
a.1 % residence of borrower in micro-finance villages (MICRO)	0.50	0.34**
a.2 % of borrower households engaged in non-farm, business & services (PCNBS)	19.69	18.75
a.3 Distance in kms of nearest market from borrower's village (MARKET)	2.44	2.32
a.4 Distance in kms of pucca road from borrower's village (PUCCA)	0.64	0.71
a.5 Distance in kms of bus route from borrower's village (BUS)	0.98	1.09
a.6 Distance in kms of Panchayet from borrower's village (PANCH)	0.64	0.86
a.7 No. of formal credit sources in borrower's village (CINST)	2.24	2.38
a.8 Bovine animals per head in borrower's village (PBOVINE)	0.60	0.34**
a.9 % of households belonging to upper caste in borrower's village UCASTE)	41.87	26.85**
a.10 % male literacy rate in borrower's village (MLIT)	57.68	49.14**
b. Household education and demographic characteristics		
b.1 Maximum level of male education (MEDU)	2.81	1.98**
b.2 Maximum level of female education (FEDU)	2.17	1.55**
b.3 Index of household extension (EXT)	1.49	1.14**
b.4 Household size in numbers (HSIZE)	6.12	4.32**
b.5 % of actual working population (PCWORK)	72.58	78.00
b.6 % of children within 6-12 age group going to work (PCCLD)	23.07	11.92**
c. Agricultural production characteristics		
c.1 operational land area in ha (AREA)	1.64	0.49**
c.2 % irrigated area (PCIR)	45.22	10.15**
c.3 Cropping intensity (in %) (CROPINT)	1.35	0.55**
c.4 % of GCA devoted to cash crops (PCCASH)	19.56	15.02
c.5 Nature of ownership of landed property (SOWN)	1.40	1.44
c.6 Nature of ownership of modern agricultural implements (MODO)	0.85	0.31**
c.7 Nature of ownership of irrigation equipments (IRRO)	0.83	0.35**
c.8 Nature of ownership of transportation equipments (TRANS)	0.98	0.51**
c.9 Annual expenditure in Rs. on purchased inputs per ha. of GCA PTINPUT)	6932.69	2242.42*
c.10 Value of all produce in Rs. /ha of operational land (PVPROD)	21848.92	7146.20**
c.11 Value of produce in Rs./ha. of GCA (PVPROD1)	16945.61	4789.18*
c.12 % of credit adjusted against sale value of output (PCOUT)	95.00	83.12
d. Household asset holding status		
d.1 Index of luxury items used (LUX)	0.49	0.20**
d.2 Index of energy used (ENERG)	0.74	0.55**
d.3 Index of deposit holding with Post Office/Banks/Coops/NBFCs/Chit funds/ SHGs (DEPO)	0.84	0.41**
d.4 Index of familiarity with gramsevak/extension officer (EXTEN)	0.78	0.78**
d.5 No. of milch animals per head (PMILK)	0.39	0.33
d.6 No. of goats, sheep, pigs & poultry birds per head (PMEAT)	0.41	0.19*
d.7 Index of ownership of intangible assets (INTAN)	0.64	0.46**
d.8 Extent of ownership of intangible assets (INTAN1)	1.61	0.78**
d.9Extent of familiarity with important village personnel(FAM)	3.55	2.52**
d.10Per head annual provisional expenses in Rs. (PPROVI)	3631.90	3260.73
e. Household income		
e.1 Annual per head income in Rs. (PY)	8385.87	4300.56**
e.2 % of income from trade & services (PCTSR)	20.50	8.79**
f. Loan characteristics		
f.1 Total Loan in Rs. (TLOAN)	29756.84	6587. 34**
f.2 Total loan in Rs. from informal sources (TNFOR)	7728.79	6587.34

f.3 % of consumption loan (PCCONS)	41.38	64.79**
f.4 % of gap between demand & supply of loan (GAP)	8.00	14.16*
f.5 Explicit annual rate of interest (INT)	16.75	19.58*
F.6 Borrower's transaction cost per Rs of loan (PTC)	0.02	0.01**
F.7 No. of days between application & approval of loan (DY)	19.21	0.55**
F.8 Nature of interest collection (upfront=1, later=0) (UP)	0.16	0.17
F.9 Index of flexibility in repayment of loan (FLX) (1= very high, 5=not)	3.32	2.42**
F.10 Monitoring & extension services on loan (MONIT) (1= yes, 0= no)	0.40	0.18**
F.11 % of default rate on loan (PCDEF)	17.23	23.14*
F.12 Years of experience with lenders (WEXP)	9.38	9.09
F.13 Use of tangible collaterals (1=yes, 0=no) (TANGI)	0.46	0.23**
F.14 Index of relative comfort level with formal lenders (RCOM)	0.47	3.01**
F.15 Index of relative recommendation index for formal (RREM)	0.54	2.83**

*Note for Appendices 1 & 2 : ** and * stand for cases where mean differences are statistically significant under one-tailed t-test at 5 % & 10 % levels of significance, respectively. MEDU and FEDU vary within [1-6] with 1= illiterate, 2= literate, 3= SSC, 4= diploma, 5= graduate, 6= post- graduate. EXT varies from 1 to 4, a higher value meaning a higher order of household extension. SOWN is 0 if no property is owned, 1 if property is owned jointly and 2 if property is individually owned, a higher value meaning a larger order of individualistic ownership of property. Similarly, MODO and IRRO vary from 0 to 2, a higher value indicating a higher order of ownership (here a value of 1 means only hired equipments) of costly agricultural equipments like power tiller, tractor and thresher and irrigation equipment like pump set, respectively. INTAN & EXTEN vary from 0 to 1, indicating the nature of access to local level organizations and to local extension facilities, respectively. INTAN1 and FAM vary from 0 to 6 and 0 to 5, respectively indicating the breath of connections to local level economic/social/political organization and familiarities to important local personnel. LUX, ENERG, and DEPO - each one of them varies from 0 to 1 to indicate absence or presence of luxury items electrical connections and deposits, respectively. RCOM and RREM are comfort and recommendation indices (5=poorest, 1= highest) for formal sector relative to the same for the informal sector. They vary from 0.20 to 5.0*

Appendix 3: Summary Statistics on Variables used in Regression Analysis (n=570)

	MINIMUM	MAXIMUM	MEAN
Village Attributes			
MICRO	0.00	1.00	0.48
PCNBS	4.74	49.16	19.58
MARKET	0.00	14.00	2.43
PUCCA	0.00	12.00	0.64
BUS	0.00	12.00	1.00
PANCH	0.00	9.00	0.66
PBOVINE	0.02	3.33	0.57
UCASTE	0.00	93.53	40.15
MLIT	0.00	96.60	56.71
Household Attributes			
HSIZE	1.00	24.00	5.91
EXT	1.00	4.00	1.45
PCWORK	0.00	100.00	73.20
PCCLD	0.00	100.00	21.80
PY	21	118582	7920
PCTSR	0.00	100.00	19.16
AREA	0.00	26.00	1.51
PCIR	0.00	100.00	41.23
PCCASH	0.00	100.00	19.04
PVPROD	0.00	1257391	20172
PCOUT	0.00	100.00	15.67
PTINPUT	0.00	860191	6398
DEPO	0.00	1.00	0.79
EXTEN	0.00	1.00	0.76
INTAN	0.00	1.00	0.62
INTAN1	0.00	6.00	1.52
FAM	0.00	5.00	3.44
PPROVI	0.00	32500	3590
FOR	0.00	1.00	0.89
NFOR	0.00	1.00	0.54
WEXP	0.00	50.00	9.35
RCOM	0.20	5.00	0.76
RREM	0.20	5.00	0.81
TANGI	0.00	1.00	0.43
LL	0.00	1.00	0.21
MG	0.00	1.00	0.32
SM	0.00	1.00	0.25
Loan Attributes			
TLOAN	200	11,80,000	27115
TFOR	0.00	8,80,000	19516.08
TNFOR	0.00	420000	7599
PCFOR	0.00	100.00	72.00
PCPROD	0.00	100.00	55.95
PCCONS	0.00	100.00	44.05
GAP	0.00	100.00	8.70
INT	0.00	60.00	17.07
FORINT (n=505)	0.00	36.00	12.42
NFORINT (n=310)	0.00	70.00	14.38
PTC	0.00	0.45	0.02
DY	0.00	269.24	17.08
FLX	1.00	5.00	3.22
MONIT	0.00	1.00	0.38
UP	0.00	1.00	0.16
PCDEF	0.00	100.00	17.96