

Access to Credit and Response to Risk: Benefits of Institutionalizing Co-operation*

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Abstract

One main advantage of having developed credit institutions is that there are better opportunities for dealing with risk. When financial institutions are not developed, alternate mutually beneficial arrangements evolve. Two examples of such arrangements are informal lending and borrowing between friends and relatives and another is a co-operative society. This study is in two parts. First part looks at access to credit in rural India and the second part looks at how household response to risk is affected by their access to different risk sharing arrangements. I am able to do this by comparing data from two states of India, Uttar Pradesh and Kerala, that I collected. The results indicate that a) there are large disparities in access to credit and particularly access to formal credit; b) though households in Kerala do not have better access to credit, the predicted probability of borrowing from formal source is significantly higher (0.76) in comparison to Uttar Pradesh(0.2). What drives this is the dependence on cooperative societies in Kerala and informal ties with friends and relatives in UP. Both are risk sharing arrangements that emerge from mechanism of co-operation. Part II evaluates the benefits and costs of institutionalizing co-operation. Using information on household responses to income shock we find that c) households with access to cooperative society are significantly less likely to reduce consumption, cut input expenditure and they are more likely to get a larger fraction of loan approved. However, when a loan is rejected, d) co-operative households have to borrow from more expensive alternative sources like moneylenders while households that rely on informal ties are likely to get another loan at the same cost elsewhere.

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1 Introduction

Access to ready and available credit is an important factor in the economic well being of a rural household. Perhaps one of the main advantages of having developed credit institutions is that there are better opportunities to dealing with risk. This is particularly relevant in rural communities. Opportunities for personal savings in lesser developed communities are often restricted. However, personal savings alone only offers limited potential for protection against risks of fluctuating income. Therefore, there is reason to believe that other arrangements for risk sharing can be mutually beneficial. A few examples of such mechanisms are informal lending and borrowing amongst friends and relatives and more organized cooperative societies. A household's response to risk will depend on the nature of arrangement that is available. Households that rely completely on informal ties for financial assistance will respond differently to risk than a household that is assured assistance through more organized mechanism. This study is in two parts. In the first, I look at access to credit in rural India. In the second part, I look at how access to different risk sharing arrangements leads to differences in household response to risk. I am able to do this by comparing data from two states of India ,Uttar Pradesh and Kerala.

Over the years, rural credit programs have become an integral part of government policy in developing countries. Special banks for rural population were set up in countries like India, Thailand and Philippines. Informal lenders, however, still remain an important source of credit within villages. Bell and Srinivasan (1986) show this for several states of India. While 84 percent of rural households in Bihar, India, rely only on informal sources for credit, even in a more developed state like Punjab, this figure is as high as 46 percent. Institutional credit, on the other hand, has been accused of bureaucratic rationing and biased

in favor of more educated and privileged households.¹

Today, a typical rural credit ‘market’ in a less developed country comprises of many lenders extending a variety of forms of credit. Alongside public lending institutions like banks and cooperative societies, there is also a thriving informal sector where private transactions occur under standard or personalized terms. Indeed the economics of these two broad categories of credit are quite different.

Several features of an existing rural credit infrastructure are determined by the way that borrowing households sort among different sources of credit. A full understanding of the existing credit situation requires knowledge of the preferences of the heterogeneous households within rural areas. First objective of this paper is to study the nature and extent of household’s demand and access for credit within a rural economy. We assess the strength and direction of different factors that influence an agrarian household’s demand for credit. In order to do so, we look at a wide spectrum of variables that a borrowing household takes into consideration in it’s borrowing decision. We study three kinds of loans 1) production 2) consumption and 3) medical. It is necessary to include non-production loans because they form a significant proportion of rural household borrowing. Within our data, consumption and medical loans account for close to 40 percent of total loans taken.

Unlike in the previous literature, informal creditors are not treated as a homogeneous entity. There are three broad informal sources of credit to rural households: 1) professional moneylenders 2) traders, landlords and employers and 3) neighbors and relatives. Each have distinct characteristics and provide credit under varying terms and conditions. Professional moneylenders generally provide credit against collateral and charge regular monthly interest payments. Credit from traders, landlords and employers is based on some economic rela-

¹Dreze, Lanjouw and Sharma (1997)

tionship that the borrower shares with the lender. The loans are either interest free or at a nominal rate. But typically they involve collateral payment, which could be in the form of future crops, labor time or future salary. The third category, neighbors and relatives, is a major source of credit for rural households. These loans are based on personal contacts and are generally interest free and without collateral.

We develop an equilibrium model of sorting based on a random utility approach. Building on McFadden's (1978) discrete choice framework, we allow borrowers to have preferences for a wide variety of attributes of a contract, for example, the source of loan and nature of collateral. Household preferences are allowed to vary with household characteristics.

Not surprisingly, the results indicate that a) there are large disparities in access to credit and particularly access to formal credit across households. But somewhat more surprising is that while b) households in Kerala do not have significantly better access to credit, the predicted probability of a household borrowing from formal source is significantly higher (0.76) in comparison to Uttar Pradesh(0.2). When we compare across five categories of lenders, we note that predicted probabilities of borrowing from a bank and a moneylender are identical across two regions. But what drives the earlier result is the dependence on cooperative societies in Kerala and informal ties with friends and relatives in Uttar Pradesh. Both are risk sharing arrangements that emerge from mechanism of cooperation. While a cooperative society is an institutionalized form of cooperation, friends and relatives are an informal form of cooperation. The second part of this paper answers two following questions: a) Are there any benefits to forming a cooperative society rather than dealing informally with other households? and b) What are the costs, if any of institutionalization? Using information on household responses to an income shock we find that c) households

that have access to cooperative society are significantly less likely to reduce consumption and input expenditure. When households apply for loan, in response to an income shock, d) they are likely to get a larger fraction of the loan approved when they borrow from cooperative than when they rely on informal ties. However, faced with a rejection, e) households that rely on co-operatives, can only borrow from more expensive alternative sources like moneylenders. While households that borrow from friends and relatives are likely to get another loan at the same cost elsewhere.

The plan of the paper is as follows. Section 2 describes in some detail survey methodology and data on which this study is based. Section 3 lays out some summary statistics. In section 4 we discuss an appropriate model of household borrowing decision. Section 5 looks at the estimation strategy and section 6 has the first set of results for access to credit. In section 7, we have a discussion. Section 8, has the next set of results for 'Responses to risk' and the last section 9 has concluding remarks.

2 Data

The study is based on an original and comprehensive primary data set that was compiled from a household survey. The survey covered 720 rural households from 21 villages across two districts in India and was held from June to September 2002. Survey districts are from two diverse states Kerala and Uttar Pradesh (U.P.). We deliberately picked two separate regions of the country to study differences, if any, in the borrowing behavior of rural households.

Insert Figure 1

Kerala is an average income state with per capita income of \$254 per annum, while Uttar Pradesh is a low income state with per capita income of \$158 per

annum.². The distinction between these two states becomes more stark when done along social development indicators. U.P. is termed as one of the ‘sick’ states of India (BiMaRU) and Kerala is ranked the highest based on social indicators.

Insert Table 1

Districts covered in survey are primarily agrarian where the population depends either directly on cultivation or agriculture related jobs like daily wage labour and trading. The sample district from U.P. is Kannauj and sample district from Kerala is Palakkad. A district in India is divided into several development blocks, which are then subdivided into many villages. For our sample, we picked one representative block in each district, based on socioeconomic indicators provided by District Statistics Office of each district. Incidentally both sample blocks are also the largest in their respective districts. The sample block in Uttar Pradesh has a total population of 2,14,964 and comprises of 108 villages. All villages are grouped into 78 *panchayats*. *Panchayat* is the lowest rung in the democratic ladder with an annual budget and an elected governing body. In Kerala, the sample block has a total population of 2,37,679 and comprises of 94 villages (wards) that are grouped into 9 panchayats.

Insert Table 2

Villages from each block were chosen based on stratified random sampling. In U.P., to pick a representative sample of households we stratified all 108 villages into 6 groups along three categories: a) distance from nearest metallic road b) Muslim village c) scheduled caste village. While distance from nearest metallic road serves as a good instrument for access to organized credit market, it also is a very good proxy for access to organized labor market. Based on this

²Handbook 2001 - Select socio-economic indicators, Department of Statistics, Government of India.

distance parameter, we form 4 groups. The second category is an important one because interaction of Muslim households in the informal credit sector has several distinct characteristics. For example, borrowing and lending amongst Muslim households is done free of interest charges. This is similar to Udry's findings in northern Nigeria (1990). Stratification of villages along 'Scheduled Caste and other Backward Caste' is important because these are target villages for government programs. For example there are exclusive projects for employment, education, building roads, drainage system, housing and repair for these villages. From each of the six categories for stratification, we randomly picked two villages. We therefore have a total of 12 villages from U.P.. In Kerala, villages can not be distinguished based on religion and every village in the selected block is linked with metallic road. There are, however, special grade *panchayats* based on the population of scheduled caste and other backward castes. There are two such panchayats in our selected block. We decided to include all the 9 *panchayats* in the block to get the most representative sample of households. We therefore, randomly picked one village from each of the 9 *panchayats*. The total number of villages covered in our sample is thus 21.

Village wise details of demographic and socioeconomic characteristics are available in table 3. Ferozpur and Bahsua are the two 'schedule caste' villages in U.P. sample. The two muslim villages are Garauli and Nisthaulli. In Kerala the sample block has two schedule caste villages and we have surveyed both, Vadakkencherry and Alathur.

Insert Table 3.

To select households within a village, we obtained the voters' list from the last election, which was held in 2000. This is a reliable and exhaustive list that has names of every member of a household above 18 years of age in the village. From the list we randomly chose 30 households from each selected village in

U.P. and 40 households from each selected village in Kerala. Therefore we have a total of 720 households in our sample, 360 each from Kerala and U.P.

To better understand household behavior with regards to indebtedness, we separately look at a) current outstanding loans of the household as well as b) loans that were repaid in the last two years. The purpose of this distinction is two fold. Firstly to measure the extent of default of institutional and informal loans and more importantly to gauge a household's attitude towards default. To analyze whether the source of credit affects a household's perception of default. Secondly this distinction helps analyze the repayment behavior of a household. The data provides detailed household level information on several variables. Member-wise household demographic details, primary and secondary occupation and wage details are available. We also have detailed account of landholding, cultivable land, usage, housing and asset holding - agricultural and household assets. The data primarily focuses on the borrowing information of households. Lending and saving data is available. Details of monthly expenditure and annual income by source is also available.

Household response to risk looks at the household behavior in 'the worst period in last 4 years'. The cause of the shock is known, in order to differentiate whether it's an aggregate or idiosyncratic one. We gathered information on household's response to overcome this shock. We have detailed information on whether the household cut consumption expenditure, input expenditure, sell jewelry, get an additional job, migrate for work etc. Besides these, we also have data on whether the household sought any financial help. The sequence in which they approached different lenders. We have lender-wise details on number of loans applied and approved. Also, consequence of not getting a loan or sufficient amount.

For the purpose of this study, the household survey data has been supple-

mented by panchayat and district level data provided by the Department of Economics and Statistics, governments of U.P. and Kerala.

3 Some basic statistics

In this section we look at some of the basic findings from the data. First, we discuss the village-wise nature of indebtedness, where we provide household level information on amount and source of debt. In the second subsection, we briefly explain the degree of presence and main characteristics of major lenders within each village. In the last subsection, we look at the different purposes for which rural households demand credit.

3.1 Indebtedness at a glance

Village wise indebtedness information is available in table 4. Some interesting facts emerge at the first glance. There is higher indebtedness in Kerala, whether measured in terms of the amount of money borrowed per loan, or the debt to income ratio per household, or even just the number of households per village that have at least one current outstanding loan.

Insert Table 4.

Table 4 also shows the break-up of debt by source. We should also mention that on comparing the different sources of credit, we note that while households in both regions, depend to a large extent on banks for credit, there are fewer number of loans taken from banks. As against from cooperative societies in Kerala and neighbors-relatives in U.P., where households not only borrow significant amounts, but the frequency is also higher from these sources.

3.2 Lenders - main characteristics and presence

There are two types of institutional credit available to the people in U.P. and Kerala. They are banks and cooperative societies. The banks are either commercial or specialized such as State Development Bank and Regional Rural Bank. Natures of banks are similar in both the states. This is because the general guidelines are established by National Bank for Agriculture and Rural Development (NABARD). The cooperative societies, too follow the basic guidelines set by NABARD, however, they acquire distinct regional characteristics. Once registered, the cooperative gets linked to District Cooperative Bank which in turn is linked to the State Cooperative Bank. These societies require membership within a specified territorial area. In U.P., co-operatives remain primarily agricultural. All loans, except 'crop loans' are seasonal and in kind, the most common being fertilizers and seeds. Membership requires landholding. The co-operatives also run specific projects of the local government which are targeted towards scheduled caste/tribe or for households that lie below "poverty line". Under these projects, assistance is provided for self employment. In Kerala, however cooperative societies have emerged as the backbone of rural credit infrastructure. Membership are typically based on occupation. There are tailors', weavers', toddy-tappers' and even unemployed people's societies among others. All cooperative societies have total functional autonomy³. He also audits the accounts of the cooperative annually. Except against deposit and personal security, all other loans are given to members only. Deposits are of various kinds but mostly gold, insurance policy, promissory certificate, government security and debenture certificates. When a loan is taken, both parties - borrower and the cooperative society, agree to a repayment schedule. But incase of failure to comply with the agreed schedule, there is recasting of a new schedule.

³The state appoints a registrar whose approval is required for any change in the rules and by-laws of the society.

Insert Table 5

There are basically five private sources of credit to households. They are: a) professional moneylenders, b) traders, c) employers, d) landlords and e) neighbors and relatives. Professional moneylenders are typically jewelers. There are no eligibility restrictions and moneylenders provide credit to anyone who can make collateral payment. The rate of interest they charge is monthly and depends on the collateral which is commonly gold or silver. It is higher if no collateral is placed. There are four cases in the data where previous defaulters have received loans against new collateral⁴. Traders give loans in the beginning of a season, against future crops but in rare cases also provide consumption loans. Landlords generally provide credit at nominal interest rates. There are only two instances in the data where loans taken from landlord are of an “interlinked” nature. Employers as a source of credit can be divided into two types. Firstly, there are households that are employed in ‘regular’ jobs and earn monthly salaries. These households have security of employment and can borrow from employer. The second type are landless households that are engaged in casual labor for a daily wage. The economics of these two types are very different. The final category, ‘neighbors and relatives’ are a significant source of credit to households in U.P. The rate of interest charged is typically zero and eligibility depends on social and personal ties between the households.

Insert Table 6

⁴This is because a moneylender gives loans worth 50 to 60 percent of the collateral value. Only small borrowers who repeatedly default have difficulty acquiring new loans.

3.3 Type of loan by source

Here, we look at village-wise break up of the main types of loans, by the source. A loans is classified as a ‘type’ based on the purpose for which it was taken. There are many reasons why households borrow, but they can all be broadly classified into three major groups - consumption, production and medical reasons. Within ‘consumption loan’, the three major sub-categories for borrowing are a) ceremonies and marriages; b) purchase of durables like T.V. and bicycle; c) day-to-day consumption and d) education. The second type of loan, ‘production loan’ comprises of a) purchase of machinery and equipment; b) purchase of inputs like fertilizer and seeds; c) purchase of livestock d) business investment and d) construction. The third loan type is ‘medical loan’. We look at this category separately because it is a type of ‘emergency’ borrowing when households behave differently and it is also a major category in the data.

Insert Table 7

Table 7 shows that in both U.P and Kerala, more than one third the total credit is borrowed for consumption and medical expenses. This is a sizeable amount and suggests that in order to study the borrowing behavior of rural households we need to also consider loans other than for production purposes. A careful look at the break-up reveals that in Kerala, most of the non-production loans are for consumption requirement, in U.P., one-third of this is to meet medical needs. In terms of number of loans taken, consumption and medical loans account for more than production loans, which suggests that amounts borrowed for consumption and medical purposes are lower, but are taken at greater frequency in both the regions.

4 Borrowing decisions of households

In this section we analyze the decision process of a borrowing household. Within this, we look at a borrowing household's choice of lender and see if it is influenced by the type of loan. We begin the analysis by setting out an equilibrium model of rural credit market. We first describe the main component of this model, a discrete choice framework that governs each households borrowing decisions. Following McFadden(1973, 1978), I use a discrete choice framework to study the household's choice of lender as this provides a natural way to estimate heterogeneous preferences for different types of credit. The utility function specification is based on the random utility model developed by McFadden(1978) and the specification of Berry, Levinsohn and Pakes(1995), which includes choice-specific unobservable characteristics. We treat each loan as a separate borrowing decision.

4.1 Borrower's optimization problem

The structure considered is as follows: agents first decide whether to borrow or not, and if they decide to do so, they choose whom to borrow from. The utility from borrowing a loan is V_l^i which is given by:

$$\begin{aligned} V_l^i &= \alpha_l^i L_l - \alpha_r^i r_l + \eta_l + \varepsilon_l^i && \text{if } V_l^i > 0 \\ \text{and } V_l^i &= 0 && \text{otherwise.} \end{aligned} \tag{1}$$

In the model, a borrowing household chooses a lender l to maximize it's utility, which depends on the observable and unobservable characteristics of his choice. Let L_l represent the observable characteristics of loan L taken from lender l , other than the rate of interest that vary with the households borrowing decisions and let r_l denote the rate of interest. Observable characteristics of

a loan include loan amount, collateral offered, type of loan (whether consumption, production, medical etc.), repayment frequency and when it was taken. Household i 's optimization problem is given by :

$$Max_l V_l^i = \alpha_l^i L_l - \alpha_r^i r_l + \eta_l + \varepsilon_l^i \quad (2)$$

where η_l is the unobserved quality of lender corresponding lender. This could include reputation of the lender, enforcement techniques, renegotiation possibilities, time spent in procuring the loan, bribe, travelling time and expense etc. The last term ε_l^i is an idiosyncratic error term that captures unobserved variation in household i 's preference for a particular lender.

Each household's valuation of choice characteristics is allowed to vary with it's own characteristics H_i including landholding, income, occupation, education, age households composition and sex of household head. The parameters associated with loan characteristics and rate of interest α_j^i for $j \in \{L, r\}$ are allowed to vary with households own characteristics,

$$\alpha_j^i = \alpha_{0j} + \sum_{x=1}^X \alpha_{xj} H_x^i. \quad (3)$$

Equation (3) describes household i 's valuation for choice characteristics j . The first term captures the taste for the choice characteristics that is common to all households and the second term captures observable variations in the valuation of these choice characteristics across households with different socioeconomic characteristics. This heterogeneous specification of the coefficients allows for variation in preferences across different types of households.

The above specification of the utility contains two stochastic components that allow flexibility in explaining the observed data. The first component is the lender specific unobservable η_l . This term captures the common value of unobserved aspects of a particular lender that is , value shared by all households. Because many loan and lender attributes are likely to be unobserved in any data

set, the specification avoids biases due to unobserved lender characteristic.

The second stochastic component of the utility function is the idiosyncratic term ε_l^i , which is assumed to be additively separable from the rest of the utility function. We assume a Weibull distribution, which gives rise to the multinomial logit model. With this assumption, the probability that household i selects lender l , P_l^i is given by

$$P_l^i = \frac{\exp(\alpha_l^i L_l - \alpha_r^i r_l + \eta_l)}{\sum_k \exp(\alpha_k^i L_k - \alpha_r^i r_k + \eta_k)} \quad (4)$$

where k indexes all possible lenders.

The multinomial logit assumption implies that the ratio of the probabilities between any two choices is independent of the characteristics of the remaining set of alternatives (Independence of Irrelevant Alternatives assumption). This is usually not a very good assumption to make but in this specification of the utility function the impact of IIA is weakened since there are heterogeneous coefficients.

4.2 Equilibrium

The random utility specification is not only flexible from an empirical point of view, but also has a relevant theoretical interpretation. Without the idiosyncratic error component ε_l^i this specification would suggest that two households with identical characteristics would make identical borrowing decisions. This is unlikely to be true, a useful interpretation of ε_l^i is that it captures unobserved heterogeneity in preferences across the otherwise identical households. Thus, for a set of households with a given set of observed characteristics, the model predicts not a single choice but a probability distribution over the set of borrowing choices. We use Nash equilibrium concept.

Household i chooses lender l if utility that it gets from this exceeds the utility from all other possible loan choices.

$$V_l^i > V_k^i \implies W_l^i + \varepsilon_l^i > W_k^i + \varepsilon_k^i \implies \varepsilon_l^i - \varepsilon_k^i > W_k^i - W_l^i \quad \forall k \neq l \quad (5)$$

where W_l^i includes all the non-idiosyncratic components of the utility function V_l^i . As this shows the probability that a household chooses a particular lender will depend on the characteristics of all the possible loans. In this way, the probability that household i chooses lender l can be written as a function of loan characteristics, both observed and unobserved, prices and households characteristics:

$$P_l^i = f(H_i, L, r, \eta). \quad (6)$$

5 Estimation

Having specified the theoretical framework, we now move on to the estimation procedure of the model. Let us rewrite the equation function as described in equation (2) and (3) as the following:

$$V_l^i = \phi_l + \theta_l^i + \varepsilon_l^i \quad (7)$$

where, ϕ_l is the choice specific constant, θ_l^i is the interaction term that includes all parts of the utility function that interact household and choice characteristic and ε_l^i is the idiosyncratic error term. Therefore,

$$\phi_l = \alpha_{0l}L_l - \alpha_{0r}r_l + \eta_l \quad (8)$$

and

$$\theta_l^i = \left[\sum_{x=1}^X \alpha_{xl} H_x^i \right] L_l - \left[\sum_{x=1}^X \alpha_{xr} H_x^i \right] r_l. \quad (9)$$

Here, choice specific constant ϕ_l denotes the portion of utility provided by lender l that is common to all households. The unobservable component η_l of this constant denotes the unobserved preferences for lender l that is correlated

across households while ε_l^i represents unobserved idiosyncratic preferences over and above the shared component.

5.1 Estimation procedure

For any combination of interaction parameters and loan specific constants, the model predicts the probability that each household i chooses lender l

$$P_l^i = \frac{\exp(\phi_l + \theta_l^i)}{\sum_k \exp(\phi_k + \theta_k^i)}. \quad (10)$$

Maximizing probability that each household makes a correct borrowing decision, conditioning on the full set of observed household characteristics, H^i and choice characteristic $\{L_l, r_l\}$, gives rise to the following log-likelihood function

$$\varrho = \sum_i \sum_l I_l^i \ln(P_l^i), \quad (11)$$

where I_l^i is an indicator variable that equals 1 if household i chooses lender l in the data and 0 otherwise. The first order condition is the derivative of the log likelihood function above with respect to ϕ_l and θ_l^i .⁵

6 Results (I): Access to Credit

Before we look at the results, it is helpful to see the variables in the regression. We have four sets of controls. Household characteristics, loan characteristics, lender dummies and variables that capture household's credit relationships. Household characteristics include various demographic, occupation and income asset details. Loan characteristics include size, length, usage and collateral details. The credit relationship variables include whether there is a co-op in the village, whether the household has any savings deposit in a formal institution,

⁵The derivative of the log likelihood function with respect to ϕ_l :

$$\frac{\delta \varrho}{\delta \phi_l} = \sum_{i=l} \frac{\delta \ln(P_l^i)}{\delta \phi_l} + \sum_{i \neq l} \frac{\delta \ln(P_l^i)}{\delta \phi_l} = \sum_{i=l} (1 - P_l^i) + \sum_{i \neq l} (-P_l^i) = 1 - \sum_i (P_l^i)$$

whether the household has ever borrowed to repay old debts, or has repaid late. The number of moneylenders in the village and the distance to the nearest bank. Also during the 'worst period in last 4 years', did the household apply for loan, but didn't get any. And if the household didn't need to apply for a loan.

From table 8, we can see that while Kerala households have higher annual income, households in U.P. have larger asset holdings. Assets include household and agricultural assets, and value of house. The average land holding is significantly higher in U.P. In terms of years of education, Kerala, on average, has 2.3 more years of education. Kerala households are smaller with fewer dependents. Occupational distribution indicates that most U.P. households are cultivators while half of Kerala households are casual laborers. Kerala has higher unemployment levels.

Loan characteristics indicate that Kerala borrows larger loans for longer periods, most likely against collateral and for consumption purposes. Number of households that borrow in order to repay old debts are higher in U.P. Same is true for late repayment. On an average, most Kerala loans are borrowed from cooperative societies while most loans in U.P. are borrowed from friends and relatives.

Insert Table 8

To assess a households 'access to credit', we have only considered households that have applied for loan at least once in the last two years. Of course this leaves out households that would 'self select' themselves out of the credit market. However, the probability of this should be very low as we have considered all forms of lenders including neighbors, relatives and friends where the incidence of 'self selection' are low. As specified before, an unit of observation here is a loan. So households that do not borrow or borrow at most once, appear once, but

households that borrow more than once are included for each loan. I haven't differentiated across these two types.⁶ So, the household decision is of two stages. First, decide whether to borrow or not, and if they decide to borrow, they choose a lender. Now, in our specification, we have looked at all 5 lenders simultaneously. However, to begin with, we will look at them as two categories - formal and informal. Formal lenders include banks and cooperative societies. Informal lenders include moneylender, neighbor-relative and trader-landlord-employer. The first set of results obtained from Heckman probit estimation are presented in Table 9. After this we will look at the predicted probabilities from the multinomial logit that we run for all five lenders simultaneously following our model.

Insert Table 9

Table 9 is the result from Heckman probit regression. First of all, rho is significant, which is evidence for selection. So, access to credit also affects choice of lender. In the 'access to credit' column, the dependent variable take value 1 if the household has a current outstanding loan and 0 if it does not. The dependent variable in second column is type of lender. It equals 1 if source is formal. and 0 if informal. Now, to accurately measure 'access' to credit, we only look at households that have applied for loan at least once in the last two years.

The results indicate that access to credit is dependent on household characteristics like total income, total asset holding and total number of members in the household. Higher income and owning more assets increases a household's access to credit, but does not affect the choice of lender. This could be because more assets imply more possible collateral. Higher education does not affect access but improves access to formal sources of credit. This corroborates findings

⁶Siamwalla et. al. (1993) also have the same strategy.

of Dreze, Lanjouw and Sharma (1997) that formal credit is biased in favor of more educated households. Access to credit improves significantly with number of household members but reduces with number of dependents. This implies that higher the number of earning members in the household, better the access. Female headed households have significantly lower access to credit, but the type of lender is not affected by gender of head. Households that belong to the backward community, as defined by government, have greater access to credit, but significantly to informal sources. Muslim households too have greater access to credit but have lower chances of borrowing from formal sources. Both these results might be driven from the fact that loans taken from informal sources are smaller and with greater frequency. Except for casual labor households that are more likely to borrow from informal sources, type of credit is not affected by occupation. Access, however is affected by occupation. Households that are unemployed have significantly lower access while those with a secure salaried job have greater access to credit. This is not surprising, as secure employment with regular flow of income implies greater repayment capacity.

Being in Kerala does not lead to greater access to credit for a household, but significantly increases chances of borrowing from formal sources. What's interesting is that presence of a cooperative society as well as the number of moneylenders in the village increases the access to credit, significantly. Also not surprisingly, households that have savings account in formal institution have better access. What's surprising, however, is that the distance to bank from village increases the access to credit but not significantly to formal credit. This is perhaps because when banks are further, households take several smaller loans from other sources. Households that have borrowed to repay old debts and those that have repaid late tend to have better access, but to informal sources.

Insert Figure 2

Now we will look at results for all types of lenders simultaneously. Following our specification we run a multinomial logit for lender choice. Here the dependent variable takes 5 discrete values from 1 to 5, for each lender type. Coefficients of a multinomial logit regression are difficult to interpret. This is because there are multiple equations and the coefficients are relative to the base category. In our estimation, we keep 'not borrow' as an option. All coefficients are relative to 'not borrow' outcome. Rather than concentrate on the structural interpretations of the estimated coefficients, we concentrate instead on the predictions of the model, particularly the probability of borrowing from different lenders. Figure 2 shows the predicted probabilities for each lender from this estimation. I have presented the predicted probabilities against the log of total wealth of a household. Wealth includes the annual income and total asset owned, both of which affect access to credit significantly, as we saw from results in table 9. The median wealth level is higher in Uttar Pradesh.

Figure 2 shows the predictions from our model controlling for household characteristics, loan characteristics and households credit relation characteristics. It clearly shows the difference in credit infrastructure between the two states. Equally remarkable, however, are the similarities between the two states. When we compare the two most evaluated sources of credit - banks and moneylenders, we note that the predicted probability of borrowing from a bank increases with total wealth in both states. The probability of borrowing from a moneylender decreases with wealth in both states. This reflects the similarity in the relative importance of these two institutions as sources of credit, across different regions. The predicted probabilities also imply that Kerala households across different wealth levels rely on cooperative societies for credit. While, in Uttar Pradesh,

households across different wealth levels rely on informal ties with neighbors and relatives for credit. Based on the formal-informal break up of lenders, the predicted probability of a formal source is 0.76 in Kerala and 0.2 in U.P.

7 What do the results imply?

The results imply that despite the presence of specialized rural banks and local moneylenders, households largely depend on mutual risk sharing arrangement of cooperation. In Kerala, the nature of cooperation is institutionalized in the form of cooperative societies. In Uttar Pradesh, the nature of cooperation remains informal between neighbors and relatives. One interesting aspect to study would be the emergence of these different institutions. What leads to emergence of different forms of the same institution, here mutual cooperation? This would require information on the institutions themselves as well as historical data. We have neither, and therefore will concentrate on the benefits and costs of institutionalization of cooperation. Are there benefits to forming a cooperative society rather than dealing informally with other households? And what are the costs, if any?

There are several potential explanations for the emergence of diverse institutions in different regions. Kerala has always been a 'special' state due to its extraordinary achievements in education and health. Dreze and Sen (2002) suggest that Kerala's success is the result of public action that promoted extensive social opportunities and the widespread, equitable provision of schooling, health and other basic services. On the other hand, they attribute failures of Uttar Pradesh to the public neglect of these very same opportunities.

Let's first compare the two separate risk sharing arrangements that have evolved in Kerala and U.P. From the results it is evident that in both regions, households primarily resort to similar mechanisms of cooperation. Making use

of local information and enforcement, co-operatives can diminish the adverse selection and moral hazard problems that exist within financial systems. Given private information, low monitoring costs and enforcement possibilities, the same is true for informal arrangements between friends and relatives. Based on earlier work, we can claim that there is sufficient evidence to suggest the significant presence of risk sharing arrangements between individuals. One example is Rosenzweig (1988) based on ICRISAT data that looks at intrafamilial transfers. Other works include Townsend (1995) which looks at implications of risk sharing in southern India and in rural Thailand. Study by Udry (1994) looks at informal credit institutions in northern Nigeria, which involve lending and borrowing arrangements between friends and relatives. Hoff (1994) looks at informal risk sharing.

To validate our claim that co-operatives and neighbors-relatives perform similar roles in the credit market of the two samples, we present some more results. The household decision is now whether to borrow from the risk sharing arrangement or other sources like moneylenders, banks etc. If the household decides to borrow from the risk sharing arrangement, it then decides whether to borrow from a cooperative society or from informal ties. The result of the Heckman probit estimation are for this are in Table 10.

Insert Table 10

The dependent variable in 'Cooperation' regression takes value 1 if household decides to borrow from the risk sharing arrangement and 0 otherwise. The dependent variable in the 'Form of Cooperation' regression takes value 1 if household borrows from a cooperative society and 0 if household borrows from friends and relatives. The results indicate that household characteristics do not affect the form of risk sharing arrangements that the household chooses to

borrow from. Number of years of education leads to lower participation in risk sharing arrangements. This would be because more educated households have comparatively better opportunities outside the community. Households from backward communities are less likely to borrow from co-operatives and friends and relatives. This is because as a community they have fewer opportunities and as a result mutual risk sharing or borrowing and lending is not feasible. These households rely on moneylenders and other formal of informal credit. Households that have repaid late are most likely to hold loans from cooperative societies rather than friends and relatives. Well, this is because repayment schedule is formally defined in a cooperative set up and therefore being 'late' in repayment is an observable factor. While amongst friends and relatives, repayment schedules are often not fixed.

Most importantly, being in Kerala significantly increases the probability of borrowing from a cooperative society.

8 Results (II): Response to Risk

We know that households in the two samples mostly rely on different forms of cooperation arrangements. In this section, we will analyze if there are benefits to institutionalizing the mechanism of cooperation. That is, we will try to answer the two following questions: a) Are there any benefits to forming a cooperative society rather than dealing informally with other households? and b) What are the costs, if any of institutionalization?

For this analysis, we will use information on household responses to an income shock. And see if access to different risk sharing arrangement has any effect on their response. We have information on 'Worst financial period for household in the last 4 years' for each household. We also know the type of shock, whether it was aggregate, that affected the entire village like drought or

flood; or an idiosyncratic one, like disease or death. For each household in our sample, we have detailed information on the responses to this shock. We also have data on whether the household sought any financial help. The sequence in which they approached different lenders. We have lender-wise details on the amount of loan the household applied and the amount that was approved. We also look at the consequences of being rejected for a loan or only getting insufficient amount. Figure 3 gives a distribution of household responses following an income shock. The most common response was to cut consumption expenditure. This includes among others, taking kids out of school and spending less on food and fuel. Dissaving by selling jewelry and withdrawing from deposit was also common response. Monetary and non monetary help from neighbors and relatives is also common. Households also reduce input expenditure when faced with an income shock. This reduction in input also includes sale of grains that were stored for usage as seeds in the next season. This response corroborates Morduch (1994) which talks about second best insurance arrangements. One such arrangement he talks about is depletion of productive assets to protect current consumption levels.

Insert Figure 3

To study the impact of access to different risk sharing mechanisms, we look at three of the commonly stated response: a) cut consumption b) cut input expenditure and c) get additional job. We present the results of the first two. Table 11 shows the estimation results. The dependent variable in regression 'Reduce consumption' takes value 1 if the household stated that it had to cut expenditure in response to the income shock, and 0 if not. The dependent variable in regression 'Spend less on inputs' takes value 1 if household stated that it reduced expenditure on inputs in response to the income shock and

0 if not. The control variables are household characteristics, credit relations characteristics, interaction of access to cooperative with household occupation and interactions of access to friends and relatives with household occupation.

Insert Table 11

The results indicate that households that have access to cooperative societies are less likely to reduce consumption as well as spend less on inputs. Households that borrow from neighbors and relatives are more likely to reduce consumption and input. Farmers, casual labor and unemployed households are significantly likely to reduce expenditure on consumption in response to an income shock. However, when they have access to credit from a cooperative society, they are significantly less likely to reduce consumption. Backward community households have a higher likelihood of reducing consumption and input after a shock, but when they have access to cooperative credit, they are significantly less likely to do so. Richer household are less likely to cut consumption and so are households with regular salaried employment, which is not surprising as they have better insurance opportunities. Households that have a savings account in formal institution are also significantly less likely to cut consumption as well as reduce input expenditure. This is because they have opportunities to self insure by dissaving. Presence of a cooperative society reduces probability of cutting inputs but increases chances of cutting consumption. This result is not surprising. Remember that the co-operatives in Uttar Pradesh are agricultural co-operatives that provide cheap seeds and fertilizer, two of the main inputs on which households spend money. Number of moneylenders in the villages reduces the likelihood of cutting consumption and input after a shock. Distance to bank has no impact on either responses.

The results in table 11 establish that access to institutionalized risk sharing

arrangement affects household response to income shock. The benefits are reflected in the fact that households are less likely to cut consumption and input expenditure merely due to access to this source of credit.

Now we will try to see benefits of institutional cooperation by analyzing whether the financial needs of a household, after an income shock, are better met through co-operatives or informal networks. Here, we use data on what fraction of the loan that the household asked for was approved by the lender. The result of this is in the first column of table 12, under 'Loan approved/applied'. We estimate this using OLS methods. The dependent variable is ratio of amount received to total amount applied.

Insert Table 12

The results indicate that households with access to cooperative society are likely to get a larger fraction of the loan applied while those who borrow from neighbors and relatives are likely to get smaller fraction. SC-ST households get significantly smaller fraction of loan asked, but those with access to co-operatives get a significantly larger fraction. The same is true for farmers as well. Households with savings account get a smaller fraction of loan approved. Households with larger asset holdings get larger fraction approved. This might be due to their ability to keep collateral. But households with higher income get smaller fraction approved.

What is the effect of a household getting rejected for a loan, either completely or partially? When asked, two of the most common response was 'Borrow from another source at higher interest' and 'Borrow from another source at same interest'. The second column in table 12 show the results of a probit estimation. The dependent variable takes the value 1 if the household borrowed from another source at higher interest rate and 0 if the households borrowed from another

source at same interest rate.

The results are somewhat surprising. When a loan is rejected, households that borrow from cooperative society are significantly likely to borrow from another source at much higher interest rate. While households that borrow from friends and relatives are likely to get another loan at the same cost elsewhere. On comparing the coefficients on occupations we note that farmers, self employed and casual labor will borrow from another source at same interest rate. However, if they borrow from co-operatives, and are rejected, then they will have to borrow from another source at much higher interest rate. When unemployed households get rejected for a loan, they get loan from another source at very high interest rate. If rejected, SC-ST households will have to borrow at higher interest rate, regardless of access to co-operatives.

These results imply that there are costs of institutionalization. When a household gets rejected for a loan from a neighbor or relative, it is most likely going to get one from another source at the same cost. But when households that borrow from co-operatives, are rejected for a loan, they only have costlier alternatives like moneylenders. One likely explanation would be that when a cooperation is institutionalized in a community, it erodes the informal financial networks and informal ties. Lending and borrowing becomes more impersonal when financial institutions develop. This result supports earlier work such as Adams (1984) where an argument is made that subsidized formal institutional credit squeezes out informal credit, offering no net gain, or even a reduction in welfare.

So institutionalization of a risk sharing mechanism such as mutual cooperation has benefits and costs. The benefits are manyfold. Households that have access to a cooperative are less likely to reduce consumption or production expenditure when faced with an idiosyncratic income shock. This is because

access to a cooperative guarantees to some degree ready and available credit in times of need. It is also likely that the household receives a larger fraction of the loan it applies from a cooperative society. Households that rely on informal ties with neighbors and relatives are more likely to get rejected in full or partially when they ask for a loan. Also these households are less insured against income shocks as we notice that they are more likely to reduce consumption and input expenditure as a result of a shock. However, in the face of rejection, they are more likely to get a loan from another source without paying higher interests. Households that rely on co-operatives as a risk sharing arrangement, however, can only get loan from another source that is costlier. In most cases, these are moneylenders. So, it would seem that when communities formalize this arrangement, it replaces the older networks and informal ties.

9 Conclusion

Access to ready and available credit is an important factor in the economic well being of a rural household. Perhaps one of the main advantages of having developed credit institutions is that there are better opportunities to dealing with risk. This is particularly relevant in rural communities. Opportunities for personal savings in lesser developed communities are often restricted. However, personal savings alone only offers limited potential for protection against risks of fluctuating income. Therefore, there is reason to believe that other arrangements for risk sharing can be mutually beneficial. A few examples of such mechanisms are informal lending and borrowing amongst friends and relatives and more organized cooperative societies. A household's response to risk will depend on the nature of arrangement that is available. Households that rely completely on informal ties for financial assistance will respond differently to risk than a household that is assured assistance through more organized mechanism. This

study is in two parts. In the first, I look at access to credit in rural India. In the second part, I compare the risk responses of households with access to different risk sharing arrangement and compare the benefits and costs of these different arrangement. I am able to do this by comparing two states of India ,Uttar Pradesh and Kerala.

The main results indicate that a) there are large disparities in access to credit and particularly access to formal credit across households. But somewhat more surprising is that while households in Kerala do not have significantly better access to credit, the predicted probability of a household borrowing from formal source is significantly higher (0.76) in comparison to Uttar Pradesh(0.2). When we compare across five categories of lenders, we note that predicted probabilities of borrowing from a bank and a moneylender are identical across two regions. But what drives the earlier result is the dependence on cooperative societies in Kerala and informal ties with friends and relatives in Uttar Pradesh. Both are risk sharing arrangements that emerge from mechanism of cooperation. While a cooperative society is an institutionalized form of cooperation, friends and relatives are an informal form of cooperation. The second part of this paper answers two following questions: a) Are there any benefits to forming a cooperative society rather than dealing informally with other households? and b) What are the costs, if any of institutionalization? Using information on household responses to an income shock we find that households that have access to cooperative society are significantly less likely to reduce consumption and input expenditure. When households apply for loan, in response to the income shock, they are likely to get a larger fraction of the loan approved when they borrow from cooperative than when they rely on informal ties. However, faced with a rejection, households that rely on co-operatives, can only borrow from more expensive alternative sources like moneylenders. While households that

borrow from friends and relatives are likely to get another loan at the same cost elsewhere.

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Figure 1: Map of India - outline of states



■ Kannauj – Uttar Pradesh

■ Palakkad – Kerala

Table 1: Basic Socio-Economic Characteristics

	Kerala	Uttar Pradesh	India
Per capita income (Rs.)	17756	9261	15887
Population density (per sq. k.m.)	749	473	274
Sex ratio (women per 1000 men)	1058	902	933
Rural literacy (%)	91	50	57
Female school enrolment rate (6-17 years)	90.8	61.4	66.2
Male school enrolment rate (6-17 years)	91	77.3	77.6
Total fertility rate (per woman)	1.96	3.99	2.85
Infant mortality rate (per 1000 live births)	16.3	86.7	67.6

Source: Selected Socio-economic Indicators 2001, Department of Statistics, Govt. of India; Handbook of Statistics, R.B.I; National Family and Health Survey-2, 1998-99

Table 2 : Sampling Methodology

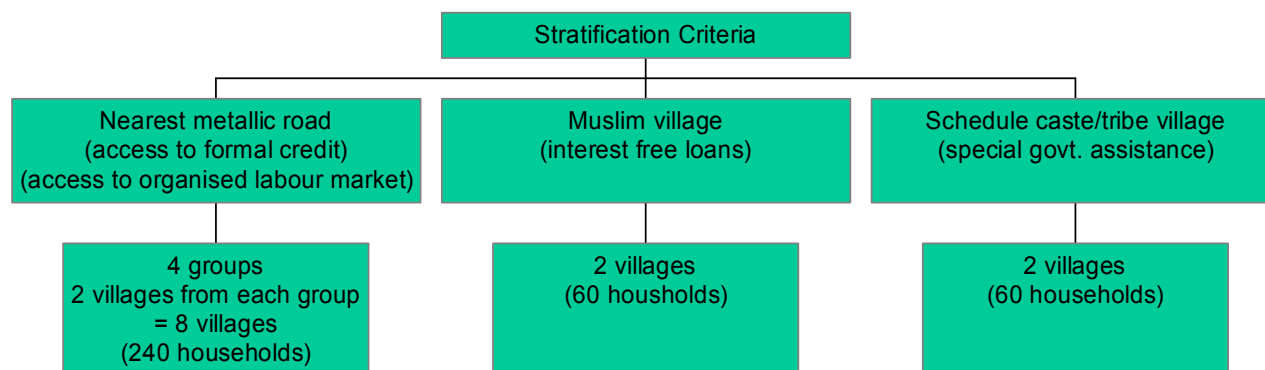


Table 3: Village-wise Basic Demographic and Socio-economic Characteristics

Village name (distance to metallic road)	Main occupation	Per-capita landholding (acres)	Per-capita Income (Rs/year)	Highest education per household	Percentage of household with atleast one regular job
Alampur (2)	F, RJ	0.46	6,234	12th grade	13
Bahsua* (3)	F,CL	0.19	4,352	10th grade	3
Balanpur (0)	F, CL, SE, RJ	0.155	5,440	10th grade	27
Ferozpur* (6)	CL, F, SE	0.1	1,997	8th grade	3
Garauli** (4)	F, CL, SE	0.45	4,820	8th grade	13
Naurangpur (5)	F	0.27	5,564	10th grade	11
Nisthau** (2)	F, CL, SE	0.33	4,276	8th grade	3
Patti (5)	F, CL, SE, RJ	0.22	5,880	8th grade	10
Ramipurva (0)	CL,F	0.23	2,872	10th grade	0
Sikrauri (4)	F, RJ, CL	0.27	3,758	10th grade	23
Siyapur (2)	F, SE	0.24	5,601	10th grade	11
Thathia (0)	F, RJ, SE, CL	0.21	6,923	12th grade	28
Uttar Pradesh		0.26	4,810		12
Alathur* (0)	CL, SE, RJ, F	0.09	7,398	10th grade	43
Erimayur (0)	CL, RJ, SE, F	0.17	13,489	12th grade	45
Kannambra (0)	CL, RJ, SE, F	0.12	9,631	10th grade	48
Kavasseri (0)	RJ, SE, CL, HW, F	0.14	8,426	12th grade	45
Kizhakencherri (0)	CL, RJ, F, SE	0.31	11,584	12th grade	44
Pudukode (0)	CL, RJ, SE, HW	0.14	10,083	10th grade	33
Tharoor (0)	CL, SE, RJ, F	0.08	7,401	10th grade	35
Vadakkencherri* (0)	RJ, CL, SE, HW	0.06	11,401	10th grade	45
Vandazhy (0)	RJ, CL, SE, F	0.12	12,336	10th grade	55
Kerala		0.14	10,194		44

* Schedule caste; ** Muslim; F=farmer; CL=casual labour; SE=self employment; RJ="regular job" (with montly salary and security of employment); HW=headload worker (with permit)

Table 4: Village-wise Features of Current Outstanding Debt

Village (distance to metallic road)	Outstanding debt per household (Rs.)	Percentage of indebted household	Outstanding debt as a proportion of income	Distribution of outstanding debt by source (%)				
				Bank	Cooperative society	Moneylender	Neighbor- relative	Employer- trader- landlord
Alampur (2)	18,648	43	43.6	78.0	8.2	4.9	8.0	1.0
Bahsua* (3)	13,223	83	55.8	37.9	1.5	40.0	20.5	0.0
Balanpur (0)	7,450	33	23.6	15.7	1.3	31.4	36.0	15.7
Ferozpur* (6)	4,830	73	38.4	24.8	10.4	40.0	23.2	1.4
Garauli** (4)	12,633	60	35.5	18.0	0.0	0.0	81.4	0.4
Naurangpur (5)	6,789	63	17.6	14.0	3.1	38.8	22.5	21.7
Nisthauri** (2)	13,117	43	38.8	72.4	0.0	2.9	24.7	0.0
Patti (5)	6,923	40	19.7	33.2	2.9	10.0	53.8	0.0
Ramipurva (0)	9,010	55	44.6	59.7	0.0	17.9	22.5	0.0
Sikrauri (4)	12,150	73	36.0	51.0	0.0	24.7	18.8	5.5
Siyapur (2)	28,683	72	55.2	83.3	0.8	4.6	3.0	8.3
Thathia (0)	14,238	55	23.0	36.0	2.5	5.6	28.0	28.0
Uttar Pradesh	12,308	58	36.0	43.7	2.6	18.4	28.5	6.8
Alathur* (0)	21,850	70	57.5	52.8	28.3	10.8	7.6	0.6
Erimayur (0)	22,425	60	30.0	62.8	26.9	7.6	2.8	0.0
Kannambra (0)	28,700	70	78.0	29.4	64.0	1.0	4.8	1.0
Kavasseri (0)	16,983	75	51.0	38.6	47.6	9.5	0.6	3.7
Kizhakencherri (0)	19,555	68	40.0	20.6	65.0	12.0	2.3	0.0
Pudukode (0)	22,830	83	61.6	17.2	59.3	20.4	2.6	0.3
Tharoor (0)	14,149	75	32.7	3.5	76.0	15.4	1.2	3.9
Vadakkencherri* (0)	24,763	63	54.0	49.3	40.5	6.7	3.5	0.0
Vandazhy (0)	15,895	63	30.6	49.0	32.5	1.3	4.4	12.6
Kerala	20,794	70	48.4	35.9	48.9	9.4	3.3	2.5

* Schedule caste; ** Muslim

Table 5: Village-wise Creditors' Information

Village (distance to metallic road)	Number of moneylenders in village	Distance to nearest bank (kms.)	Bank Name	Number of cooperative societies
Alampur (2)	4	4	AB	1
Bahsua* (3)	2	7	AB	0
Balanpur (0)	4	6	BoI	1
Ferozpur* (6)	0	8	BoI	0
Garauli** (4)	0	2	AB	0
Naurangpur (5)	1	3	BoI	0
Nisthali** (2)	2	1	AB	0
Patti (5)	0	6	AB	0
Ramipurva (0)	0	2	AB	0
Sikrauri (4)	3	3	BoI	0
Siyapur (2)	2	3	BoI	0
Thathia (0)	12	1	AB, BoI	1
Uttar Pradesh	3	3.83		0.25
Alathur* (0)	12	2	CB	13
Erimayur (0)	5	2	NB, CB, SBT	2
Kannambra (0)	10	2.5	SBT, CB	2
Kavasseri (0)	6	3	SBT, CB	1
Kizhakencherri (0)	5	5	VB, CB	5
Pudukode (0)	4	2.5	CB, SBT	2
Tharoor (0)	5	4	SBT, CanB, CB	3
Vadakkencherri* (0)	6	2	SBT, CB	1
Vandazhy (0)	3	1	CB, VB	4
Kerala	6.22	2.67		3.67

* Schedule caste, ** Muslim; AB= Allahabad Bank; BoI= Bank of India; CB= Commercial Bank; SBT= State Bank of Travancore; CanB= Canara Bank; VB= Vijaya Bank; NB= National Bank

Table 6: Synoptic List of Main Credit Sources- Uttar Pradesh

Credit source	Typical Range of interest rates	Typical Repayment frequency	*Collateral requirements (%)	Eligibility conditions and special characteristics
Banks	10 to 16	Half yearly	Land title (77) None (13)	Usually based on scheme; falling below "poverty line", "backward caste" or size of land holding
Co-operative societies	12 to 15	Half yearly	Land title (50) None (25) Future crop (17)	Membership based on size of landholding; these are agr co-ops; all loans except 'crop loans' are in kind
Moneylenders	60 to 120	Monthly	None (80) Gold, silver (9) Land title (7)	None, as long as collateral is provided; previous defaulters get credit against new collateral; (loan/collateral) value is 60%
Neighbors-Relatives	0 to 60	Not fixed	None (81) Land title (10) Gold, silver (4)	Social ties or personal relationship with lender
Employer-Landlord-Trader	0 to 60	Not fixed	None (50) Future crop (35)	Economics ties with lender

* Remaining forms of collateral: Provident Funds, Guarantor, Bank deposit, Labor hours and Livestock and land cultivatiob rights

Table 6: Synoptic List of Main Credit Sources- Kerala

Credit source	Typical Range of interest rates	Typical Repayment frequency	*Collateral requirements (%)	Eligibility conditions and special characteristics
Banks	10 to 18	Half yearly, some annual	Land title (45) Gold, Silver (32) None (22)	Whether household falls in tartget group, against bank deposits, jewelry, immovable property
Co-operative societies	12 to 20	Depending on loan type; 'Gold loans'- monthly	Gold, Silver (59) Land title (33) None (6)	Membership, deposits, guarantor; some loan categories - self employment, education, marriage, house repair, religious rites, medical, job search in foreign countries
Moneylenders	60 to 240	Monthly	None (53) Gold, silver (36) Land title (8)	None, as long as collateral is provided; commonly addressed as "blade loans"
Neighbors-Relatives	0	Not fixed	None (60) Gold, silver (20) Land title (20)	Social ties or personal relationship with lender
Employer-Landlord-Trader	0 to 144	Not fixed	None (45) Gold, silver (30) Guarantor (10)	Economics ties with lender

* Remaining forms of collateral: Provident Funds, Guarantor, Bank deposit and Labor hours

Table 7: Village-wise Break up of Types of Loan

Village	Consumption		Production		Medical loan	
	Amount (Rs.)	Number	Amount (Rs.)	Number	Amount (Rs.)	Number
Alampur	51,000	5	362,900	10	0	0
Bahsuia	158,496	12	211,700	25	26,500	5
Balanpur	130,002	6	28,500	2	65,000	5
Ferozpur	32,304	16	70,004	11	42,588	13
Garauli	208,800	16	29,205	9	129,000	10
Naurangpur	74,000	8	32,800	10	20,202	3
Nisthali	62,000	8	317,508	12	14,000	2
Patti	85,704	8	112,005	9	10,000	4
Ramipurva	38,997	9	140,503	11	700	1
Sikrauri	23,200	4	294,789	33	46,503	9
Siyapur	23,500	4	410,004	12	9,800	2
Thathia	114,000	8	414,000	20	41,502	6
Uttar Pradesh	1,002,003	104	2,423,918	164	405,795	60
Alathur	304,000	20	569,997	27	0	0
Erimayur	349,998	6	532,004	22	5,000	2
Kannambra	607,992	28	339,003	9	185,999	11
Kavasseri	112,806	18	483,506	23	83,000	5
Kizhakencherri	188,689	19	567,996	26	22,500	5
Pudukode	355,500	18	550,706	26	5,000	2
Tharoor	187,250	35	351,696	16	27,000	4
Vadakkencherri	283,500	15	678,996	18	28,002	3
Vandazhy	317,604	14	272,704	16	5,000	2
Kerala	2,707,339	173	4,346,608	183	361,501	34

Table 8: Details and summary statistics of variables in regression

	Mean	Uttar Pradesh		Mean	Kerala	
		Std.Dev.	Sample size		Std. Dev.	Sample size
<i>Household Characteristics</i>						
Logarithm of annual income	9.73	1.65	332	10.3	0.98	359
Logarithm of total assets	11.76	1.61	332	11.6	1.35	359
Total landholding	1.8	2.38	332	0.62	1.24	359
Number of years of education	5.2	0.9	332	7.4	0.73	359
Age of household head	49.9	14.32	332	55.44	12.2	359
Total number of members	7.6	4	332	4.8	2.2	359
Number of dependents	2.9	2.11	332	0.57	0.92	359
Female headed household	0.11	0.311	332	0.15	0.34	359
SC_ST	0.18	0.38	332	0.22	0.42	359
Muslim	0.18	0.38	332	0.15	0.32	359
Farmer	0.68	0.46	332	0.14	0.34	359
Self employed	0.04	0.19	332	0.11	0.31	359
Casual labor	0.22	0.41	332	0.51	0.49	359
Regular salaried job	0.06	0.23	332	0.2	0.4	359
Unemployed	0.01	0.09	332	0.03	0.17	359
<i>Loan characteristics</i>						
Logarithm of size of loan	8.45	1.3	341	9.1	1.22	397
Length of loan	1.95	2.9	341	2.02	2.59	397
Use of collateral to secure loan	0.41	0.49	341	0.79	0.4	397
Collateral==land	0.12	0.32	341	0.22	0.42	397
Collateral==jewelry	0.03	0.155	341	0.32	0.47	397
Collateral==future crop	0.03	0.15	341	0	0	397
Collateral==guarantor	0.015	0.12	341	0.02	0.14	397
Loan use =production	0.48	0.47	341	0.4	0.44	397
Loan use=consumption/medical	0.49	0.43	341	0.6	0.49	397
<i>Credit relations</i>						
Co-operative society in village	0.1	0.3	332	0.97	0.14	359
Savings account in formal institution	0.33	0.47	332	0.38	0.47	359
Borrow to repay old debt	0.23	0.43	332	0.1	0.3	359
Late repayment	0.36	0.48	332	0.2	0.4	359
Number of moneylenders in village	1.9	6.9	332	6.4	4.8	359
Distance to nearest bank	3.9	2.5	332	2.3	1.4	359
Dummy (applied but got no loan)	0.06	0.24	332	0.02	0.14	359
Dummy (No apply)	0.15	0.35	332	0.21	0.41	359
<i>Lender</i>						
Friends-relatives	0.4	0.48	341	0.05	0.22	397
Bank	0.16	0.37	341	0.22	0.43	397
Co-operative society	0.04	0.19	341	0.54	0.5	397
Moneylender	0.33	0.47	341	0.16	0.36	397
Employer-trdaer-landlord	0.07	0.25	341	0.03	0.16	397

Sample size - 691 households and 738 loans

Table9: Selection Regressions - Access and Type of Lender

	Access to Credit		Type of Lender	
	Coefficient	z-stat	Coefficient	z-stat
Constant	-1.561	(4.69)**	-2.717	-0.9
<i>Household Characteristics</i>				
Logarithm of annual income	0.041	(2.06)*	0.003	0.06
Logarithm of total assets	0.05	(2.31)*	0.133	1.41
Number of years of education	-0.078	-1.69	0.181	(1.98)*
Age of household head	-0.002	-0.6	0.004	0.56
Total number of household members	0.043	(4.62)**	-0.016	-0.4
Number of dependent members	-0.072	-0.66	0.072	1.14
Female	-0.147	(2.06)*	-0.013	-0.06
SC_ST	0.346	(5.67)**	-0.549	(4.82)**
Muslim	0.243	(2.48)*	-0.363	-1.18
Farmer	-0.203	-1.88	-0.205	-0.62
Casual labor	-0.131	-1.28	-0.168	(2.17)*
Unemployed	-0.721	(3.84)**	0.506	0.68
Regular salaried job	0.192	(4.27)**	0.138	0.28
Kerala dummy	0.267	0.432	0.463	(2.68)**
<i>Credit Relations</i>				
Co-operative society in village	0.591	(3.50)**	0.28	0.8
Savings account with formal institution	0.122	(2.33)*	0.034	0.23
Ever borrowed to repay old debt	0.772	(9.93)**	-0.153	-0.24
Ever repaid late	0.16	(13.01)**	-0.283	-0.39
Number of moneylenders in village	0.017	(4.19)**	-0.005	-0.32
Distance to nearest bank	0.03	(2.39)*	0.012	0.27
Rho	0.925	0.0451		
Observations			990	
Wald			106.7	
Log-likelihood			-2379.67	

Absolute value of z statistics in parentheses, *significant at 5%, **significant at 1%, The estimation is done using Heckman Probit method. The dependent variable in 'Access to Credit' probit regression takes value one if household has borrowed and 0 if not; In the 'Type of Lender' probit, dependent variable takes value 1 if the lender is formal and 0 if informal.

Figure 2: Predicted Probabilities of Different Lenders

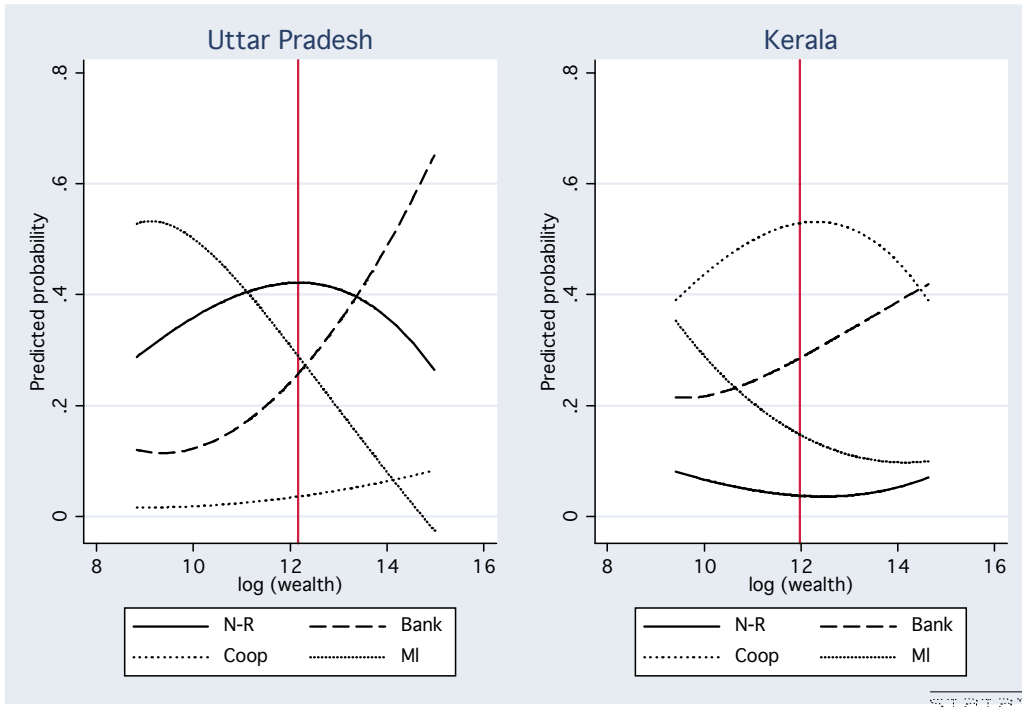


Table10: Regression for forms of co-operation- co-operative soicity or informal ties

	Co-operation		Form of co-operation	
	Coefficient	z-stat	Coefficient	z-stat
Constant	-1.701	(2.89)**	-2.879	-1.02
<i>Household Characteristics</i>				
Logarithm of annual income	0.067	-1.78	0.048	-0.45
Logarithm of total assets	0.04	-1.01	-0.041	-0.4
Number of years of education	-0.206	(3.32)**	0.084	0.39
Age of household head	-0.001	-0.25	0.02	1.49
Total number of household members	0.028	1.69	-0.083	-1.86
Number of dependent members	-0.052	-1.63	0.159	1.78
Female	-0.209	-1.56	0.062	0.18
SC_ST	-0.421	(3.70)**	-0.293	-0.67
Farmer	0.427	(2.14)*	-0.892	-1.14
Casual labor	0.373	1.95	-1.093	-1.46
Unemployed	0.352	0.99	-0.94	-0.96
Regular salaried job	0.035	0.16	-0.973	-1.22
<i>Credit Relations</i>				
Co-operative society in village	0.182	0.76	0.669	0.81
Savings account with formal institution	0.127	1.34	-0.395	-1.57
Ever borrowed to repay old debt	0.018	0.15	0.131	0.41
Ever repaid late	0.066	0.6	0.817	(2.36)*
Number of moneylenders in village	0.007	1.06	0.013	0.9
Distance to nearest bank	0.035	1.61	0.13	(2.07)*
Kerala dummy	0.442	1.76	3.489	(5.18)**
Rho	0.0739	1.071		
Observations			990	
Wald			104.07	
Log-likelihood			-683.729	

Absolute value of z statistics in parentheses, * significant at 5%; ** significant at 1%; Dependent variable in "cooperation" regression takes value 1 if household borrows either from co-operative or from friends and relatives and 0 otherwise; Dependent variable in "form of co-operation" takes value 1 if household borrows from co-operative and 0 if household borrows from friends and relatives.

Figure3: Household Response to Income Shock

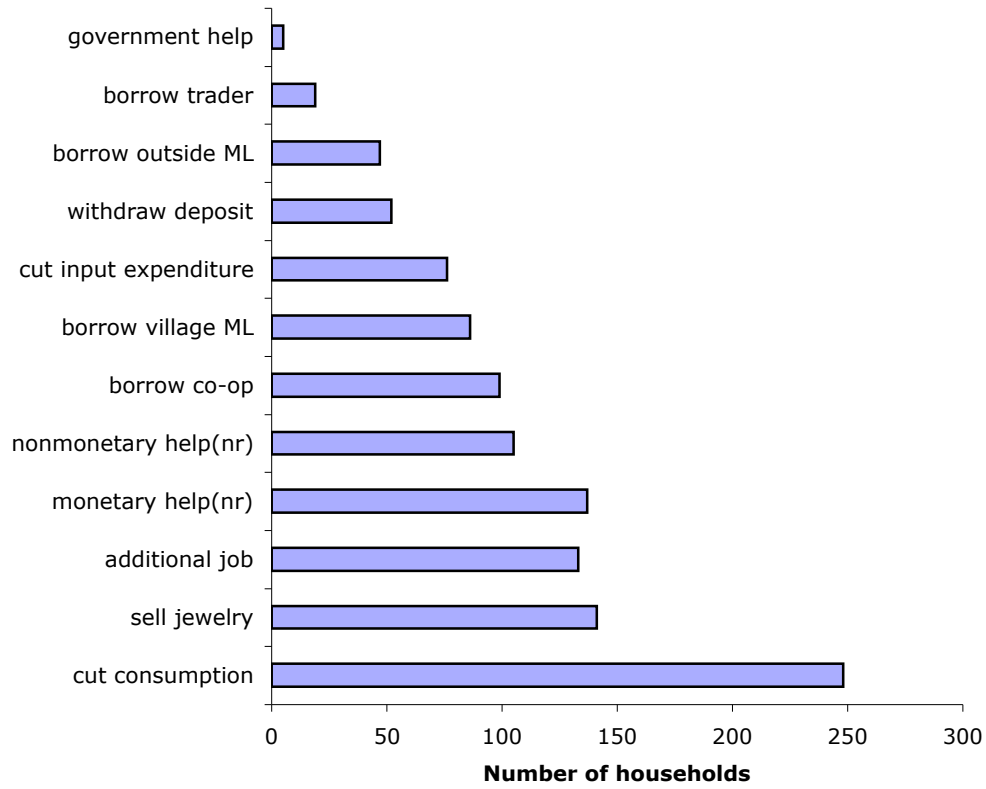


Table11: Response to Income Shock

	(I) Reduce consumption		(II) Spend less on inputs	
	Coefficient	z-stat	Coefficient	z-stat
Constant	0.289	(2.12)*	2.264	(11.04)**
<i>Household Characteristics</i>				
Log of total income	-0.081	(9.77)**	-0.013	-1.31
Log of total assets	-0.012	-1.32	-0.118	(9.82)**
Number of years of education	0.061	(4.14)**	0.073	(3.97)**
Age of household head	0.002	(2.41)*	-0.007	(6.51)**
Number of dependents/total members	0.174	(3.14)**	0.013	0.2
Female	0.068	(2.10)*	0.31	(7.32)**
SC_ST	0.004	0.12	0.232	(5.53)**
Farmer	0.284	(5.24)**	-0.823	(6.30)**
Self employed	-	-	-0.652	(4.63)**
Casual labor	0.196	(3.82)**	-0.593	(4.66)**
Unemployed	0.37	(3.49)**	-	-
Regular salaried job	-0.889	(14.98)**	-2.344	(10.90)**
Kerala dummy	0.378	1.62	-1.721	-1.84
<i>Credit Relations</i>				
Co-operative society in village	0.292	(5.14)**	-0.196	(3.12)**
Savings account in formal institution	-0.205	(8.57)**	-0.269	(8.14)**
Number of moneylenders in village	-0.024	(10.81)**	-0.004	-1.41
Distance to nearest bank	0.009	1.6	-0.011	-1.67
<i>Co-operative and interactions</i>				
Borrow from Co-operative society	-0.063	(2.41)*	-0.353	(4.75)**
Co-op*SC_ST	-0.594	(9.29)**	-0.179	-1.74
Co-op*farmer	-0.025	(2.28)*	-	-
Co-op*labor	-0.388	(4.74)**	-0.113	-1.22
Co-op*selfemp	0.244	(2.17)*	-	-
Co-op*unempl	-	-	-	-
Co-op*job	-	-	1.634	(8.00)**
<i>Neighbors-Relatives and interactions</i>				
Borrow from Neighbors/relatives	0.228	1.39	1.63	(8.64)**
NR*farmer	0.498	(2.97)**	-1.268	(6.57)**
NR*labor	0.214	1.25	-1.848	(9.26)**
NR*selfemp	-	-	-1.795	(7.06)**
NR*unempl	-0.154	-0.58	-	-
NR*job	0.717	(3.60)**	-	-
Observations	691		691	
Adjusted R square	0.18		0.27	

Absolute value of z statistics in parentheses, * significant at 5%; ** significant at 1%; Regression(I) estimated using probit, dependent variable takes value 1 if household cut consumption after shock and 0 if not; Regression II estimated using probit, dependent variable takes value 1 if household reduced expenditure on inputs and 0 if not.

Table 12: Response to Income Shock in Credit Market

	Loan Approved/Applied		Consequence of Rejection	
	Coefficient	z-stat	Coefficient	z-stat
Constant	0.682	(16.81)**	7.891	(.)
<i>Household Characteristics</i>				
Log of total income	-0.008	(4.67)**	-0.124	(7.41)**
Log of total assets	0.019	(9.00)**	-0.005	-0.23
Number of years of education	-0.01	(3.10)**	0.253	(7.73)**
Age of household head	-0.001	(6.99)**	-0.014	(7.86)**
Number of dependents/total members	-0.08	(6.63)**	0.922	(7.91)**
Female	-0.01	-1.3	0.917	(12.90)**
SC_ST	-0.054	(7.47)**	0.382	(6.32)**
Farmer	-0.014	-0.47	-6.479	(22.38)**
Self employed	-0.069	(2.25)*	-6.72	(23.62)**
Casual labor	0.006	0.19	-6.466	(24.19)**
Unemployed	-	-	-	-
Regular salaried job	0.046	-1.5	-5.576	(17.89)**
Kerala dummy	0.247	1.23	0.226	1.09
<i>Credit Relations</i>				
Co-operative society in village	-0.003	-0.25	-0.452	(5.28)**
Savings account in formal institution	-0.021	(3.97)**	-0.175	(3.75)**
Number of moneylenders in village	0	-1.09	-0.057	(12.34)**
Distance to nearest bank	-0.011	(9.11)**	-0.028	(2.74)**
<i>Co-operative and Interactions</i>				
Borrow from Co-operative society	0.123	(3.24)**	0.78	(4.96)**
Co-op*SC_ST	0.043	(3.37)**	0.399	(2.79)**
Co-op*farmer	0.098	(2.52)*	1.21	(7.11)**
Co-op*labor	-0.085	(2.20)*	1.91	(10.97)**
Co-op*selfemp	-0.02	-0.49	-	-
Co-op*unempl	-	-	6.568	(16.70)**
Co-op*job	-0.174	-	-	-
<i>Neighbors-Relatives and Interactions</i>				
Borrow from Neighbors/relatives	-0.005	-0.12	-2.378	(15.87)**
NR*farmer	-0.002	-0.04	1.223	(7.65)**
NR*labor	-0.069	-1.47	-	-
NR*selfemp	0.084	-1.53	-	-
NR*unempl	0	(.)	-	-
NR*job	0.117	(2.29)*	-0.714	(2.95)**
Observations	691		523	
Adjusted R square	0.3		0.49	

Absolute value of t statistics (Regression I) and z statistics (Regression II) in parentheses, * significant at 5%; ** significant at 1%; Regression(I) estimated using OLS methods, dependent variable is loan amount approved to loan amount applied; Regression II estimated using probit, dependent variable takes value 1 if household had to borrow from another source at higher rate of interest and value 0 if at same rate of interest.