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# Explaining Access to Credit by Rural Households: Results based on a Study of Several States in India

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## Abstract

Against the backdrop of evolution of rural credit system in India as well as its observed failure to be inclusive in character, this paper makes use of a fairly large data set of the Center for Mangement in Agriculture in Indian Institute of Management, Ahmedabad to try to explain several hitherto unaddressed issues – why certain rural households fail to have any access to credit from any source, and especially from the much-publicized and much-pampeered formal source, and even from the emerging MFIs. Three probit models are used to explain this phenomenon in terms of village and household characteristics of the sample households. The paper highlights the need for strengthening rural infrastructure, which is often found to stand in complementary relation with credit demand and credit access. Emphasis is also laid on strengthening of semi-formal souces of credit known as micro-finance, which seem to follow a market logic rather than strict regulatory approach of formal banking system, and doesn't always favor large borrowers and large projects, in spite of apparent economies of scale of such projects. Familiarity to powerful rural personnel seem to be playing a dubious role in influencing credit demand and credit access – a matter which needs to be addressed revamping of development policy administration in the countryside.

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# Explaining Access to Credit by Rural Households: Results based on a Study of Several States in India

## Section 1: Introduction & Statement of the Problem

Credit constitutes the life blood of any economic activity, which often requires funds more than what the owner of the enterprise can provide out of own savings. Naturally, in the process of economic development of any developing country usually dominated by rural agriculture-based activities, only credit can facilitate transformation of subsistence agricultural farms into dynamic profit-making commercial enterprises, which start producing for the market either in commodity form (e.g., sugarcane) or in the form of value-added processed products/services (e.g., sugar, co-generated electricity through burning of bagasse, potable or industrial alcohol or gasohol from molasses, modern manure based on press-mud – all generated in a relatively modern sugar factory). So, if the development process is to become a smooth and inclusive, it is inevitable that the demand for credit would arise from all rural households. In other words, if certain rural households lack positive credit demand or face difficulties in accessing credit, one would fear that the development process is far from smooth, continuous, harmonious, or inclusive.

It is against this background that even the colonial government in British India, following the Raifeissen model of Germany (Prinz, 2002), introduced credit cooperatives as early as in 1904 not only to free poor rural borrowers from the clutches of rural moneylenders, who used to charge usurious interest rates and often induced default to misappropriate borrower collaterals, but also to facilitate their gradual elevation along the development ladder (Rao, 1976). After the country's Independence in 1947, consistent efforts have been made not only to strengthen credit as well as non-credit cooperatives, but also to nationalize major commercial banks and liberalize their branch expansion and lending policies. At the same time, specialized rural lending institutions like Regional Rural Banks and an apex body called National Bank for Agriculture and Rural Development (NABARD) were created to improve functioning of the formal rural credit system, besides the central government and the central bank called the Reserve Bank of India (RBI) offering cheap line of credit or re-finance to various lending institutions and the government providing occasional loan waiver, interest waiver and various schemes to make the formal credit system as much inclusive as possible. Nevertheless, as successive Rural Credit Surveys of RBI and independent researchers (see, for example, Mahajan & Ramola, 1996) have often found, the expansion of the formal credit system has left much to be desired, while the share of the various informal lenders

including Rural Moneylenders has been rather reluctant to fall further. Given the consistent failure of the formal credit system to be inclusive, on the one hand, and the generally exploitative nature of informal credit, on the other, micro credit became a handy and popular tool, not unlike in many other parts of the globe, to meet the credit gap of poor people, who often lack marketable collateral to access formal sources of credit, nor can afford informal credit at unfavorable terms and conditions.

Micro credit started expanding at sharp rates in recent times not only through self-help groups (SHGs) formed by non-profit entities like NGOs, NABARD and Rural Development Ministry of the Government of India (see, for example, Bansal, 2003), but also through Joint Liability Groups (JLGs) quickly formed by Micro-finance Institutions (MFIs) created at the behest of profit-making Non-Banking Financial Companies (NBFCs) (see, for example, Mishra, 2011). The latter category of MFIs were initially operating under minimum of government regulations, bur after a serious crisis of confidence arose in October 2010 – popularly referred to as Andhra Pradesh Crisis – mainly due to profiteering companies and their coercive loan repayment collection processes allegedly leading to large number of farmer suicides, RBI also started regulating them beginning early 2011 (RBI Report, 2011)[3]. So, in the Indian context, the formal banking sector comprising of government or private scheduled commercial banks (SCBs), cooperative banks and RRBs is subjected to rigorous RBI regulations, while for-profit or non-profit MFIs – which we shall refer to as semi-formal sector in this paper - are subject to less stringent regulations. The informal sector, on the other hand, is mostly free of government regulations, although formally rural moneylenders are required to register under Rural Moneylending Acts of various states[4]. The traditional thinking is to look upon the semi-formal segment as part of the informal sector, though a refined approach ought to look upon the semi-formal component as an expansion of the formal sector. Irrespective of how the formal segment is defined vis-à-vis the informal segment, the government concern, however, continues to be why the formal credit sector, in spite of prolonged government interventions in the form of providing easy credit at concessional terms, is not in a position to be exhaustive and inclusive in terms of its coverage. It is in the spirit of this general concern of the Indian government we shall try to identify the characteristics of borrowers in terms of their village and household characteristics, who are not able to access credit, in general, and formal and even micro credit, in particular. This is the main research question we shall try to address in this paper on the basis of a handy data originally created by the Center for Management in Agriculture (CMA) of the Indian

[3] *RBI Report (2011). 'Report of the Sub-Committee of the Central Board of Directors of Reserve Bank of India to Study Issues and Concerns in the MFI Sector', Reserve Bank of India.*

[4] *Registration under this Act is generally low not only because nobody wants to be branded as moneylender, which began to be looked upon as a derogatory term, but also of poor enforcement against politically powerful elements, which have begun moneylending in recent times.*

Institute of Management (IIM), Ahmedabaded (CMA Report, 2011)[5], which was later extended to cover a random sample of altogether 600 households across six states of the Indian Republic (Pal, 2012).

The paper is organized as follows. The next section provides a brief review of the literature pertaining to the evolution of rural credit in India as well as the problems being encountered in this sector. This section also provides a setting to appreciate the research question being addressed in this paper – namely, how to explain failure of the inclusive property of rural credit, in general, and of formal institutional credit, in particular. Section 3 provides a brief description of the data set being used, besides the sample design and a brief description of the sample villages and households. It also talks about the main study methodology being followed. Section 4 describes the main findings from tabular analysis as well as from three probit models being applied to explain absence or presence of credit demand from any of the sources, besides observed presence or absence of access to formal credit sources and presence or absence of access to semi-formal or MFI sources by households which fail to get access to formal sources. The final section brings out the policy implications of the results.

**Section 2: A Short Review of the Literature**

From a review of the landmark developments in the Indian credit scenario, it is seen that the first cooperative society was formed in India as far back as in 1891 to control the village common land. However, the British government in India inspired by the Raiffeisen model of Germany made a formal beginning of the first Cooperative Societies Act - a beautiful and simple Act - to protect the farmers from exploitation of village moneylenders. In 1915, a MaClagan Committee constituted by the British Government in India advocated the principle of "one village, one cooperative". Considering the importance of agricultural credit, a separate Agricultural Credit Department of the Reserve Bank of India was established in 1935. In view of the observed tendency of elite capture of village cooperatives, a Cooperative Planning Committee of the Government of India called for state protection to cooperatives from private sector in 1945. This issue of government protection to cooperatives assumed further importance in Independent India when in 1954 the All India Rural Credit Survey found that the share of informal lenders in total rural credit was as large as 70%, whereas the share of rural cooperatives was a meager 3% (Dwivedi, 2005). As a result, the cooperative movement in India was given a strong boost in post-independent period so much so that notable political figures proclaimed that cooperatives must succeed, even if they had failed, and in the process the various amendments brought to the original

[5] *CMA Report (2011). 'Assessing Policy Interventions in Agri-business and Allied Sector Credit versus Credit Plus Approach for Livelihood Promotion', IIM Ahmedabad.*

British Act of 1904 by various state governments (as cooperatives became a state subject under the Indian Constitution after Independence) made the subject of cooperatives not only much more legalistic and complex for understanding by ordinary citizens, but also a fertile domain of government intervention on one plea or the other – so much so that cooperatives lost their autonomous character and got degenerated into para-statal bodies. This approach towards cooperatives, in general, and credit cooperatives, particular, led to lackluster performance of all cooperatives. So, the then Prime Minister of India, Late Mrs. Gandhi decided to nationalize in 1969 all major commercial banks in the country with the stated objective of guiding priority sector lending to vulnerable sections in rural India. The year of 1976 saw establishment of Regional Rural Banks (RRBs) as special purpose instruments to correct the situation when the Debt Survey Report of the RBI showed in 1971 that the share of informal credit continued to remain as high as 71% in rural India. This share was believed to have declined to 39% by 1979. So, to give a further boost to this momentum, the Integrated Rural Development Program (IRDP) was set up in 1980 to promote asset based employment generation. Year 1982 saw the beginning of the National Bank for Agriculture and Rural Development (NABARD) and also the beginning of the special program under IRDP called Development of Women and Children in Rural Areas (DWCRA). In 1987, an NGO called Mysore Resettlement and Development Agency (MYRADA) approached NABARD for policy changes regarding funding of self-help groups. It advocated for bank lending to unregistered groups, and lending to the group as a whole, rather than to individual members based on mutual trust and not any marketable collateral. It led to the beginning of NABARD's SHG-bank linkage program in 1992 – initially started as a pilot project involving only 500 SHGs. In the same year, the Chaudhury Brahm Prakash Committee advocated for lesser state involvement in cooperatives, while the Narasimhan Committee advocated phasing out of interest concessions. In 1995, through the advocacy of several doyens of the cooperative movement in India, the Andhra Pradesh Mutually Aided Cooperative Societies' Act (MACS Act) was passed to have a parallel set of cooperatives which were interested in increased autonomy from government control and were willing to forego government financial support (Munkner, 2006). In 1999, the Rural Development Ministry of the Government of India launched the Swarna Jayanthi Gram Swarojgar Yojana (SGSY), its intention being subsidized promotion of village self-employment through formation of their self-help groups. The Central Government set up in 1980 a Micro Finance Development and Equity Fund (MFDEF) to provide funding support to SHG-MFIs as well as to promote capacity building of all relevant stakeholders. In the same year the RBI permitted banks through one Business Correspondent Model to utilize services of intermediaries like NGOs and SHG-MFIs in providing financial and banking services (Raghavan, 2006). The Central Government further set up in 2007-08

Financial Inclusion Fund (FIF) and Financial Inclusion Technology Fund (FITF) to fund developmental and promotional activities, as well as to promote investment in information, communication, and technology to achieve the goal of financial inclusion.

The MFI movement got several boost ups since 1999. When SHG-bank linkage program started facing credit constraints, MFIs began switching over to non-banking financial company (NBFC) format, and a private MFI company called SKS became the first MFI in India to follow the IPO route achieving great success. This movement however got a severe jolt from the Andhra Pradesh crisis, when the state government passed the Andhra Pradesh Microfinance Institutions (Regulation of Money Lending) Ordinance in 2010 to highlight the need for regulations in this segment. Accordingly, the RBI constituted one Malegam Committee, following whose recommendations it also started regulating the private companies engaged in micro-finance operations to avoid recurrence of Andhra type crisis. Meanwhile, in 2012, the Central Government also introduced one Microfinance Institutions Development and Regulations Bill, while broadening the definition of microfinance to include savings, insurance and money transfers, to distinguish NBFC MFIs from NGO MFIs, and also to empower RBI as the sole regulator of MFIs.

Against the backdrop of the short history of evolution of the credit sector in India – especialy in the rural context, it is no surprise that most of the literature has concentrated on estimating formal credit demand or evaluating the formal credit delivery system. Most of the demand estimates conducted at behest of government organizations are faulty, as they seem to have arrived at notional demand figures (like an hungry man is asked how much will be his demand for food, as if food were a free good!), irrespective of the price and other terms and conditions of credit, the terms and conditions of credit from alternative sources, borrower income and wealth, and other village and household characteristics – the variables which ought to influence demand as per the logic of economic theory. As a result, most of these demand estimates are arbitrary, while varying quite a lot among themselves. But invariably this kind of exercise has led to ambitious government budget provision for subsidy to various credit schemes for vulnerable sections of people, with little accountability and implementation power of the government and quasi-government machinery. In this situation, while elaborate and continuous efforts to gear up the inclusiveness property of the formal credit delivery system are in force, relatively scanty efforts have been made to identify together with their characteristics the section of people who have remained outside of the orbit of the formal credit system and why so. Given the nature of the data made available to us at this juncture from CMA of IIM, Ahmedabad, and knowing that this issue is not

addressed either by the Ministry of Agriculture Study for which the data was initially created, nor by the Fellow Program in Management (FPM) student[6] who had expanded the data and made it available for the current use, the deliberate thrust of this paper would be to address this neglected aspect of rural credit in India – namely, whether, how and to what extent village and household attributes differ across households going in for formal or semi-formal vis-à-vis informal type loans.

**Section 3: Description of Data, Sampling Design & Study Methodology**

As mentioned earlier, the motivation for this paper is to apply econometric techniques to a fairly representative data collected from 600 rural households in India to identify statistically significant variables at village and borrower household level to explain differential access to credit. Given the source and original purpose of collection of these data under a Ministry of Agriculture, Government of India project on rural credit (CMA Report, 2011)[7], the collected dataset comprised of information not only on the household attributes, but also on the village attributes of the sample households. The states covered in the current dataset are West Bengal (located on the eastern part), Chhattisgarh (located in the central part), Gujarat (located in the western part), Maharashtra (located on the south-western part), Andhra Pradesh and Tamil Nadu (both located in the South, though the latter is located further down on the South, almost at the bottom of India, relative to the former). In contrast to the objectives of the Government of India study and the FPM dissertation out of it, the current purpose is to follow a statistically rigorous process to explain differential access to credit by village households on the basis of their village and individual attributes.

Since the main purpose of the Government of India project was to assess the role of formal credit vis-a-a-vis those of informal and semi-formal (i.e., micro-finance institutions) sources in promotion of rural livelihood, the sample was drawn from each of the selected states from a representative cluster, where

[6] *The authors wish to acknowledge their gratitude to Prof. Debdatta Pal of IIM, Indore to kindly make this data set available to them for the current analysis.*

[7] *The main purpose of the Government of India project was to ascertain the role of various lending agencies operating in rural areas, in general, and of their credit-alone versus credit-plus services, in particular, in promoting rural livelihood. The Fellow Program in Management (FPM) dissertation by Pal (2012), which augmented the data by adding two other states of Andhra Pradesh and Tamil Nadu, aimed at bringing out the implications of interlinked transactions in rural credit to extract appropriate lessons for management of formal sector credit (i.e., credit provided by government and private scheduled commercial banks, Regional Rural Banks and cooperative banks, which strictly follow the guidelines of the Reserve Bank of India (RBI).*

most of the above-stated three types of lending agencies were in operation in a contestability mode[8]. Existence of precise forms of lending agencies in the sample villages across states is displayed in Table 1 below.

**Table 1: Distribution of Lending Agencies across Sample Villages**

| State | Village | District | Types of formal and semi-formal creditors |
|---|---|---|---|
| Chattisgarh | Kendri, | Raipur | RRB, PACS, SHG-MFI |
| | Tarpongi | Simgaon | RRB, MPACS, NBFC-MFI |
| | Bhatagaon | Raipur | SCB, NBFC-MFI, PACS |
| Maharastra | Bahirewadi | Akot | MPACS, SCB, SHG-MFI |
| | Amboda | Akola | PACS, NBFC-MFI |
| | Chohottobazar | Akola | SCB, RRB (but no MFI) |
| West Bengal | Dhuchnikhali | 24 Pgs (N) | RRB, PACS, SHG-MFI |
| | Chorabidya | 24 Pgs (S) | SCB, NBFC-MFI |
| | Khulna | 24 Pgs (N) | RRB, PACS, SHG-MFI |
| | Metiyakhali | 24 Pgs (N) | MPACS, SCB, NBFC-MFI |
| | Madhusudankati | 24 Pgs (N) | SCB, MPACS (but no MFI) |
| Andhra Pradesh | Kesharajpally | Nalgonda | SCB, MFI, SHG-MFI |
| TamilNadu | Eenathi | Shivaganga | SCB, SHG-MFI |
| Gujarat | Kotha | Navsari | SCB, MPACS (but no MFI) |

Note: PACS=Primary Agricultural Credit Societies, MPACS= Multipurpose PACS. Substantial presence of informal lenders is found in all villages except Kotha in Gujarat.

The data was collected in the following manner. Once a representative cluster of about five villages (displaying contestability across lending agencies) within a single agro climatic region of a state was identified, the next step was to canvas two different types of questionnaires for this study – first, a village questionnaire to identify and record village level demographic, land use, and infrastructure parameters, which may have an impact on credit delivery and credit use, and second, a short household level questionnaire to perform a complete enumeration of all village households on the basis of their credit experiences both before March 2007 (the cut-off date for loan waiver scheme) and after March 2008 (the announcement date for the above mentioned scheme) so that a suitable stratified random sample of households together with suitable controls could be drawn. Two criteria were used for purpose of stratification to draw the sample following a probability proportionate stratified random sample procedure – the source of borrowing (whether formal or non-formal) and the land holding class

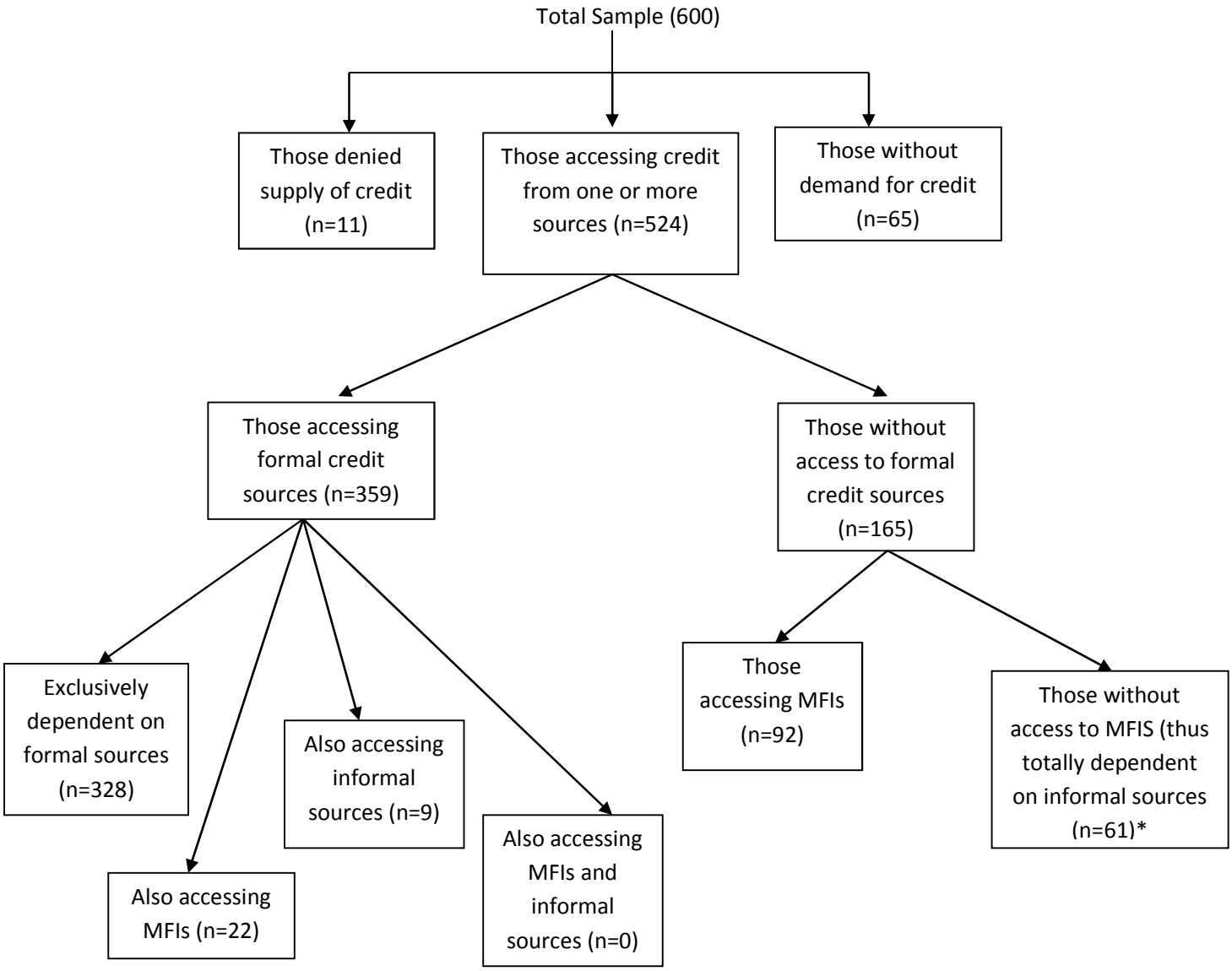
[8] *A closer look at Table 1 reveals that apparently three villages don't have existence of MFIs – a fact constraining any attempt to explain access to MFIs in these villages, as we shall see later in this paper.*

of the borrower (whether landless, marginal (0-1 hectare of land holding), small (1 – 2 hectare of land holding), medium (2-3 hectare of land holding) or large (above 3 hectare of land holding)). A detailed household questionnaire was canvassed on the selected sample households. Naturally, a small group of households who did not borrow at all from any source during the reference period got included in the sample. This small group included households, which possibly because of their affluence did not have to borrow (i.e., households without positive demand for loans), and also very poor households, who wanted to borrow, but could not find any lender (i.e., households without supply of loans). An interesting feature of this dataset is that it distinguishes the former group from the latter, though the size of the latter is too small (only 11 out of 600) to allow for any rigorous statistical analysis. Ultimately, the total sample included 524 borrowers with positive loans from at least one source, 65 households without any demand for loans (though apparently there was no supply constraint) and only 11 households whose demand for loan was not met. The data was collected during the last quarter of 2010 and the first quarter of 2011, while the reference period was the two financial years preceding 2010 – i.e., April, 2008 – March, 2009, and April, 2009 – March, 2010. The observed structure of the sample households is displayed in Chart 1 below.

Average indices of access to various sources of credit (together with CV of such indices) of different groups of sample households are displayed in Table 2 below. All loanee households in the sample have an overall 85% access to formal (32% to formal-1 and 53% to formal-2), 21% to semi-formal (12% and 9%, respectively to semi-formal 1 and 2), and 45% to informal (11% and 34%, respectively, to informal 1 and 2) sources. Households already having access to formal sources do have still 5% and 29% access to semi-formal and informal sources, respectively. Naturally, for those having no access to formal sources these percentages are much higher – 55% and 80%, respectively. Among households having no access to formal sources, but having access to semi-formal sources, as many as 56% depend on informal sources of credit. The extent of dependence on informal-2 sources seems pretty large for all borrower groups, as reflected in these average figures[9]. The number of sample households within these categories being fairly good, we are in a position to attempt to explain statistically variation in these indices of access to to various sources of credit for different groups of sample households.

[9] *However, the CVs of access indices being pretty high, one can't rely too much on differences in average indices of access.*

**Chart 1: Observed Categories of Sample Households (n=600)**




** Note: Rest 12 households within this category didn't have any MFI in their villages.*

| Table 2: Means and CV of indices of access to sources of credit (0-1) of different categories of sample households | | | | | |
|---|---|---|---|---|---|
| Sources of credit | All loanee households (n=524) | With/without access to formal | | No access to formal , but with/without access to MFIs | |
| | | Yes (n=359) | No (n=165) | Yes (n=92) | No (n=61)[10] |
| **FORMAL** | 0.85 (53.96) | 1.00 (0) | 0 (-) | 0 (-) | 0.07 (371.33) |
| **FORMAL-1** | 0.32 (145.07) | 0.34 (139.57) | 0 (-) | 0 (-) | 0.07 (371.33) |
| **FORMAL-2** | 0.53 (94.52) | 0.76 (54.48) | 0 (-) | 0 (-) | 0 (-) |
| **SEMIFORMAL** | 0.21 (193.08) | 0.05 (412.28) | 0.55 (90.45) | 1.00 (10.54) | 0 (-) |
| **SEMIFORMAL-1** | 0.12 (270.77) | 0.04 (479.56) | 0.29 (156.6) | 0.53 (96.27) | 0 (-) |
| **SEMIFORMAL-2** | 0.09 (315.21) | 0.01 (842.6) | 0.26 (168.95) | 0.47 (107.33) | 0 (-) |
| **INFORMAL** | 0.45 (114.05) | 0.29 (156.8) | 0.80 (57.68) | 0.56 (90.15) | 1.00 (0) |
| **INFORMAL-1** | 0.11 (283.72) | 0.06 (382.75) | 0.21 (193.31) | 0.14 (247.86) | 0.21 (153.31) |
| **INFORMAL-2** | 0.34 (138.96) | 0.23 (184.05) | 0.59 (83.98) | 0.42 (117.21) | 0.79 (51.21) |

*Note: Formal credit sources comprise of commercial banks & RRBs (Formal-1), and cooperative banks (Formal-2). Semi-formal sources include SHG-MFIs (Semi-formal-1) and NBFC-MFIs (Semi-formal-2), whereas informal sources consist of rural moneylenders (Informal-1) and families, friends, local shops etc. (Informal-2).*

**Section 4: Study Findings**

The study villages display a lot of variation in terms of observed literacy rates (40 to 85%), incidence of upper caste Hindu households (5 to 96%), location of various infrastructure facilities (i.e., their distance from the selected villages), and incidence of no irrigation (0 to 100%) etc. So, we found it pragmatic to plug in these village characteristics alongside household characteristics in explaining access to credit. The sample households also display a lot of variation in terms of education level of household heads, type of dwelling houses, operational land holding size, irrigational status of their lands, land quality etc. So, it was also found prudent to extract explanatory power from these household characteristics for observed variation in loan access.

Although we were keen to bring out through rigorous regression methods (e.g., through multinomial logit or ordered logit/probit with taking one group as basis for comparison) the features of households failing to satisfy their demand for loans (i.e., cases of supply failures) as distinct from those without any demand (i.e., cases of demand failure, but without apparently any supply failure) and those having their positive demand satisfied through the available credit network, we were constrained to do so because of scanty size of observations (only 11) in the very first group. In this situation, we constructed simple averages and coefficients of variation (CV) of those averages across all possible independent variables

[10] *These averages are not calculated over those 12 households, in whose villages MFIs apparently don't exist.*

for these three groups to get a fair idea of the plausible reasons. These comparative figures are given in Table 3 below.

**Table 3: Average values (with CVs shown in brackets) of possible independent variables to explain differential access to credit**

| (1) Explanatory variables | (2) Total Sample | (3) Families with no supply of loan | (4) Families with no demand for loan | (5) Families with positive loans | (6 a & b) Families with access to formal lending organiza-tions | | (7 a & b) Families having no access to formal lenders, but access to MFIs | |
|---|---|---|---|---|---|---|---|---|
| **Village attributes** | **n=600** | **n=11** | **n=65** | **n=524** | **Yes, n=359** | **No, n=165** | **Yes, n=92** | **No, n=61** |
| Percentage of agricultural land under irrigation (PIRRI) | 58.91 (52.47) | 42.24 (77.41) | 52.53 (63.45) | 59.7 (51.16) | 62.07 (49.58) | 54.55 (53.98) | 53.66 (49.44) | 61.71 (42.87) |
| Avg. distance from town, markets etc. in Kms INFRAD) | 3.75 (44.33) | 3.36 (45.54) | 3.13 (57.51) | 31.23 (5.21) | 28.24 (111.66) | 37.76 (85.59) | 39.06 (82.41) | 30.92 (94.27) |
| Avg. distance from bus, highway & rail in Kms (CONNECTD) | 6.85 (74.61) | 9.76 (55.22) | 6.41 (74.41) | 6.9 (74.64) | 3.66 (45.14) | 4.19 (36.31) | 4.19 (34.27) | 4.18 (39.91) |
| Avg. distance from educational institutions in Kms (EDUD) | 2.23 (77.4) | 2.49 (92.77) | 1.56 (107.69) | 2.31 (74.03) | 6.65 (78.75) | 7.43 (66.17) | 7.38 (64.68) | 7.14 (74.77) |
| Avg. distance from formal financial institutions in Kms (FININSD) | 3.76 (63.22) | 3.71 (64.42) | 2.63 (89.35) | 3.9 (60.26) | 3.7 (64.48) | 4.35 (50.63) | 4.45 (41.6) | 5.01 (41.65) |
| Percentage of upper caste Hindu households (PUCASTE) | 53.17 (58.69) | 57 (66.68) | 62.49 (42.26) | 52.01 (60.72) | 2.04 (69.58) | 2.9 (72.63) | 3.48 (64.04) | 2.44 (66.41) |
| % of households with electricity connection (PELECTRIC) | 72.86 (40.83) | 65.73 (51.73) | 81.32 (29.21) | 71.81 (42.14) | 58.37 (50.07) | 38.18 (84.25) | 28.26 (93.52) | 43.03 (74.98) |
| % of literate population (PLIT) | 62.65 (24.58) | 62.73 (22.08) | 61.08 (25.13) | 62.84 (24.52) | 76.83 (31.73) | 60.9 (62.49) | 51.49 (79.95) | 68.92 (45.2) |
| **Household attributes** | | | | | | | | |
| Per capita total operational land holding in ha (PCTOLAND) | 0.09 (123.5) | 0.04 (75) | 0.1 (140) | 0.09 (122.22) | 0.1 (101.91) | 0.07 (175.8) | 0.08 (189.33) | 0.06 (118.52) |
| Caste and religion dummy[11](CASTRDUM) | 0.31 (149.7) | 0.36 (138.89) | 0.25 (172) | 0.32 (146.87) | 0.35 (135.35) | 0.24 (180.3) | 0.18 (211.19) | 0.34 (139.16) |
| Farmer's operational land holding group[12] (TYPE) | 1.01 (49.4) | 0.82 (48.78) | 0.86 (53.49) | 1.03 (48.54) | 1.11 (41.44) | 0.85 (63.24) | 0.88 (60.34) | 0.82 (61.03) |
| Status of irrigation[13] (IRRISTAT) | 0.89 (95.3) | 0.27 (240.74) | 0.78 (114.1) | 0.91 (93.41) | 1.04 (78.33) | 0.61 (136.9) | 0.62 (141.24) | 0.61 (128.69) |
| Land quality[14] (QUALITY) | 1.06 (57.83) | 1 (63) | 0.98 (73.47) | 1.07 (56.07) | 1.1 (48.13) | 0.99 (72.43) | 1.04 (66.51) | 1.03 (72.82) |

[11] *1 = Upper caste Hindu, 0 = Otherwise (lower caste Hindu and minority).*
[12] *0 = landless, 1 = more than '0' up to 2 ha (small), 2 or more than 2 ha (medium & large)*
[13] *0 = rain-fed, 1 = un-assured irrigation, 2 = assured irrigation*
[14] *0 = poor, 1 = medium and 2 = good)*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| % Cropping intensity (CROPIN) | 119.69 (63.85) | 94.55 (60.08) | 126.31 (374.57) | 118.86 (388.6) | 124.65 (54.69) | 106.27 (77.32) | 113.1 (76.24) | 94.75 (67.76) |
| Per capita small ruminants (PCSRUMI) | 0.14 (239.4) | 0.14 (185.71) | 0.05 (360) | 0.16 (225) | 0.13 (240.65) | 0.21 (206.5) | 0.27 (188.07) | 0.15 (230.99) |
| Per capita poultry birds (PCBIRD) | 0.33 (237.8) | 0.35 (142.86) | 0.09 (422.22) | 0.36 (227.78) | 0.29 (274.04) | 0.52 (165.8) | 0.66 (142.47) | 0.39 (192.24) |
| Index (1-4) of ownership of household asset[15] (ASSET) | 2.97 (26.01) | 1.55 (33.55) | 3.35 (14.33) | 2.93 (26.96) | 3.04 (25.41) | 2.68 (28.85) | 2.61 (27.82) | 2.75 (30.13) |
| Holding status of investment assets (1-4)[16] (INVESTMENT) | 2.85 (40.92) | 1.27 (37.01) | 2.89 (41.87) | 2.84 (40.84) | 2.94 (38.79) | 2.62 (44.73) | 2.8 (38.93) | 2.34 (52.76) |
| Type of sanitation[17] (1-3) (SANIT) | 2.19 (37.88) | 1.55 (33.55) | 2.48 (31.85) | 2.16 (38.42) | 2.21 (38.98) | 2.05 (36.56) | 2.11 (33.32) | 1.92 (43.93) |
| Farming implement status[18] (IMPLDUM) | 0.33 (143.4) | 0.27 (174.07) | 0.26 (169.23) | 0.34 (138.23) | 0.32 (145.87) | 0.37 (131.0) | 0.46 (109.71) | 0.28 (162.22) |
| Per capita room (PCROOM) | 0.59 (60.8) | 0.52 (75) | 0.69 (55.07) | 0.57 (61.4) | 0.62 (60.47) | 0.49 (58.79) | 0.46 (49.68) | 0.54 (69.02) |
| Number of key social leaders[19] the household is familiar with (FAMTOT) | 3.94 (44.69) | 4.45 (77.41) | 3.22 (63.97) | 4.03 (42.184) | 4.25 (38.06) | 3.55 (50.27) | 3.77 (53.33) | 3.23 (45.01) |

With reference to Table 3, we first compare the averages of independent variables between columns 2 and 3 in order to find out how the village attributes of the small number (n=11) of households, who had been denied credit, differ from those of the total sample. Clearly, these small number of 11 households confronting supply failure in credit comes from villages with lesser irrigation facilities, which are located at longer distance from bus, highway and railway connections as well as educational institutions, and have larger percentages of upper caste Hindu population, but considerably lower percentages of households with electricity connections. In terms of household attributes, these 11 households have smaller per capita and overall operational holding, lower irrigation status, lower land quality, lower cropping intensity, lower status of household and investment assets, lower sanitation and farm implementation status and lesser per capita room availability, as compared to the total sample of 600 households. Nevertheless, the former group has on average greater familiarity with important village functionaries. Unfortunately, this kind of comparison does not statistically confirm greater comparative disadvantage of these 11 households, as coefficients of variation of the independent variables too are varying in both directions, nor can this kind of hypothesis be rigorously tested in a suitable regression framework, given extremely scanty size of households within one category. Nevertheless, this table can legitimately raise a hypothesis that rural households confronting supply side failure in credit seem to be

[15] *1= nil or basic household assets, while 4 if household possesses highest end costly assets*
[16] *Such as gold ornaments, deposits, financial instruments etc. (1= nil or basic investment assets, while 4 if household possesses highest end assets)*
[17] *1 = w/o toilet facility, 2 = non-sanitary toilet, 3 = sanitary toilet*
[18] *1 = if household having higher end farm implements like power tiller, tractor, thresher, harvester, trolley transport vehicle, 0 = otherwise*
[19] *Such as Gram Panchayat Mukhiya, Extension Officers etc.*

coming from infrastructurally weaker villages and are also having weaker households attributes, which ought to be tested against a much larger size sample.

We now turn to comparison between households who have no demand for loan (i.e., cases of demand failure) with households who have managed to get positive amount of loan from some sources (i.e., a comparison between columns 4 and 5 of Table 3). On comparison of the average values of independent variables, it appears that loanee households seem to have higher percentage of irrigation and higher percentage of literacy in their villages, but their villages are not necessarily located in closer proximity to the various infrastructural facilities, as compared to the households confronting demand failures. In terms of household attributes, the loanee households have definitely larger size land holding, better irrigation and land quality status, belong to higher caste and religion status, have larger per capita endowment of small ruminants and poultry birds, higher status of firm implements and better familiarity with key village functionaries, but since CVs are also variable and only two way comparisons are not enough, we cannot come to a conclusion that the loanee households are relatively better endowed in terms of the above stated attributes. Naturally, we need to perform rigorous statistical analysis to identify characteristics which distinguish these two categories of households. We shall turn to this matter a little later.

Columns 6A and 6B of Table 3 compares the averages and CVs of independent variables across borrowers who have and don't have access to formal sector credit. From this comparison, it appears that the borrowers having access live in villages with higher percentage of irrigated land, higher percentage of caste Hindu population, higher percentage of electricity connections and also higher percentage of literacy, while these villages are located nearer to various infrastructural facilities as compared to their counterparts, which have no access to formal sector credit. In terms of household attributes, households with access to formal sources have larger operational holding as well as per capita operational holding of land, better irrigation and land quality status, higher cropping intensity, better quality of household and investment assets, better sanitation facilities, larger number of per capita rooms available to them and better familiarity with important village functionaries, as compared to the latter group. The former categories of households also have higher caste and religion status. As there are sufficient numbers of households in both groups, we are in a position to apply rigorous statistical methods to find out which variables among those specified above are significantly different between these two groups.

Finally, we turn to a comparison between groups of borrower households, which do not have access to formal sector loans, but may or may not have access to MFIs (column 7a and 7b in Table 3). From this comparison it turns out that the households having access to MFIs have lesser percentage of irrigated area, lesser percentage of upper caste Hindu population, lesser percentage of electricity connection and also lesser percentage of literacy in the villages they live in, as compared to their counterpart having no access to MFIs. At individual household level, the former category of households has however larger overall as well as per capita operational holding, higher cropping intensity, larger per capita holding of small ruminants and poultry birds, higher status in terms of investment assets, sanitation facilities and farm implements, and better familiarity with important village functionaries, as compared to the latter. The former category also belongs to lower caste and religion status. As there are sufficient observations

in these two groups of borrower households, we are in a position to apply rigorous regression procedure to identify important village as well as individual household characteristics, which can significantly differentiate between these two groups of households.

We have also attempted to divide the households having access to formal sector credit into those depending exclusively on formal sources (n=328), those having access to MFIs as well (n=22), those having access to informal sources beyond formal sector access (n=9), and those enjoying access to both MFIs and informal sector creditors (n=0). Although we have constructed averages of all independent variables across these groups in Table 4 (columns 2, 3 and 4), we don't observe any clear pattern. Moreover, a number of observations in two out of these three groups are too small to perform any rigorous statistical analysis. So, we are not in a position to run any regression to identify distinctive village and household features to differentiate across these three groups.

Given the above-stated features of the data set, therefore, only three types of categorical variables regression models could be tried on the available dataset to identify the role of village and household attributes (besides state attributes) in explaining

Step 1: A positive demand for loan, irrespective of source (n=524) as compared to no demand (n=65);
Step 2: Access to formal sources of credit (n=359) vis-à-vis no access (n=165); and
Step 3: Access to semi-formal sources of credit (n=92) vis-à-vis no access.

**Table 4: Average values of possible explanatory variables (with CVs shown in brackets) for different types of borrowers with access to formal lending organizations**

| (1) Explanatory variables[20] | (2) Access to exclusively formal lenders | (3) Access to semi-formal lenders, too | (4) Access to informal lenders, too |
|---|---|---|---|
| **Village attributes** | **(n=328)** | **(n=22)** | **(n=9)** |
| Percentage of agricultural land under irrigation (PIRRI) | 62.21 (49.48) | 53.24 (64.06) | 78.32 (11.96) |
| Avg. distance from town, markets etc. in Kms (INFRAD) | 3.63 (45.46) | 3.24 (34.21) | 5.76 (24.97) |
| Avg. distance from bus, highway & rail in Kms (CONNECTD) | 1.99 (70.42) | 2.59 (65.51) | 2.28 (40.49) |
| Avg. distance from educational institutions in Kms (EDUD) | 3.58 (66.5) | 4.07 (41.87) | 7.04 (17.48) |
| Avg. distance from formal financial institutions in Kms (FININSD) | 6.56 (80.23) | 9.27 (55.99) | 3.9 (8.44) |
| Percentage of upper caste Hindu households (PUCASTE) | 59.77 (47.48) | 42.77 (83.09) | 45.56 (71.73) |
| Percentage of households having electricity connection (PELECTRIC) | 77.85 (30.34) | 54.09 (50.44) | 95 (0) |
| Percentage of literate population (PLIT) | 65.06 (24.37) | 52.27 (29.18) | 70 (0) |
| **Household attributes** | | | |
| Per capita total operational land holding in hectares (PCTOLAND) | 0.10 (102.85) | 0.1 (98.68) | 0.12 (87.68) |

[20] Details of all explanatory variables are provided in Table 2.

| | | | |
|---|---|---|---|
| Caste and religion dummy (0-1) (CASTRDUM) | 0.35 (137.22) | 0.41 (123.01) | 0.44 (118.59) |
| Operational land holding status of farmer (0-2) (TYPE) | 1.12 (41.46) | 1.05 (35.88) | 1.11 (54.08) |
| Status of irrigation (0-2) (IRRISTAT) | 1.05 (76.99) | 0.82 (117.09) | 1.33 (53.03) |
| Land quality ( 0-2) (QUALITY) | 1.10 (47.5) | 0.95 (50.89) | 1.56 (46.7) |
| Cropping intensity in percentages (CROPIN) | 125.18 (54.92) | 97.73 (42.71) | 171.11 (44.36) |
| Per capita small ruminants (PCSRUMI) | 0.13 (243.64) | 0.14 (157.35) | 0.03 (300) |
| Per capita poultry birds (PCBIRD) | 0.24 (307.04) | 0.66 (137.3) | 1 (135.99) |
| Ownership status of household asset (1-4) (ASSET) | 3.07 (24.56) | 2.45 (37.14) | 3.22 (13.68) |
| Holding status of investment assets (1-4) (INVESTMENT) | 2.95 (38.65) | 2.64 (43.08) | 3.33 (33.54) |
| Type of sanitation (1-3) (SANIT) | 2.22 (38.93) | 2 (40.82) | 2.11 (37.03) |
| Farm implement holding status (0-1) (IMPLDUM) | 0.30 (151.23) | 0.5 (102.35) | 0.44 (118.59) |
| Per capita room (PCROOM) | 0.62 (61.28) | 0.55 (47.92) | 0.64 (52.72) |
| # of key social functionaries the family is familiar with (FAMTOT) | 4.23 (38.29) | 4.73 (27.06) | 3.56 (56.44) |

Thus, in the first step, probit regression models[21] are fitted to the sample of 589 borrowers, which have found access to some source of credit (displayed in Appendix 1). In the second step, we have played with the sample of 524 households with positive demand, of which 359 have access to formal lending organizations, while the rest 165 don't have access. Probit model-2 is fitted to this dataset (displayed in Appendix-2). Appendix-3 displays the results on probit model-3 which elaborate on access of 92 households to semi-formal sources, while the rest 61 out of 153 households having no access to formal sources are reasonably dependent exclusively on informal sources. Although several regressions have been run under each of these three models to check robustness of the result, we are presenting the summary results of only statistically significant variables in Table 5.

As Table 5 displays, among the village attributes, only a few have statistically significant roles in one or more of the three models tried in this paper. These are percentages of agricultural land under irrigation (PIRRI), average distance of the village from nearest town, markets etc. (INFRAD), average distance of village from formal financial institutions (FININSD), and average distance of village from educational institutions (EDUD). The household attributes which are found to have significant roles in explaining at least one of the models are operational landholding category (TYPE), household asset holding status (ASSET) and familiarity with the key village functionaries (FAMTOT). The state dummies are used for 5 of the 6 states (namely, Chhattisgarh, Maharashtra, West Bengal, Andhra Pradesh and Tamil Nadu), while the sixth state, Gujarat is used as the reference point for the first two models, while for the third model, Tamil Nadu is chosen as the reference point (as Gujarat is absent in this dataset). The cross sectional regressions tried through these three models have fairly good explanatory power – namely,0.28, 0.43 and 0.33, respectively.

[21] We are using probit rather than logit models as the former is offering better fit to the given data.

| Table 5: Summary of the roles of statistically significant explanatory variables to explain access to credit in different models | | | | |
|---|---|---|---|---|
| | **Explanatory Variables** | **Model 1** No loan vs. loan (n=589) | **Model 2** No formal vs. formal loan (n=524) | **Model 3** Only informal vs. Semi-formal loan, too (n=153) |
| 1 | **Village Attributes** | | | |
| 1.1 | % of irrigated land (PIRRI) | ↓↓ - 0.0152 | ↓- 0.0103 | ↑0.0423 |
| 1.2 | Distance from general infrastructure (INFRAD) | ↓- 0.2694 | | |
| 1.3 | Distance from financial institutions (FININSD) | | | ↑0.8304 |
| 1.4 | Distance from educational institutions (EDUD) | ↓- 0.2104 | ↑0.1528 | |
| 2 | **Household attributes** | | | |
| 2.1 | Landholding status (TYPE) | ↓- 0.5071 | ↓↓(- 0.6774) | |
| 2.2 | Asset holding status (ASSET) | ↑0.7536 | | |
| 2.3 | Familiarity with key village functionaries (FAMTOT) | ↓- 0.1171 | ↓- 0.3047 | |
| 3 | **State Dummies**[22] | | | |
| 3.1 | Chhatisgarh | | | |
| 3.2 | Maharashtra | | | ↑ |
| 3.3 | West Bengal | | | ↑ |
| 3.4 | Andhra Pradesh | | | |
| 3.5 | Tamil Nadu | ↑ | | X |
| 4 | Pseudo $R^2$ | 0.2766 | 0.4266 | 0.3311 |

*Note: Single and double arrows are used to indicate the direction as well as relative strength of regression coefficients.*

Greater availability of irrigation in the sample villages seems to have statistically significant negative effect on demand for loan, in general, and access to formal source of credit. Availability of greater irrigation facility, as it tends to augment income and surplus generation from agriculture, seems to have

[22] For models 1 & 2 data from all states are involved, wherein observations from Gujarat have constituted the reference point for defining dummies for other states. For model 3, however, as there is no observation from Gujarat, Tamil Nadu is used as reference point for defining dummies for other states.

reduced access to formal source of credit, and slightly more so, for demand for loan from any source. Looked from these results, it appears that extension of irrigation facilities which augments productivity, income and surplus generation, has lessened dependence on informal sources of loans. Distance of a village from the general infrastructure of towns, markets etc. has a significant effect in reducing demand for loans in general. Thus, general infrastructural facilities stand in complementary relationship with demand for credit. The same is also true for distance from financial institutions – the far off these institutions are from the borrower villages, the greater the likelihood of the borrowers' access to MFIs away from informal lenders. This is expected because MFIs, particularly NBFC-MFIs have a tendency to develop their network more in areas far from where formal financial institutions are in existence. The far off are the educational institutions from the borrower villages (EDUD), the lesser the demand for loans in general, as seen from column 2 of Table 5. This is expected as easier access to education creates more awareness about credit-worthy projects and thus the greater the demand for loans. However it is no surprise that with greater distance of villages from educational institutions, access to formal lending organizations, which generally support small credit-worthy projects, tend to go up. Probably because of formal banking sector's policy of branch expansion in far off villages and priority sector lending, even larger distance of borrower villages from educational institutions (EDUD) seems to have significantly improved access of borrowers to formal lenders.

Larger landholding status of borrower households (TYPE), like better irrigation facilities in borrower villages, seems to have reduced demand for loans, in general, and more so access to formal sector loans. The last mentioned result may also be a reflection of government policy to offer easier access to smaller landholding families. Household asset holding status, however, has a boosting up effect on demand for loans in general (ASSET). Familiarity to important village functionaries (FAMTOT), which probably reflect household's affluence, has a negative effect on the demand for loans in general, and more so on borrower's access to formal sector loans.

Among the state dummy variables, only the dummy for Tamil Nadu seems to have a positive and significant effect on demand for loans in general, as compared to Gujarat (column 2). None of the state dummies are significant for Model 2 (column 3). The state dummies for Maharashtra and West Bengal seem to have positive and significant effects in Model 3 – thus indicating better access to MFIs in these two states as compared to Gujarat.

**Section 5: Policy Implications:**

Certain strengths and weaknesses of this paper may be highlighted at this stage to take this research topic forward in the coming years. Unlike in the existing literature, which is merely concerned with borrowers' access to only formal sector credit, this paper has taken a much broader view, although scanty size of the sample in certain categories has restricted rigorous analysis of all aspects of the study.

The study has probably for the first time identified the existence of several categories of households which are altogether neglected in the literature, especially households, which are desperately poor and need credit but denied credit by almost all sources (cases of supply failure in credit), and households who don't have any demand for credit. In the context of a developing economy, as commercialization

progresses, it is expected that households whould be demanding more and more credit to finance their growing economic activities. So, this paper makes a strong case for identifying the probable reasons for both demand and supply side failure of credit. The second direction in which this paper has made considerable progress is to look upon credit in a broader perspective than what has been done so far to look upon formal credit as a 'holy cow' and as the final target policy makers. In reality, informal borrowers of category 2 – i.e., friends, families and local shopkeepers are found to be playing a very significant role in offering credit even to households, which are lucky enough to have got access to formal sector credit. Second, the importance of two more sources of credit seem to have been undermined – namely, cooperative banks and NBFC-MFIs. As this paper has pointed out, in various pockets of the country where there is sufficient contestability across various credit sources, cooperatives seem to have been doing very well in providing access to credit. So also are MFIs and especially NBFC-MFIs. Although this paper could not pursue this matter further because of scanty sample sizes within certain groups, it is pretty clear that there are cases when access to formal sector credit is not good enough to meet credit needs. This matter need further probing through careful researches.

This paper has a few other policy recommendation based on the findings from regression analysis. Extension of irrigation, which is a very important goal of government policy, is expected to generate a number of complementary demands for credit. If availability of irrigation increases productivity, income, surplus generation and thus reduces demand for informal credit, there is not much to be worried about, but if it decreases demand or access for formal credit, it becomes a matter of serious concern. Fortunately, as this paper brings out, expansion of irrigation augments access to semi-formal sources of credit. In other words, the semi-formal lendors are found to be taking advantage of expansion in irrigation facilities through providing access to credit demand for resources complementary to irrigation. Formal sources must work in tandem with MFIs to tap the opportunity generated through expansion of irrigation by providing more access to borrowers seeking irrigation complementary resources through credit.

It is pragmatic on the part of MFIs and especially NBFC-MFIs to expand their networks in villages far off from where formal financial institutions are located. Although formal credit institutions have done well to expand their rural networks, it is important to improve the other kinds of rural infrastructure, especially proximity to roads communication and market on the one hand, and to educational institutions on the other, so much so that demand for credit, especially from formal and semi-formal sources tend to go up significantly through establishment of better physical connectivity, electronic connectivity and economic connectivity, as Dr. Kalam has highlighted in his famous talk on PURA (Provisions of Urban amenities in Rural Areas) (Kalam and Singh, 2011).

Household assets seems to be still playing a significant role in augmenting access to loan from all sources, in general, though this is not the case with respect to formal or semi-formal sources of credit. This means formal and semi-formal sources are yet to expand their domain of credit through SHG and JLG route and promotion of peer-pressure based intangible collateral.

Finally, important village functionaries like *panchayat pradhan*, extension officers, veterinary doctors etc. if they are really performing well in the countryside, ought to augment access to formal and semi-formal sources of credit as soon as the villagers gain greater access and familiarity to them. If this is not happening, as this paper brings out, it becomes a matter of serious concern. Naturally, a complete rehauling and revamping of the development administration machinery in the countryside has become a crying need of the hour.

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| Appendix-1 | | | | |
|---|---|---|---|---|
| **Explaining Absence of Loan Demand (Dependent variable=1) from any Source (n=65) vis-à-vis Positive Demand (Dependent variable=2) n=524** | | | | |
| | **Model 1** | **Model 2** | **Model 3** | **Model 4** |
| **Explanatory Variables**[23] | Coefficients[24] | Coefficients | Coefficients | Coefficients |
| **INTERCEPT** | - 1.2086 (0.2946) | - 1.0318 (-1.0318) | - 0.7919 (0.4776) | - 0.7850 (0.4820) |
| **1. Village Attributes** | | | | |
| **1.1 Percentage of agricultural land under irrigation (PIRRI)** | - 0.0138 (0.0213) | - 0.0140 (0.0188) | - 0.0145 (0.0143) | - 0.0152 (0.0099) |
| **1.2 Avg. distance from educational institutions in Kms (EDUD)** | - 0.1691 (0.0402) | - 0.1821 ( 0.0253) | - 0.1854 (0.0214) | - 0.2104 (0.0066) |
| **1.3 Avg. distance from town, markets etc. in Kms (INFRAD)** | - 0.2092 (0.1428) | - 0.2270 (0.1062) | - 0.2344 (0.0949) | - 0.2694 (0.0516) |
| **1.4 Avg. distance from formal financial institutions (FININSD)** | - 0.0597 (0.2678) | - 0.0635 (0.2414) | - 0.0589 (0.2744) | |
| **2. Household Attributes** | | | | |
| **2.1 Operational land holding size of farmer (0-2) (TYPE)** | - 0.4832 (0.0021) | - 0.4776 (0.0024) | - 0.4875 (0.0019) | - 0.5071 (0.0013) |
| **2.2 Ownership of household asset (1-4) (ASSET)** | 0.6440 (< 0.0001) | 0.6893 (< 0.0001) | 0.7292 (< 0.0001) | 0.7536 (< 0.0001) |
| **2.3 Type of sanitation (1-3) (SANIT)** | 0.1136 (0.3514) | | | |
| **2.4 Per capita room (PCROOM)** | 0.2500 (0.3026) | 0.3085 (0.1897) | | |
| **2.5 # of key social functionaries the family is familiar with (FAMTOT)** | - 0.1113 (0.0761) | - 0.1103 (0.0781) | - 0.1057 (0.0897) | - 0.1171 (0.0566) |
| **3. State Dummies (vis-à-vis Gujarat)** | | | | |
| **3.1 Dummy for Chhatisgarh state (CGARH)** | 0.6176 (0.1935) | 0.5896 (0.2106) | 0.4604 (0.3105) | 0.4352 (0.3464) |
| **3.2 Dummy for Maharashtra state (MAHA)** | - 0.0575 (0.8980) | - 0.0679 (0.8799) | - 0.2340 (0.0897) | - 0.1845 (0.6570) |
| **3.3 Dummy for West Bengal state (WB)** | 0.7258 (0.1034) | 0.8151 (0.0637) | 0.6533 (0.3105) | 0.6741 (0.1056) |
| **3.4 Dummy for Andhra Pradesh state (AP)** | 0.3449 (0.4861) | 0.3614 (0.4650) | 0.2475 (0.0897) | 0.1160 (0.8043) |
| **3.5 Dummy for Tamil Nadu State (TN)** | 1.7214 (0.0280) | 1.7388 (0.0268) | 1.6062 (0.3105) | 1.4639 (0.0544) |
| **4. Pseudo $R^2$** | 0.2877 | 0.2852 | 0.2803 | 0.2766 |
| **5. Likelihood Ratio** | 91.6248 (< 0.0001) | 90.7431 (<0.0001) | 89.0710 (<0.0001) | 87.7988 (< 0.0001) |

[23] Details about the explanatory variables are provided in Table 1.
[24] P-values (shown in parentheses) represent probabilities of the test statistic falling outside the range of the critical value of the relevant Chi-square distribution for one-tailed test.

| Appendix-2 | | | | | | |
|---|---|---|---|---|---|---|
| **Probit model to explain access=1 (n=359) vis-à-vis no access=0 to formal lending organizations (n=165)** | | | | | | |
| | **Model 1** | **Model 2** | **Model 3** | **Model 4** | **Model 5** | **Model 6** |
| **Explanatory Variables**[25] | Coefficients[26] | Coefficients | Coefficients | Coefficients | Coefficients | Coefficients |
| **INTERCEPT** | - 2.1242 (0..9911) | -2.2335 (0.9907) | -2.8170 (0.9883) | -3.0348 (0.9874) | -3.4016 (0.9858) | -3.1108 (0.9871) |
| **1. Village Attributes** | | | | | | |
| **1.1 Percentage of agricultural land under irrigation (PIRRI)** | -0.0141 (-0.0141) | -0.0141 (0.0007) | -0.0112 (<.0001) | -0.0109(<.0001) | -0.0106 (<.0001) | -0.0103 (0.0001) |
| **1.2 Avg. distance from educational institutions in Kms(EDUD)** | 0.1775 (0.0045) | 0.1765 (0.0048) | 0.1681 (0.0067) | 0.1621 (0.0085) | 0.1604 (0.0090) | 0.1528 (0.0123) |
| **1.3 Avg. distance from town, markets etc.in Kms(INFRAD)** | -0.0837 (0.4221) | -0.0926 (0.3716) | | | | |
| **1.4 Avg. distance from formal financial institutions (FININSD)** | -0.0312 (0.4862) | | | | | |
| **2. Household Attributes** | | | | | | |
| **2.1 Operational land holding size of farmer (0-2) (TYPE)** | -0.6955 (<.0001) | -0.6995(<.0001) | -0.6921 (<.0001) | -0.7107(<.0001) | -0.7056 (<.0001) | -0.6774(<.0001) |
| **2.2 Ownership of household asset (1-4) (ASSET)** | -0.1112 (-0.1112) | -0.1065 (0.3463) | -0.1057 (0.3495) | | | |
| **2.3 Type of sanitation (1-3) (SANIT)** | 0.1565 (0.1368) | 0.1662 (0.1113) | 0.1793 (0.0816) | 0.1422 (0.1348) | 0.1122 (0.2234) | |
| **2.4 Per capita room availability (PCROOM)** | 0.3270 (0.3270) | -0.3567 (0.1813) | -0.3573 (0.1801) | -0.3792 (0.1538) | | |
| **2.5 # of key social functionaries the family is familiar with (FAMTOT)** | -0.2880 (<.0001) | -0.2918(<.0001) | -0.2922 (<.0001) | -0.2996(<.0001) | -0.7056 (<.0001) | -0.3047 (<.0001) |
| **3. State Dummies (with Gujarat as reference point)** | | | | | | |
| **3.1 Dummy for Chhatisgarh state (CGARH)** | 3.9274 (0.9836) | 3.9328 (0.9836) | 4.1118 (0.9829) | 4.1448 (0.9828) | 4.3403 (0.9819) | 4.2206 (0.9825) |
| **3.2 Dummy for Maharashtra state (MAHA)** | 4.1058 (0.9829) | 4.1516 (0.9827) | 4.2523 (0.9823) | 4.2904 (0.9821) | 4.5370 (0.9811) | 4.4615 (0.9815) |
| **3.3 Dummy for West Bengal state (WB)** | 4.6113 (0.9808) | 4.6205 (0.9807) | 4.6700 (0.9805) | 4.7905 (0.9801) | 5.1014 (0.9787) | 5.0434 (0.9790) |
| **3.4 Dummy for Andhra Pradesh state (AP)** | 6.4054 (0.9733) | 6.3442 (0.9735) | 6.2839 (0.9738) | 6.3073 (0.9738) | 6.4891 (0.9729) | 6.3760 (0.9735) |
| **3.5 Dummy for Tamil Nadu State (TN)** | 4.4493 (0.9815) | 4.3276 (0.9819) | 3.9880 (0.9834) | 3.9630 (0.9835) | 4.1562 (0.9827) | 3.9820 (0.9835) |
| **4. Pseudo $R^2$** | 0.4373 | 0.4364 | 0.4349 | 0.4333 | 0.4293 | 0.4266 |
| **5. Likelihood Ratio** | 195.5694 (< 0.0001) | 195.0891 (<0.0001) | 194.2902 (<0.0001) | 193.3961 (<0.0001) | 191.2732(< .0001) | 189.8078(< 0.0001) |

[25] Details about the explanatory variables are provided in Table 2.
[26] P-values (shown in parentheses) represent probabilities of the test statistic falling outside the range of the critical value of the relevant Chi-square distribution for one-tailed test.

| Appendix 3 | | | | |
|---|---|---|---|---|
| **Logistic regression to explain access=1 (n=92) vis-à-vis no access=0 ( n=61) to semi-formal loan sources among families w/o access to formal sources** | | | | |
| **Explanatory Variables** | **Regression 2** | **Regression 2** | **Regression 2** | **Regression 2** |
| | Coeffi-cients | Coeffi-cients | Coeffi-cients | Coeffi-cients |
| **INTERCEPT** | - 14.2417 (0.0009)[27] | - 13.9833 (0.0011) | - 13.1816 (0.0016) | - 13.9218 (0.0008) |
| **1. Village Attributes** | | | | |
| **1.1 Percentage of agricultural land under irrigation (PIRRI)** | 0.0419 (0.0027) | 0.0411 (0.0032) | 0.0404 (0.0036) | 0.0423 (0.0023) |
| **1.2 Avg. distance from town, markets etc. in Kms (INFRAD)** | 0.4787 (0.1261) | 0.4819 (0.1217) | 0.4173 (0.1687) | 0.4384 (0.1469) |
| **1.3 Avg. distance from educa-tional institutions in Kms (EDUD)** | - 0.1994 (0.1959) | - 0.2015 (0.1892) | - 0.2011 (0.1883) | - 0.1832 (0.2277) |
| **1.4 Avg. distance from formal financial institutions (FININSD)** | 0.8516 (0.0005) | 0.8174 (0.0006) | 0.7867 (0.0008) | 0.8304 (0.0004) |
| **2. Household Attributes** | | | | |
| **2.1 Operational size group of farmer (0 = landless, 1 = small, 2 = medium and large) (TYPE)** | - 0.2317 (0.2947) | | | |
| **2.2 Number of key social functionaries like Village Head, Extension Officer etc. the family is familiar with (FAMTOT)** | - 0.1043 (0.2821) | - 0.1003 (0.2956) | | |
| **2.3 Type of sanitation (1 = without toilet facility, 2 = non-sanitary toilet, 3 = Sanitary toilet) (SANIT)** | - 0.2021 (0.2680) | - 0.2201 (0.2234) | - 0.2129 (0.2351) | |
| **2.4 Per capita room (PCROOM)** | 0.7687 (0.0955) | 0.7716 (0.0933) | 0.7371 (0.1059) | 0.6046 (0.1627) |
| **3. State Dummies[28]** | | | | |
| **3.1 Dummy for Chhatisgarh state (CGARH)** | 7.8201 (0.0016) | 7.5842 (0.0021) | 6.9813 (0.0034) | 7.2623 (0.0023) |
| **3.2 Dummy for Maharashtra state (MAHA)** | 9.4520 (0.0012 | 9.2078 (0.0015) | 8.1443 (0.0023) | 8.4344 (0.0016) |
| **3.3 Dummy for West Bengal state (WB)** | 6.7176 (0.0009) | 6.5355 (0.0011) | 5.8461 (0.0019) | 5.8687 (0.0018) |
| **3.4 Dummy for Andhra Pradesh state (AP)** | 3.0514 (0.0237) | 2.9586 (0.0279) | 2.4177 (0.0489) | 2.5173 (0.0402) |
| **4. Pseudo $R^2$** | 0.3545 | 0.3475 | 0.3404 | 0.3311 |
| **5. Likelihood Ratio** | 46.5176 (<.0001) | 45.4395 (<.0001) | 44.3676 (<.0001) | 42.9655 (<.0001) |

[27] P-values (shown in parentheses) refer to probability of the test statistic falling outside the range of the critical value of the relevant Chi-square for relevant one-tailed tests.

[28] These dummies are with Tamil Nadu as reference point, as this data set doesn't consist of any household from Gujarat (the sample area in Gujarat doesn't have any MFI)

**References**

Bansal, H. (2003). 'SHG-Bank Linkage Program in India – An Overview'. *Journal of Microfinance*, *Vol 5.*

Crombrugghe, A. D. et. al (2008). 'Performance Analysis for a Sample of Microfinance Institutions in India'. *Annals of Public and Cooperative Economics*, *Vol 79, Issue 2.*

Das, B. et. al (2006). 'Problems and Prospects of the Cooperative Movement in India under the Globalization Regime'. *XIV International Economic History Congress, Helsinki*.

Datta, S.K. et al (2011). 'Assessing Policy Interventions in Agri-business and Allied Sector Credit versus Credit Plus Approach for Livelihood Promotion'. *Indian Institute of Management, Ahmedabad.*

Datta, S.K. et al (2013). 'Assessing impact of Bandhan's microcredit and related development interventions and the policy implications thereof'. *Indian Institute of Management, Ahmedabad.*

Datta, S. (2012). 'A Categorical Variable Model to explain Absence of Demand for Loans in Rural Households of India'. *University of Texas, Dallas, USA.*

Fernandez, A. P. (1998). 'The Myrada Experience-Alternate Management Systems for Savings and Credit of the Rural Poor'. *http://www.microfinancegateway.org/gm/document-1.9.26064/313.pdf*.

Ghate, P. (2007). 'Microfinance in India: A State of the Sector Report'. *http://www.microfinancegateway.org/p/site/m/template.rc/1.9.25072/*

'Integrated Rural Development Program'. (2010) http://en.wikipedia.org/wiki/Integrated_Rural_Development_Program

Kalam, A. P. J. A. & Singh, S. P. (2011). 'Target 3 Billion'. New Delhi-Penguin Books.

Leeladhar, V. (2006). 'Taking Banking Services to the Common ManFinancial Inclusion'. *http://rbidocs.rbi.org.in/rdocs/Bulletin/PDFs/68236.pdf*.

'Microfinance in India: A Crisis At The Bottom Of The Pyramid'. Legatum Venture (2011). *http://www.legatum.org/attachments/MicrofinanceCrisis.pdf*

'Mutually Aided Cooperative Societies Act 1995'. Andhrapradesh. Act No 30 (1995). *http://brlp.in/admin/Files/APMACS_1995.pdf*.

'Narasimham Committee on Banking Sector Reforms'. (1998). *http://en.wikipedia.org/wiki/Narasimham_Committee_on_Banking_Sector_Reforms_(1998)*.

Pal, D. (2012). 'Managing Rural Institutional Credit: Lessons from Interlinked Transactions'. *Indian Institute of Management, Ahmedabad*.

Priyadarshee, A. & Ghalib, A.K. (2012). 'Over-indebtedness, coercion, and default: Causes of the Andhra Pradesh microfinance crisis and regulatory implications'. ***http://www.ingentaconnect.com/content/itpub/edm/2012/00000023/00000003/art00003***

Ramachandran, V. K. & Swaminathan, M. (2001). 'Does Informal Credit Provide Security? Rural Banking Policy in India*'. International Labour Office.*

Ramalakshmi, C. S. & Yunus, M. (2001). 'Dwcra - A Successful Experiment to Emancipate Rural Women in Andhra Pradesh'. *http://www.rd.ap.gov.in/PPTandPDF/DWCRA-A%20SUCCESSFUL%20EXPERIMENT%20TO%20EMANCIPATE%20RURAL%20WOMEN%20IN%20A.pdf*.

Shylendra, H.S. & Bhirdikar, K. (2005). 'Good Governance' and Poverty Alleviation Programmes: A Critical Analysis of the Swarnjayanti Gram Swarozgar Yojana'. *International Journal of Rural Management, Vol 1*.

Sidel, M. (2007). 'Philanthropy and Law in South Asia: Recent Developments in Bangladesh, India, Nepal, Pakistan and Srilanka'. ***http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1126337***

Thornley, B. et. al (2011). 'Priority Sector Lending-Impact Investing a Framework for Policy Design and Analysis'. *http://www.rockefellerfoundation.org/news/publications/impact-investing-framework-policy*.

Warschauer, M. (2003). 'Technology and Social Inclusion: Rethinking the Digital Divide'. MIT Press.