

A Framework to Assess Credit Risk in Group Lending with an Application to Rural South India

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Abstract

This study develops a framework to assess credit risk in joint-liability based group lending. Three broad categories of risk are defined: (i) the credit risk associated with individual group members, which can be further decomposed into socio-economic status, financial history and family support toward group membership (ii) risk arising from the purpose of loan use and (iii) risk relating to group dynamics. The framework is applied to a cohort of 85 'Self Help Groups' in rural South India that received loans in 2003. The model predicts 'arrears' in repayments with high accuracy: Groups with arrears suffer a multiple disadvantage. Low socio-economic status is accompanied by a lack of family support toward group membership and weaker informational and social capital. The use of loans for consumption is the highest for these groups, implying that repayments are from household income or savings rather than the returns on productive investments. Given that the majority in these groups are daily-wage labourers with poor financial habits (lack of regular savings), the chances for successful repayment are clearly unfavourable. Members of these groups have a poor financial history (prior loan refusals), but reported being able to access credit from other sources at the point of taking the loan. The ability to access other sources of credit reduces incentives for repayment as the threat of sanctions on further loans by the MFI – a central feature of the group lending contract – carries little value. In aggregate, therefore, the ability and incentives to repay appear heavily skewed against these groups. In contrast, live groups are at a multiple advantage: Members have a higher socio-economic status, family support and there is greater social and informational capital within groups. Members in these groups have a good financial history - with regular savings and fewer loan refusals - but report being unable to access credit from other sources in the base year. Therefore overall these groups appear more able and inclined to honour their loan obligations.

Keywords: Credit Risk, Microfinance, Banking, Financial Inclusion, India, Self Help Groups

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1. Introduction

‘Microfinance’ is the term used to refer to the provision of financial services to low-income populations who cannot access mainstream banks (Karlan 2006). In the late 1980s and the early 1990s, when the field was in its relative infancy, the central question of interest was whether lending to the poor is feasible “in environments where banks have limited sanctions against delinquent borrowers” (Besley and Coate, 1995). The success of certain initiatives in achieving very high repayment rates through an innovative approach known as ‘joint-liability based group lending’, however, overturned much of the erstwhile skepticism. The best known example of these is the Grameen Bank of Bangladesh. Given the apparent profitability associated with lending to very low income segments, several profit-oriented organizations have since entered the sector with the result that the market structure in microfinance has changed rather dramatically in some parts of the world over the past decade or more (McIntosh and Wydick, 2005). The old questions of repayment rates and organizational sustainability are therefore worth revisiting in a very different context.

This paper develops an analytical framework to assess credit risk in joint liability based group lending, drawing from existing theoretical and empirical literature and qualitative observations based on fieldwork. The study identifies three major sources of credit risk: (i) risk at the individual level (ii) risk arising from the purpose of loan use and (iii) risk relating to group dynamics. The framework is applied to a cohort of 85 Self Help Groups (SHGs) in rural South India that received loans in the year 2003, in order to empirically examine the efficacy of the proxies of credit risk employed in explaining group outcomes. Group outcomes are defined at the end of the term of the loan, in 2008, as three categories: Groups that had repaid their loans and graduated to further loans (‘live’ groups); groups that had repaid and chosen not to take a further loan (‘closed’ groups); and groups with outstanding dues (‘arrears’ groups).

Arrears groups are of the maximum concern to lenders as non repayment undermines the sustainability of lending in the long term; live groups are of interest as these clients are both able to repay and have a recurring demand for credit; and closed groups represent attrition, which is particularly relevant in a scenario of increasing competition.

The rest of this paper is organized as follows: Section 2 provides a background to the SHG model of lending in India and Madura Micro Finance, the MFI that provides loans to the SHGs in this study; Section 3 reviews the theoretical and empirical literature in the area of joint-liability based group lending, which informs the conceptual framework for the analysis of credit risk presented in Section 4; Section 5 provides definitions of the proxies employed in in the credit risk assessment framework with corresponding descriptive statistics from the dataset; Section 6 outlines the statistical model and findings from the empirical analysis; and Section 7 concludes, with a discussion of the practical applications of the study.

2. The Self Help Group Model of Lending in India & Madura Micro Finance Ltd.

The following features typically characterize microfinance worldwide: (i) Small size of transactions (whether loans, savings or insurance products), (ii) Loans for entrepreneurial activities, (iii) Collateral-free loans, (iv) Group lending, (v) A focus on the poor, (vi) A focus on women and (vii) Market-level interest rates to cover operating costs for the lender (Karlán and Goldberg, 2006).

The present study involves a pioneering MFI in India, Madura Micro Finance Limited (hereafter Madura), which fits the above characterization. Madura is an example of the ‘Self Help Group - Bank Linkage’ model, which is the predominant approach to lending in low income and rural areas of the country today. The model involves the extension of loans by commercial banks or Non Banking Financial Corporations

(NBFCs)¹, which are a form of MFIs in India that closely resemble banks, to groups of 15-20 women, known as Self Help Groups (SHGs), who are jointly liable for repayment. An intermediary agency - typically, an NGO – works in partnership with the bank or NBFC and is responsible for group formation and monitoring. Once formed, SHGs are observed for a period of time to test their levels of cohesiveness and the financial discipline of members, and if assessed as eligible, they are ‘linked’ to the bank or NBFC for loans. Other development interventions in areas such as health and education might also be offered to the groups, and entrepreneurship is strongly encouraged among members, with training sometimes provided.

Madura was established as an NBFC in 2005, formally acquiring its license from the RBI in early 2006. As with many NBFC-MFIs, Madura evolved out of a not-for-profit Section 25 Company (NGO), called the Microcredit Foundation of India, which worked in partnership with the commercial bank, ICICI, in extending loans to SHGs. Once Madura was established as an NBFC, groups that had repaid their loans to ICICI were gradually acquired for further loans by Madura, and the functions of the intermediary NGO were also taken over and performed directly by the NBFC. The groups in this study were formed in 2002 when the partnership between ICICI and the Microcredit Foundation of India was operational.

Madura SHGs, and those formed under the previous partnership, typically comprise 18-20 women from a village. Groups are either self-assembled or formed by partial facilitation. Once formed, they are observed for a year during which time members are required to attend monthly group meetings and contribute to a monthly savings scheme. Repayment capacity is assessed based on a token loan of Rs. 500 per member. Groups that qualify become eligible for their first loan of INR 50,000 (Rs. 2500 per member) to be repaid over 44 months through monthly instalments. The interest rate is 18-20%, charged on a declining balance.

Loans are made by the company to the individual members but the repayment record of the group as a

whole is used as the criterion for all members to become eligible for a further loan of a higher denomination. Two meetings are held per month over the term of the loan, the first for loan repayment and the second to discuss issues of social relevance. The meetings are typically facilitated by a Madura officer at the initial stages, but as the group matures, members are expected to take charge themselves.

The SHGs in the present study received their first loan in 2003. A stratified random sampling technique was used to select groups^{II}: At the first stage, the state was divided into four agro-climatic zones that roughly correspond to four quadrants, as per the classification in the Tamil Nadu Human Development Report (2003), and two districts were purposively sampled from each^{III}. Two additional districts were sampled from the largest zone, totalling 10 districts^{IV}. A sampling frame was then constructed for each district, comprising all groups that received loans in 2003, and 10 groups were randomly selected from each zone, totalling 100 groups. However, due to attrition over the course of the survey, the final sample size was 85 SHGs drawn from 9 districts^V. Since the sample was drawn from all parts of the state, we expect to discern varying occupational specializations and patterns of loan use among members (based on different agro-climatic conditions and resource endowments) and understand associated implications for repayment.

All groups were expected to have repaid their loans at the end of 44 months (the term of the loan) in August 2007. We allow a further one year for loan recovery and classify the status of groups in 2008 into three categories: (1) 'Live' – groups that had repaid and taken a further loan (2) 'Closed' – groups that had repaid and dissolved and (3) 'Arrears' - groups that had outstanding dues. Of the 85 groups, 38 (44.7%) were found to be 'arrears'; 26 (30.6%) 'live'; and 21 (24.7%) 'closed'.

The next section reviews the theoretical and empirical literature in group lending, which informs the framework for the analysis of credit risk that is developed in this paper.

3. Group Lending in Microfinance: Determinants of Repayment Performance

'Group lending' as an approach to microfinance gained popularity worldwide following the success of the Grameen Bank in Bangladesh, which proved that it was possible to lend to very poor people with high repayment rates "in environments where banks have limited sanctions against delinquent borrowers" (Besley and Coate, 1995). The Grameen example spurred substantial interest in the Nineties in the theoretical foundations of group lending, primarily to explain the empirically observed high rates of repayment. Most theories have implicitly or explicitly used the 'joint liability' feature of group lending as a point of departure. Joint liability implies that borrowers are collectively responsible for the repayment of the group loan and are therefore all liable even when a single member is unable to repay their share. The principle is frequently combined with dynamic incentives, where groups become eligible for further loans, often of higher amounts, based on prompt repayment.

In explaining the high repayment rates, a first set of studies in the theoretical literature, whose origin is often ascribed to Stiglitz (1990), focuses on the ability of group lending to overcome informational constraints faced when lending to low income and rural households. Studies of this school argue that 'joint liability' provides incentives to members for peer screening, monitoring and enforcement, thereby solving ex-ante and ex-post informational asymmetries (or formally, problems of 'adverse selection' and 'moral hazard'). Within a 'principal-agent' framework, the joint liability contract transfers the functions of screening, monitoring and enforcement from the 'principal' (the MFI) to the 'agents' (the borrowers), as the latter are expected to be better placed to observe and elicit information about one another. The transactions costs of lending are also reduced, which is important as loan sizes are small (Varian 1990).

A second emphasis in the theory has been on the notion of ‘social capital’. In widely cited paper, Besley and Coate (1995) propose that the high levels of social connectedness observed in societies where group lending is undertaken (referred to as ‘social capital’) can be used to solve problems of monitoring and enforcement. Since borrowers are encouraged to select one another to form a group, once the group is formed, members would face considerable pressure to repay, since default could lead to alienation within a member’s social circle or some form of punishment. Using a game theoretic framework, they show that if social sanctions are sufficiently high, group lending would lead to repayment rates higher than with individual lending.

While there is a sizeable theoretical literature that examines repayment rates in joint liability group lending, the empirical literature appears to lag behind. Hermes and Lensink (2007) note that this is at least partially on account of the difficulty in obtaining reliable data about programs and participants. Further, the findings in existing empirical studies suggest that many of the assumptions underlying the early theoretical models, which were developed largely on the basis of the Grameen example, do not hold in reality.

A first common assumption in the theory is that MFIs lend against the returns on the investment being undertaken by the borrowers. Aghion and Murdoch (2000) note, however, that group lending tends to involve frequent collections of small repayment amounts so that “the bank is effectively lending partly against the household's stream of outside income, not just the proceeds from the risky project^{VI}.” This is in contrast to the standard business loans advanced by commercial banks where the lump sum (principal amount plus interest) is repayable at the end of the term of the loan, once returns have been realized, or in a limited number of installments. The assumption of loan use for productive activities also disregards a range of other loan use scenarios. The latter is an area that has received little attention in empirical research^{VII}.

A related assumption of the social-capital based model of Besley and Coate (1995) is that of zero positive

covariance in the incomes of borrowers in a group. As acknowledged by the authors, however, covariance could be high in certain occupations such as agriculture or fishing, which are dominant in rural areas and tend to involve sector-wide risks, particularly related to the weather. Insofar as members would tend to select others of a similar risk type, as proposed by theories that emphasize the ability of joint liability contracts to overcome adverse selection and improve screening (Ghatak, 1999), homogeneity in occupation could lead to a countervailing influence on repayment due to the concentration of occupations with low or unstable incomes or covariant income risk (Berhane et al. 2009).

A third limitation of the theory is that it assumes away important behavioral aspects within groups that would have implications for repayment. For example, in the game theoretic framework of Besley and Coate (1995), the possibility of collusion is ignored. A number of studies have shown, however, that greater homogeneity within groups along social dimensions can have a negative influence on repayment rates (see Hermes and Lensink (2007) for a review of studies in this regard). A shortcoming of these studies, however, is the endogeneity of measures of social connections (Hermes and Lensink, 2007). Since groups are peer-selected, social connections might be correlated with other social and economic characteristics of borrowers that affect repayment. Inferences on the causal effect of social ties on repayment are therefore difficult to establish. A study by Karlan (2007) based on the microfinance organization FINCA-Peru is a rare example that overcomes the endogeneity problem. Groups in his study are formed through an exogenous process, where the names of individuals who express interest in a loan are added on to a list by the organizations and a group is automatically convened once there are 30 people on the list. Consistent with theory, he finds that groups with stronger social connections show better repayment performance, which he explains in terms of better peer monitoring and enforcement. Cassar et al. (2007) arrive at a similar result based on field experiments in South Africa and Armenia. Overall however the findings with regard to the effect of social capital on repayments appear inconclusive.

A further behavioral aspect of groups that has recently received attention is the possibility of independent loan transactions between members. Berhane et al. (2009) note that in the absence of insurance markets and given the possibility of “side payments” between members, the optimal choice for borrowers is to form groups that are heterogeneous with respect to risk types, as this would allow ‘risky’ borrowers to compensate ‘safe’ borrowers in bad states of nature. They argue that this could explain the observed heterogeneity within groups with respect to risk types, which is contrary to the prediction of social capital based theory. Such heterogeneity has typically been ascribed to the inability of members to find others of a similar risk type or the external facilitation of group formation by MFIs.

Independent loan transactions in groups has implications for repayment as it raises the debt levels of certain members within the group disproportionately, which could lead to difficulties in the repayment of the independent loan and the member’s share of the aggregate group loan. Non repayment in independent transactions could also result in conflicts between members that have an adverse impact on cohesiveness and repayment of the group loan.

A fourth and emerging area of focus in the literature is the implication of increased competition in the MFI sector for repayments, an aspect not considered in previous theoretical models. In the early days of microfinance a single MFI typically enjoyed a monopoly in a region and the dynamic incentives of the group lending contract – where there is a threat of sanctions on future loans if the group does not repay - served as an effective incentive for borrowers to repay since there were few outside options other than traditional money lenders who charged a much higher rate of interest. With the increasing number of MFIs serving the same region, however, this threat has diminished value (Hoff and Stiglitz, 1998). Further, with no mechanisms in place for information sharing among MFIs on the repayment histories of borrowers, borrowing from multiple sources is an easy option, with weak incentives to repay. Competition is therefore

expected to have an adverse effect on repayments for the incumbent MFI.

Based on the important determinants of repayment observed in the theoretical and empirical literature, Section 4 presents an analytical framework to assess credit risk within borrower groups.

4. A Framework to Assess Risk in Group Lending

The conceptual framework outlines the major drivers of credit risk in three categories – risk pertaining to individual borrowers, loan utilization risk and risk arising from group dynamics.

Theories that have attempted to explain repayment in microfinance identify two avenues through which households repay loans: returns from the productive investment (if the loan is utilized for a productive purpose as most often assumed) and the stream of the household's income. In identifying the sources of credit risk, therefore, an important objective of this study is to distinguish between the risk associated with *loan utilization* and the *existing profile of credit risk* of the individual borrowers. In the former category, we examine the various purposes of loan use, besides productive investments, an aspect that has received very little attention in the literature. The existing credit risk of members is evaluated in three categories – (i) the socio-economic status of the member (ii) financial history and (iii) the support of the member's family toward SHG membership. We also capture whether the member reported having had any shocks to household income during the repayment period, which might have affected repayment capacity.

At the *group level*, we examine whether peer selection has a positive impact on repayment as proposed by both the social capital and information-constraints based theories. We further consider whether social capital within groups – captured by the extent of homogeneity in terms of caste, religious affiliation,

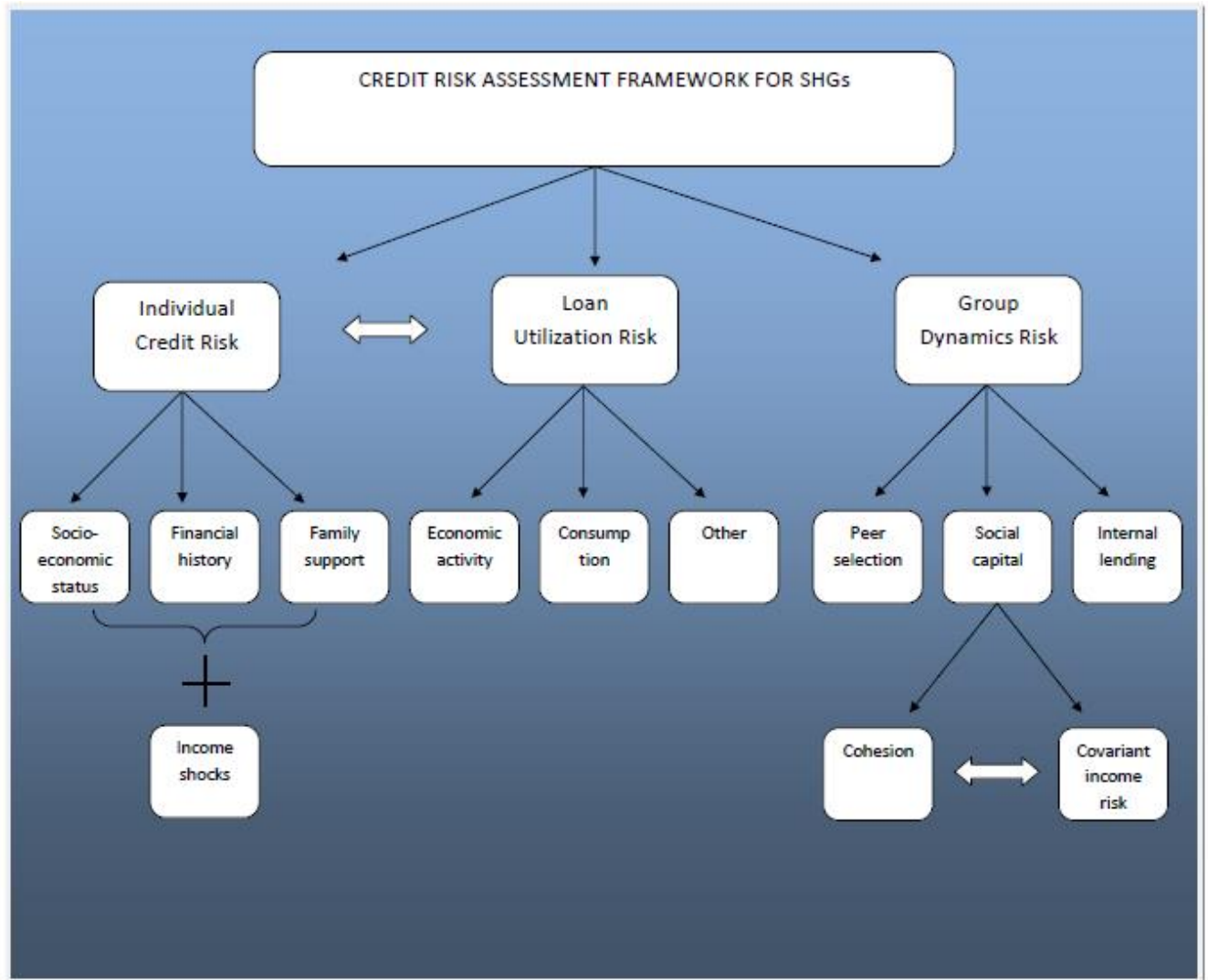
occupation and neighborhood of residence - has a positive effect on repayment. Our hypothesis, as per the social capital based theory, is that greater homogeneity would lead to better repayment rates. In the category of occupational specialization, however, we consider whether greater homogeneity could introduce a countervailing influence on repayments due to a concentration of occupations characterized by low or unstable incomes or a greater covariance in the incomes of members. In the category of group-related variables, we include the extent of internal lending activities within groups.

In terms of the outcomes of interest, the analysis considers group attrition and repayments, each in a distinct sense. Discussions on attrition have often been conflated with non-repayment since groups that do not repay are automatically ineligible for further loans from the MFI. However, the present study distinguishes between 'involuntary' attrition (groups that drop out due to non-repayment or 'arrears' groups) and 'voluntary' attrition (those that repay but choose not to take a further loan – 'closed' groups). This distinction questions the often implicit assumption in microfinance that borrowers always prefer more credit to less. Further, the analysis differentiates between those with a recurring demand for loans (those that repay and take a further loan from the same MFI – 'live' groups) and those that do not ('closed groups'). The latter gives MFIs a sense of the size of the market in a dynamic sense.

Finally the study examines the implications of the changing market structure (increasing competition) for repayments and attrition. While existing theory suggests that competition leads to 'double dipping' among borrowers (entering into contracts with multiple MFIs simultaneously) and a fall in the repayments of the incumbent, we examine the associated default rates for the newer MFIs. Our conjecture is that 'hopping between MFIs' or 'double dipping' would also lead to poor repayment rates for the newer MFIs who acquire these clients given that such behavior is associated with a poor credit history (default on the previous loan).

A diagrammatic representation of the analytical framework described here is presented below. Detailed definitions of the proxies in the framework are presented in Section 5.

Figure 1. A Credit Risk Assessment Framework for Group Lending



5. A Description of the Model Variables

Extensive survey data was collected corresponding to the baseline period (2003) when the loan was taken in order to determine the likely influences on repayment and attrition. Data was collected at the level of the individual borrower and has been aggregated into group-level measures for the analysis. Below is a description of the variables under the three categories of the framework, with a discussion of the summary statistics. The emphasis of the discussion is on variables that are statistically different across live, closed and arrears groups, by a t-test.

I. Individual-level Credit Risk

At the level of the individual member, variables relevant to credit risk are captured in three categories: (A) Socio-economic status and basic demographic characteristics (B) Financial history and (C) Family support toward group membership. The summary statistics for this category are presented in Table 1.

A. Socio-economic status:

Our basic premise is that at the individual level, a lower socio-economic status would cause greater difficulty in repayment. A range of variables are used to capture socio-economic status, including the monthly household income of the member, the occupation of the Chief Wage Earner (CWE) of the member's household, and the member's level of education, earning status, village of origin, caste and religious affiliation. We also include measures that capture the state of the member's dwellings, the number of durable assets owned, and whether the household owns any land.

Table 1. Summary statistics for Individual-level Credit Risk Variables: Live, Closed and Arrears

VARIABLES	Live		Closed		Arrears	
	Mean	SD	Mean	SD	Mean	SD
<i>Socio-economic characteristics</i>						
Age (years)	40.34	2.61	39.73	2.78	39.26	3.36
Education - None to 3 rd grade level (share)	0.31	0.23	0.26	0.19	0.40	0.22
Monthly HH income (INR)	2241.04	1604.82	2395.00	1296.83	1920.81	1285.12
Wage worker (share)	0.26	0.27	0.31	0.30	0.53	0.32
Member earning income (share)	0.62	0.30	0.58	0.30	0.57	0.29
Member from village (share)	0.49	0.29	0.38	0.38	0.35	0.32
Dwellings score>3 (share)	0.90	0.18	0.71	0.31	0.58	0.31
Durables score>4 (share)	0.46	0.34	0.54	0.28	0.25	0.24
<i>Financial history</i>						
Prior SHG membership (share)	0.03	0.11	0.01	0.02	0.04	0.10
Other credit source- 2003 (share)	0.08	0.17	0.07	0.16	0.16	0.19
Regular savings in past (share)	0.23	0.32	0.27	0.36	0.13	0.24
Prior loan refusal (share)	0.04	0.11	0.06	0.08	0.16	0.24
Income shocks (share)	0.06	0.11	0.03	0.08	0.06	0.10
<i>Family support (share)</i>	0.88	0.21	0.78	0.38	0.77	0.31

The differences in the values of all the variables are in the expected direction across the three groups. Of particular relevance among the various occupational categories is the share of daily wage workers in the group, who would have unstable incomes and consequently a higher likelihood of default. We find that the share in arrears groups (53%) relative to closed (31%) and live groups (26%) is significantly higher by a t-test.

The village of origin is relevant since in a rural setting it is often the case that a woman migrates to her husband's village once she marries. We therefore include a variable for whether or not the member belongs to the particular village in which the MFI is operating. We expect women from the village to be more concerned about local reputation and therefore more inclined to honour their loan obligations. We find a

higher share from within the village in the live groups (49%) compared to closed (38%) or arrears (35%) groups. The t-test between the live and arrears category is statistically significant for this variable.

The ‘caste system’ is a form of social affiliation in India, which is believed to have its origins in ancient Hindu society (over 3000 years ago): “The ancient Hindu society divided the population initially into four (that later grew into five) mutually exclusive, exhaustive, hereditary, endogamous, and occupation-specific *Varnas* (translated into English as ‘caste’). These were the Brahmins (priests, teachers), Kshatriyas (warriors, royalty), Vaisyas (moneylenders, traders), Sudras (menial jobs) and Ati Sudras (the untouchables, doing the lowest of the menial jobs). Caste affiliation dictated all aspects of a person's existence” (Deshpande, 2000). In the context of the financial services sector, the caste groups referred to as ‘Scheduled Castes’ (SCs) and ‘Scheduled Tribes’ (STs) are particularly emphasized in the category of “weaker sections” that are eligible for credit on a priority basis from banks – that is, at concessional terms and according to specified quotas^{VIII}. Religious minorities are also a part of the list. While we have listed caste and religion under the demographic information of borrowers in this section, in our actual analysis, caste and religion are considered aspects of social capital and included in the category of risk pertaining to group dynamics. Specifically, we examine whether greater homogeneity along these two dimensions has a positive effect on repayment rates.

The state of dwellings can be measured along several dimensions that include ownership (whether the house is owned by the member), security (whether the house has a lock), number of rooms (specifically, whether the kitchen is a separate room versus a ‘single room dwelling’), construction materials of the roof (such as thatch, mud, tile etc.), construction materials of the floor (mud, cement, tile etc.), access to electricity, source of water supply (open source such as a river, handpump, borewell, piped water supply etc.), and whether there are toilet facilities available. Given that each of these attributes is reflective of the underlying standard of living, we would expect a high degree of correlation between variables in the dwellings category. We therefore create a composite dwellings score that sums up the quality along the constituent dimensions,

where each attribute is reduced to a binary variable with 1 representing a superior quality and 0 a relatively inferior quality. For example, for ‘construction materials of the roof’, the binary variable assumes the value 1 if the materials are other than thatch or mud, which are the inferior materials that are accorded the value 0^{IX}. The resulting dwellings score can assume values between 0 (where all attributes are of the lowest quality) and 7 (where all attributes are of the highest quality).

We define the dwellings variable in the analysis as the share in each group that has a score above 3 out of a total of 7. The proportions are 90% in live groups, 71% in closed groups and 58% in arrears. The differences are significant by the t-test between live and arrears groups and live and closed groups. Overall we find that live groups have a better state of dwellings on average and are more homogenous whereas closed and arrears groups have a lower standard of dwellings on average and greater disparity within the groups in terms of the quality of dwellings.

A similar process is used to create a durables score. A master list of household durables was created and the relevance of items validated through qualitative interviews conducted in the homes of borrowers. The final list included a fan, television, blender (“mixie”), refrigerator, fixed line phone, mobile phone, sewing machine, vehicle (of any kind) and modern cooking facility (defined as any form besides firewood). The score can therefore assume values between 0 (none are owned) and 9 (all are owned). For the analysis, we construct a variable to represent the proportion of the group that has a durables score above 4 out of 9. We find that the proportion is 46% in live groups, 54% in closed groups and 25% in arrears groups. The t-tests indicate that the score is significantly lower in the arrears category relative to both live and closed groups. Overall it appears that closed groups fare the best in terms of number of durables owned on average, followed by live groups, and both closed and live groups appear fairly heterogeneous by this measure with a roughly equal split of members

owning more and less than 4 out of the nine durables on the list. Arrears groups are poorest in terms of durables owned and homogeneously so.

B Financial history:

A second source of credit risk arising at the level of the member pertains to financial history and habits, which we capture through the following four proxies.

(i) Prior SHG membership

'Prior SHG membership' is considered more risky since it indicates a possible scenario of "MFI hopping" or "double dipping" although we strictly cannot verify if the member defaulted on the prior loan. The average prior SHG membership is higher in arrears groups – 4% - against 3% in live groups and 1% in closed groups, although the variable is not significantly different across categories.

(ii) Past loan refusals

Members who had been unsuccessful at securing other loans before 2003 are considered more risky as they have demonstrably failed to meet the eligibility criteria of other lenders in the past. We find 16% on average in the arrears group who had been denied loans on previous attempts versus only 4% in live groups and 6% in closed groups. The variable is significantly higher by the t-test for arrears groups relative to the live and closed categories.

(iii) Saving habits

Members that had good financial habits – regular savings – would be more likely to successfully meet loan obligations. As expected, arrears groups have a lower share of those who had saved regularly in the past (13%) compared to the live (23%) and closed (27%) groups. The difference in

the means between arrears and closed groups is significant by the t-test but only weakly so between arrears and live groups.

(iv) Credit constraints

The group lending approach involves the use of dynamic incentives, or the eligibility for future loans, typically of larger amounts, based on timely repayment. The availability of outside options to access credit would therefore weaken the dynamic incentives of the contract, since members are not necessarily dependent on the MFI for further loans. In order to elicit information on whether the member was “credit-constrained” at the point of taking the loan, members were asked whether or not they could have borrowed from another source in the base-year (2003), if they had wanted to. This method of capturing information on credit constraints has been referred to by Boucher and Guirkinger (2009) as the Direct Elicitation Methodology (DEM), as it involves directly asking individuals about their credit constraint status. It is particularly relevant in the case of individuals who do not participate in the credit market, where credit constraints cannot be observed.

The manner in which the term ‘credit constrained’ is used in our analysis requires explanation in a few respects. First, we follow the definition by Quisumbing and Boucher (2006): “An agent is *credit constrained* if her terms of access to the credit market imply that she does not exploit (either because she is unable or unwilling) some socially profitable (expected income enhancing) investment”^x. In our case, since the question is posed in a hypothetical manner (“could you have accessed credit from other sources, *if you had wanted to*”), those who answered ‘no’ would include those that could not borrow from other sources and needed to (an ‘actual’ credit constraint) and those that could not borrow and didn’t need to (a ‘potential’ credit constraint). Second, those who answered ‘yes’ to the question are considered ‘unconstrained’, but we do not know whether the other source(s) would

have fully met their credit needs^{XI}. Third, the survey question relies on members' perceptions of whether they would be able to access credit from other sources and insofar as members systematically under or over-estimate their actual ability, responses could suffer from a bias (Boucher and Guirking, 2009). However, as our intention is to study whether the perceived ability of members to access outside sources of credit influences repayment, inaccuracies in estimation are not strictly a shortcoming.

A much higher share (16%) in arrears groups had other sources of borrowing in 2003 compared to the live (8%) and closed (7%) groups. The share for arrears groups is significantly higher by the t-test relative to live and closed groups.

C. Family support

Qualitative interviews with SHG women showed that the support of family is essential for a woman to take up activities outside the home. Therefore we include a variable on whether or not the woman had discussed the decision to join the SHG with her family prior to taking up membership. It is expected that discussion would minimize the likelihood of subsequent resistance from the family toward the member's participation in SHG activities. We find a lower incidence of discussion with the family in arrears groups (77%) compared to live (88%) and closed (78%) groups, although the differences across the categories are insignificant by the t-test.

The final variable included in the category of individual-level credit risk is shocks to income over the term of the Madura loan. We might expect that those who faced income shocks would have found repayment more difficult. However, income shocks could also drive the need for a future loan from the MFI and lead to prompt repayment. The summary statistics indicate that the share of members

reporting income shocks is in fact the same in live and arrears groups (6%) and lower in closed groups (3%) (see Table 1). The variable is insignificant by the t-test across categories.

II. Loan utilization risk

Our second category of variables examines whether there are systematic differences in repayment performance associated with alternative forms of loan use. The purposes of loan utilization are categorized as: (i) Productive investment (for any existing or new economic activity) (ii) Repayment of other loans (iii) Consumption expenditure (daily household expenses; expenses for major personal events such as births, weddings and funerals; expenses for religious or seasonal celebrations and purchase of household durables) (iv) Home construction, renovation or repair (v) Any other (this includes health, emergency expenses, education and all other uses).

Table 2. Summary Statistics for Loan-use Variables: Live, Closed and Arrears

VARIABLES (<i>shares</i>)	Live		Closed		Arrears	
	Mean	SD	Mean	SD	Mean	SD
Loan use: productive activity	0.62	0.34	0.67	0.31	0.44	0.36
Loan use: repayment of other debts	0.07	0.10	0.03	0.05	0.08	0.09
Loan use: home construction/repair	0.08	0.09	0.07	0.11	0.09	0.11
Loan use: other	0.09	0.15	0.09	0.18	0.10	0.19
Loan use: consumption purposes	0.07	0.11	0.04	0.06	0.15	0.16

Note: This table shows group-level shares of the different types of loan-use for each category.

Of interest is the use of loans for productive investments, which is significantly higher in the live and closed groups compared to arrears (62% and 67% versus 44%, respectively). In contrast, the use of loans for consumption is higher in arrears groups (15%) compared to 7% and 4% respectively in live and closed groups and the differences are significant by the t-test.

III. Group Dynamics Risk

The variables in this category pertain to the manner in which the group was formed (specifically, the extent to which members were peer selected), the social capital within the group (as measured by homogeneity along the social dimensions of caste, religion and occupational specialization of the CWE of the household, and the number of ‘neighbours’ within the group), and the extent of ‘internal lending’ within groups. Table 3 presents summary statistics.

Table 3. Summary Statistics for Group Dynamics Variables: Live, Closed and Arrears

VARIABLES	Mean	SD	Mean	SD	Mean	SD
<i>Group formation mechanism</i>						
Peer selected (share)	0.63	0.36	0.34	0.42	0.49	0.38
<i>Social Capital</i>						
Neighbours when joining (number of members)	5.84	2.81	5.47	2.37	4.55	2.44
Caste HHI (index scale 0-1)	0.79	0.16	0.72	0.22	0.76	0.20
Religion HHI (index scale 0-1)	0.88	0.17	0.88	0.15	0.87	0.15
Occupation HHI (index scale 0-1)	0.30	0.25	0.26	0.25	0.44	0.29
<i>Internal Lending within Groups (share)</i>	0.83	0.29	0.75	0.41	0.77	0.32

A. Group formation mechanism

Theories that explain the success of group lending in ensuring high repayment rates – of both the asymmetric information and social-capital schools - assume that members select one another to form groups. According to the asymmetric information point of view, peer selection would ensure effective screening of membership with the result that ‘safe’ risk types would tend to select one another (Ghatak, 1999). The social capital view emphasizes that peer selection would result in the

formation of groups where members have stronger social ties and the level of peer pressure to repay is higher. In practice, however, group formation might be facilitated partially by an intermediary such as an NGO or bank. Groups that are formed through external facilitation might lack the benefits of effective screening of membership and the subsequent ability of members to monitor and enforce each other's repayments. Such groups might also be more dissimilar along social lines and therefore less cohesive.

We find that the average number of members who were peer recruited is the highest in live groups (63%) followed by arrears groups (49%) and the lowest in closed groups (34%). The variable is significantly different by the t-test between live and closed groups.

B. Social capital

In this category, we consider the extent of concentration in groups along the dimensions of caste, religion, neighbourhood of residence and occupation, given that these represent important aspects of social capital in rural South India. In keeping with the social-capital based theory, our conjecture is that groups with a greater concentration along these dimensions might be more cohesive and hence better able to repay. In the category of occupation, however, we are interested in whether a greater concentration of particular occupations within groups, which have low or unstable incomes or which are associated with positive income covariance (such as agriculture), leads to a countervailing influence on repayment as suggested by the more recent 'insurance' perspective (Berhane et. al, 2009).

For each of the categories of social capital - caste, religion and occupational specialization - we create a measure to capture concentration (or conversely, diversity) akin to the Hirschman-

Hirfindahl Index (H) traditionally used to measure market concentration in economics (Hirschman, 1945; Hirfindahl, 1950). In our context, for a given category of social capital, the measure (H) is derived by summing the squared shares of each constituent type within the group. In the equation below, ' s_k ' denotes the size of each constituent type (indexed by k) in the group of size ' n '.

$$H_{CATEGORY} = \sum_k \left(\frac{s_k}{n} \right)^2; \text{Category} = \text{Religion, caste or occupation}; k = \text{type within a category}; s = \text{share of type } k.$$

We find a high caste concentration by this measure across groups, with a slightly higher concentration in live groups (79%) versus arrears (76%) and closed groups (72%). This variable is not statistically different across the three categories. Given a higher share of unreported castes found in closed and arrears groups, however, it is possible that our index does not capture the actual extent of caste concentration in these groups. A similarly high concentration is noted for religion: 88% in the live and closed groups and 87% in the arrears groups. In the category of occupational specialization, we note a distinctly higher concentration in arrears groups (44%) relative to live (30%) and closed groups (24%). The difference in means between arrears groups and live and closed groups is statistically significant by the t-test.

For the variable neighbourhood of residence, we simply include the number of other members within the group reported as 'neighbours' by each member on average. The number is 5.84 for live groups, 5.47 for closed groups and 4.55 for arrears group, with the difference between live and arrears group being statistically significant by the t-test.

C. Internal lending

Lending amongst members within a group outside of the MFT's formal lending channels would tend to increase the debt levels of some members of the groups disproportionately, thereby concentrating the risk of default to a greater extent among a smaller number. It is therefore reasonable to expect that internal lending would elevate the overall risk of group default. Contrary to expectation, however, we find that the incidence of internal group lending is higher in live groups (83%) versus closed (75%) and arrears groups (77%), although the difference in means between categories is insignificant by the t-test.

The next section presents the statistical model used in the analysis and discusses the findings from the empirical analysis.

6. A Multinomial Logit Model to Determine Group Outcomes

We use a Multinomial Logit Model (MLM) to determine the likelihood of occurrence of the three possible outcomes – live, closed and arrears - based on the set of independent variables. Specifically, we compare the relative probability of groups being live or closed relative to 'arrears', which is used as the base category. The arrears category is conceptually the most relevant since default undermines the sustainability of lending in the long term. 'Arrears' also comprises the largest share in the sample.

The MLM model is described in formal mathematical notation below (Boucher et al., 2009): Let Y_i be a categorical variable that takes values $1, 2 \dots j$ and that represents the observed outcome for group i . We define Y_{ij}^* as the unobserved "propensity" of group i to be in the outcome category j :

$$Y_{ij}^* = X_{ij}'\beta + \varepsilon_{ij} \quad \text{--- (1)}$$

where X_i' is a vector of group characteristics; β is a vector of parameters associated with the j th category, and ε_{ij} is the unobserved component of the i th group's propensity to be in category j . The observed category j for each group is the one that corresponds to the highest underlying propensity. The probability that group i is in the j th outcome category is therefore:

$$\Pr(Y_i = j) = \Pr(Y_i^* > Y_k^*) \text{ for all } i \neq j \quad \text{--- (2)}$$

Table 4 presents the results in terms of the marginal effects of the independent variables on the probabilities associated with each outcome^{XII}. All changes are expressed as percentage points.

Overall the results suggest that the proxies employed in our framework – pertaining to individual credit risk, loan utilization and group dynamics – are effective in demarcating groups in terms of the three outcomes^{XIII}. In interpreting the results as marginal effects, we note that it makes conceptual sense to speak of how the probability of a particular outcome (live, closed or arrears) would change if an additional member within the group were to have the particular characteristic. In order to determine this, we examine the associated change in the probability of the outcome for a 5% increase in the particular characteristic within the group, which corresponds to an additional person with the characteristic in a group of size 20.

Table 4. Multinomial Logit Model: Marginal Effects of Variables in Live, Closed and Arrears Groups

	Live Groups		Closed groups		Arrears groups	
	dy/dx	P>z	dy/dx	P>z	dy/dx	P>z
MEMBER CREDIT RISK						
Age	0.02	0.45	0.00	0.99	-0.02	0.37
Education_Noneto3rd	-0.27	0.53	-0.22	0.56	0.49	0.18
Log HH Income	0.08	0.02	-0.05	0.11	-0.03	0.32
Daily-wage worker	0.34	0.67	0.48	0.57	-0.82	0.28
Member earning	2.42	0.01	-0.45	0.35	-1.97	0.01
Member from village	1.46	0.02	-0.85	0.04	-0.62	0.14
Dwellings score (>3)	0.02	0.94	0.25	0.45	-0.27	0.37
Durables score (>4)	0.88	0.13	0.20	0.63	-1.08	0.03
Own land in village	-1.10	0.03	1.16	0.02	-0.06	0.89
Family support	1.50	0.06	1.50	0.07	-3.00	0.00
Prior SHG member	0.49	0.25	-2.46	0.01	1.97	0.02
Other credit in 2003	-1.48	0.06	0.42	0.46	1.07	0.11
Regular savings	0.51	0.15	-0.47	0.17	-0.05	0.89
Prior loan refusal	-2.61	0.02	1.85	0.01	0.75	0.40
Income shocks	4.97	0.01	-4.28	0.00	-0.69	0.59
LOAN USE						
Loan-economic use	-1.03	0.09	1.14	0.05	-0.11	0.75
Loan – repay debts	1.94	0.22	-1.70	0.22	-0.23	0.84
Loan– home repairs	1.66	0.03	-0.09	0.89	-1.57	0.03
Loan use – all other	-1.62	0.05	1.47	0.05	0.15	0.76
GROUP DYNAMICS						
Peer selected	1.05	0.01	-0.57	0.07	-0.48	0.07
Joining_neighbours	0.05	0.10	0.02	0.43	-0.07	0.07
Religion_HHI	-0.85	0.05	0.15	0.75	0.71	0.17
Caste_HHI	0.29	0.52	-0.45	0.26	0.17	0.60
Occupation_HHI	-0.58	0.56	-0.94	0.38	1.52	0.13
Intra-group lending	0.02	0.96	-1.41	0.04	1.39	0.03

Notes: (i) dy/dx represents the average marginal effect of each variable on the outcome variable of interest; (ii) the z statistic is a measure of how far the coefficient (dy/dx) is from the sample mean; (iii) The p>z value reflects the probability that the effect is purely due to sampling error.

Most of the proxies employed to measure ‘socio-economic status’ have strong associations with the three group outcomes in the directions hypothesized. The variables that have significant associations with a ‘live’ outcome are levels of household income, the number of durables owned, and the earning status and village of origin of members. Specifically, a log point increase in the average household income within a group increases the likelihood of a live outcome by 8 percentage points; an increase in the share of earning members in a group by 5% (or, an additional earning member in a group of size twenty) increases the probability of a live outcome by 0.4 percentage points; similarly, an additional member within a group who is originally from the village raises the likelihood of a live outcome by 7.3 percentage points; and an additional member with more than 4 durables owned leads to a higher probability of a live outcome by 4.4 percentage points.

In contrast, higher average household incomes and a greater share of members from within the village have a significant negative association with group closure. Specifically, a percentage increase in average household incomes in a group decreases the likelihood of closure by 5 percentage points and every additional person in the group who is a native of the village reduces the probability of closure by 4.3 percentage points.

Similarly, most of the proxies of socio-economic status are also found to be significantly associated with an arrears outcome in the direction expected: education, working status of the woman, the village of origin of the member and the number of durables owned. Specifically, for every additional member within a group with low levels of education (ranging from no schooling to 3rd grade levels) the likelihood of an ‘arrears’ outcome increases by 2.5 percentage points. On the other hand, each additional earning member within a group decreases the likelihood of an arrears outcome by 9.9 percentage points. An additional member whose origin is from the village reduces the probability of

arrears by 3.1 percentage points and an additional member with a durables score above 4 reduces the likelihood of arrears by 5.4 percentage points^{XIV}.

The second set of measures at the individual member level, which relates to the financial history of members, also shows significant associations with live, closed and arrears outcomes as expected. A higher incidence of regular savings among members has a significant positive association with live groups and a significant negative association with closed groups (albeit with relatively high standard errors): Specifically with every additional member that saves in a group, the likelihood of a live outcome increases by 2.5 percentage points and that of closure falls by 2.4 percentage points. Further an adverse credit history among members (unsuccessful attempts at prior loans) has a significant negative association with a live outcome and a significant positive association with closure: For each additional person in a group who had been denied a loan in the past, the likelihood of a live outcome falls by 13 percentage points and that of closure rises by 9.3 percentage points.

A higher incidence of prior SHG membership among members is found to have a significant positive association with an arrears outcome and a significant negative association with closure. Specifically, for each additional person who had been a member of another SHG in the past, the likelihood of arrears rises by 4 percentage points and that of closure falls by 12.3 percentage points. While we have no evidence to conclude that members who had moved from a previous MFI into a Madura SHG had defaulted on a prior loan, the present analysis highlights the potential value of information sharing amongst MFIs regarding group membership and repayment history.

The final variable in the set of financial history measures relates to the liquidity constraints of members at the point of taking the Madura loan. We find that groups where a greater number of

members reported that they had “other sources of borrowing” at the baseline period have a significantly lower likelihood of a live outcome and a higher likelihood of an arrears outcome. Specifically with each additional member within a group who has other sources of borrowing, the likelihood of a live outcome falls by 7.4 percentage points and that of group arrears increases by 2.3 percentage points.

The findings with regard to the financial history of borrowers provides an interesting and perhaps counter-intuitive contrast to our earlier findings on socio-economic status: While groups that default are characterized by members with lower incomes, fewer assets, less education and a greater share of non-earning women on average, these groups appear to have been significantly less credit-constrained in the base year. Specifically, a much larger share in these groups reported having access to other sources of credit in the base year if they had needed the money. The lack of credit constraints is particularly surprising given that members of arrears groups appear to fare poorly on financial history, demonstrated by the lack of regular savings and past loan refusals. The implication of a lack of credit constraints is that the threat of sanctions on future loans – or the dynamic incentives of the group lending contract - would matter less to these groups.

The final measure in the category of individual member level credit risk is discussion with the family regarding the decision to join the SHG. We find that the variable has a significant positive association with a live and closed outcome and a significant negative association with an arrears outcome: With every additional member that discusses their decision to join the SHG with the family, the likelihood of a live and closed outcome both increase by 8 percentage points and that of an arrears outcome falls by 15 percentage points.

The variable measuring shocks to income over the period of loan repayment shows a strong positive association with a live outcome and a strong negative association with a closed outcome. Specifically, for every additional person in a group reporting an income shock, the likelihood of a live outcome increases by 25 percentage points and that of a closed outcome falls by 21.4 percentage points. This result is intuitive as it suggests that income shocks might drive the need for a further loan within live groups.

Our second category of variables in the framework pertains to loan utilization. Specifically, we examine whether there are significant associations with particular types of loan use and the likelihood of a live, closed or arrears outcome. In order to do this, the use of loans for consumption is taken as the base category in the model and compared with loan use for all other purposes such as productive economic activities, the repayment of other loans, home renovation (including renovation and repair) and “all other purposes”. For arrears groups, the use of loans for consumption has a higher associated probability than loan use for all other purposes, whereas for live groups, there is a greater likelihood of loan use for home renovation and the repayment of other loans than consumption. Interestingly, for live groups, loan use for economic purposes has a lower probability than the use of loans for consumption. In contrast, for closed groups, the use of loans for economic activities has a greater likelihood than the use of loans for consumption.

Within our third and final category of measures – pertaining to group dynamics - peer selection is found to have an important positive association with a live outcome and a significant negative association with both a closed and arrears outcome. Specifically, for each additional member who is peer-selected within a group, the likelihood of a live outcome increases by 5 percentage points and a closed outcome and arrears outcome falls by 3 and 2 percentage points respectively.

Among the variables that capture social capital within a group, for every additional member who was a ‘neighbour’ of another SHG member at the time of group formation, the likelihood of a live outcome increases by 0.2 percentage points and that of an arrears outcome falls by 0.3 percentage points, suggesting that proximity of members’ residence might enhance peer monitoring and enforcement. Contrary to expectation, however, groups that are more concentrated in terms of the religious affiliation of members are found to be less likely to yield a live outcome and are in fact associated with a higher likelihood of an arrears outcome, albeit at a low level of significance.

Of particular interest is the variable occupational concentration, which is found to have a significant positive association with an arrears outcome and is negatively associated with both live and closed outcomes, although not significantly so. The latter suggests that occupational concentration tends to raise levels of risk – either due to a greater incidence of low and unstable incomes or greater covariance in incomes. Given the lower average incomes in arrears groups and a significantly larger share of agricultural labour in these groups compared to live and closed groups, both are likely explanations. The share of agricultural labour in arrears groups is 23% against 3% in live and 13% in closed groups (see Table 5) and these differences are statistically significant by a t-test.

Finally, internal lending is found to have an adverse effect on repayments as expected: With every additional person in a group that engages in internal lending, the likelihood of arrears increases by 7 percentage points and that of a closed outcome falls by a similar amount (7 percentage points).

Table 5. Summary Statistics for Occupational Variables: Live, Closed and Arrears

Categories of occupation	Live	Closed	Arrears
Agriculture using own land	3.85%	4.85%	3.39%
Agricultural labour	2.88%	12.62%	22.88%
Fishing	0.00%	0.00%	0.00%
Daily wage worker	22.12%	17.48%	32.20%
Government employee	3.85%	2.91%	0.85%
Private sector employee	8.65%	5.83%	7.63%
Employment guarantee scheme	0.00%	0.00%	0.85%
Own business	17.31%	10.68%	7.63%
Unemployed	0.00%	0.00%	0.00%
Retired	0.00%	0.00%	0.00%
Other	41.34%	45.63%	24.57%
Total	100.00%	100.00%	100.00%

The results from the MLM analysis suggest overall that the framework for credit risk is effective in explaining the three group trajectories and that “high risk” (“arrears”) groups in particular are distinguishable fairly easily by these measures.

The characterization of arrears groups suggests a *cumulative disadvantage* occurring at low levels of socio-economic status in terms of ability to repay, incentives for repayment and propensity to enter into a state of over-indebtedness: Apart from low and unstable incomes – derived to a large extent from agricultural and manual labour – lower levels of education and fewer assets owned among members in these groups, the women also appear to have poor financial habits in terms of a lack of regular savings. Lower economic status also appears to be accompanied by a greater likelihood of family problems – evidenced by the lack of discussion with the family prior to taking the loan^{xv} – and weaker social capital within the groups – borne out by the lack of peer selection and fewer ‘neighbours’ within the group. In the latter regard, it is likely that the immediate need for liquidity was the overriding motivation for members to join, without due diligence in judging the repayment capacity of their peers.

The lack of peer selection and family discussion prior to taking the loan also points to a potentially myopic approach to borrowing, further supported by the evidence regarding a history of loan refusals. Simultaneously the lack of credit constraints appears particularly pronounced for this category of groups, indicating a counter-incentive to repayment since credit is easily available and the threat of sanctions to further loans from the MFI carries little value. Further, the lack of credit constraints implies that members in these groups are more likely to enter into a state of over-indebtedness due to borrowing from multiple sources, which would worsen their chances of prompt repayment. While we do not have information on pre-existing debt levels at the point of taking the loan, we see that a greater number in arrears groups borrowed further from other sources during the term of repayment of their Madura loan. The average incidence of further borrowings between 2003 and 2008 in arrears groups is 24%; closed groups 18% and live groups 14%.

For arrears groups, the likelihood of loan use for consumption is higher than for all other purposes, besides the 'other' category. Insofar as loans are used for consumption and repayment derives solely from household income and savings, the socio-economic status and financial history of members suggests weak chances. At the group level, the occupational concentration of agricultural and daily-wage labour appears to further exert a countervailing influence on repayment – either due to the concentration of low and unstable incomes within the group or due to covariant incomes. Given that we find the largest concentration of agricultural labour in arrears groups (Table 5), covariant income is a plausible explanation.

We further note that the use of loans for economically productive activities appears lower in arrears groups (42.7%) relative to live (61.2%) and closed groups (65.9%), and the differences are significant by a t-test (see Table 6).

Table 6. Group-Wise Summary Statistics for Economic Activity/Business Indicators

Variables	Live		Closed		Arrears	
	Mean	SD	Mean	SD	Mean	SD
Loan use for a productive activity (share)	0.62	0.34	0.67	0.31	0.44	0.36
Provided details about business (share)	0.27	0.28	0.25	0.27	0.19	0.26
Was a further amount borrowed for the business? (share)	0.07	0.21	0.02	0.08	0.01	0.05
Number employed in the business full-time at start	2.52	3.26	1.22	0.34	1.93	2.37
Number employed in the business part-time at start	1.92	2.78	1.39	0.70	0.96	0.50
Use of family-assistance in running the business (share)	0.28	0.40	0.30	0.37	0.25	0.29
Does the business exist today? (share)	0.76	0.22	0.44	0.33	0.46	0.32
<i>If the business still exists:</i>						
Were there profits last year? (share)	0.91	0.17	0.98	0.05	0.76	0.34
Do you face cash shortages in the business? (share)	0.47	0.44	0.64	0.45	0.45	0.44
Are your earnings sufficient to meet business expenses? (share)	0.71	0.33	0.51	0.32	0.43	0.40
<i>After meeting business expenses, is there enough to repay loans? (share)</i>	<i>0.62</i>	<i>0.34</i>	<i>0.39</i>	<i>0.39</i>	<i>0.37</i>	<i>0.41</i>

Moreover, while 40% of members in arrears groups on average reported using the loan for an existing or new economic activity, only 19% were able to provide further details of the activity for which the loan was used. Of the 19%, 54% reported that their business was no longer in existence at the end of the loan repayment period^{XVI}. Of those with surviving businesses, however, 76% reported having made a profit in the previous year. A closer look at the nature of these businesses reveals that most are two-person enterprises (the average number of full-time workers is 1.93 and part-time 0.93), and virtually no further funds had been secured for the business subsequent to the Madura loan. In contrast, the performance in live groups is clearly superior: While 62% in live groups reported using the loan for an economic activity, 27% were able to provide details. Based on the responses of those who provided details, the survival rate of enterprises is found to be 76%,

with 91% of the surviving businesses reporting a profit in the previous year. Businesses in this category are slightly larger – with 2.52 full-time and 1.92 part-time employees on average - and 7% had made further investments over the term of the Madura loan. The differences in means of the business data between live and arrears groups are statistically different in terms of the aggregate loan use for economic activities, survival rates of businesses and the number of firms reporting profits.

The break-down of the various types of economic activities or businesses towards which the loans were used is presented in Table 7. As can be seen, the use of loans for agriculture is relatively low within the arrears groups despite the high occupational concentration of agricultural labourers in this category. The types of economic activities for which loans are used in this category are largely to set up small shops (30%) and to start a milk-retail business (22%).

In contrast, agriculture forms the largest share of loan use among the various types of economic activities in live groups (26%), despite a much smaller share in these groups that has agriculture as the primary household occupation - 7% versus 32% in arrears groups in the categories of agriculture with own land and agricultural labour combined (see Table 7). This might be explained by the differing size of land holdings in the village between the two categories on average – 3 acres in live groups versus 1.8 acres in arrears groups. Agriculturalists in live groups are therefore more likely to utilize the credit for investment in better seeds or other farm inputs and implements given that they have the benefit of scale economies.

Table 7: Breakdown of Business Activities by Type (Loan Use)

Economic Activities	Live		Closed		Arrears	
	Number	Share	Number	Share	Number	Share
Shop	28	0.22	29	0.29	42	0.30
Trading	7	0.05	9	0.09	2	0.01
Agriculture	34	0.26	1	0.01	10	0.07
Milk	26	0.20	15	0.15	40	0.29
Livestock	5	0.04	5	0.05	3	0.02
Food	9	0.07	18	0.18	17	0.12
Textile	11	0.09	19	0.19	15	0.11
Handicrafts	0	0.00	0	0.00	1	0.01
Transport	0	0.00	0	0.00	0	0.00
Miscellaneous	9	0.07	5	0.05	8	0.06
Total	129	1.00	101	1.00	138	1.00

Note: This table shows the number and share in each category against each type of business.

While the above analytical framework for credit risk is able to distinguish the three categories of outcomes effectively, it includes two variables – ‘income shocks’ and ‘intra-group lending’ - that do not correspond to the baseline period. In order to build a model that can “predict” outcomes with baseline data alone, we would need to re-run the model without these two variables, as a second iteration.

A further shortcoming of the analysis is that loan use data are based on self-reported information provided by borrowers at the point of taking the loan and no subsequent verification was done to check whether loans were in fact applied toward the stated use. Given that Madura, like many other SHG initiatives, encourages loan use for entrepreneurial activities, it is possible that borrowers stated this as their intended use in order to please the company. Borrowers might have also used the loans for purposes other than those originally intended. For these reasons, the loan use data is potentially noisy. As a third iteration, we therefore re-run the model by further dropping the loan use variables and check whether the results vary significantly.

Tables A1, A2 and A3 in the appendix compare the results from the three iterations, for live, closed and arrears groups, respectively. The results for live and closed groups, under each of the iterations, produce broadly similar results. However, the consistency in results is particularly striking for the arrears category across the three scenarios, suggesting that the framework is as effective in predicting default, even with the reduced set of variables.

In terms of predictive power, we find that in the first iteration, the model overall “predicts” outcomes correctly in nearly 90% (89.4%) of cases (See Table 8). Category-wise, predictions are correct for 84.6% of live groups, 90.5% of closed groups and 92.1% of arrears groups. However, as noted, the model cannot claim to “predict” outcomes but rather only explains them. In the second iterations, with two variables removed, the overall predictive power of the model falls to 78.8%. Category-wise, predictions are correct for 80.8% of live groups, 61.9% of closed groups and 86.8% of arrears groups. Clearly, the loss in predictive power is the greatest for the closed group. In the third scenario, where loan use variables are also removed, the model’s predictive power falls only slightly further to 76.5%, with outcomes correctly predicted for 80.8% of live groups, 47.6% of closed groups and 89.5% of arrears groups. Once again, the predictive power falls to the greatest extent for closed groups and to the least extent for arrears groups.

Table 8. Number & Percentage of Correctly Predicted Group Outcomes under Three Scenarios

Categories	Scenario 1		Scenario 2		Scenario 3	
Live (26)	22	84.6%	21	80.8%	21	80.8%
Closed (21)	19	90.5%	13	61.9%	10	47.6%
Arrears (38)	35	92.1%	33	86.8%	34	89.5%
Total groups (85)	76	89.4%	67	78.8%	65	76.5%

Note: Scenario 1 is the comprehensive model with all explanatory variables included; Scenario 2 excludes ‘income shocks’ and ‘intra-group lending’; Scenario 3 further excludes all loan use variables.

The high and consistent results in prediction for the arrears category (nearly 90%) is very encouraging as MFIs are likely to be most concerned about default, followed by attrition. The fact that the predictive power for closed groups suffers the most in the second and third iterations should not be surprising given that the variables that were successively removed were highly significant in explaining closure in the prior iterations. Specifically, income shocks and intra-group lending were highly significant in explaining closure in the first iteration, and loan use variables – particularly for entrepreneurial and “other” purposes (a miscellaneous category) – were significant in explaining closure in both prior iterations.

The next section summarizes the findings, with a discussion of the practical applications of the study.

7. Summary of Findings and Practical Implications

The present study develops a conceptual framework for the analysis of credit risk in group lending based on the existing theoretical and empirical literature in the field. Specifically, three major sources of credit risk are defined pertaining to individual socio-economic status, loan utilization and group dynamics. The model is applied to a cohort of 85 SHGs that received loans in 2003 to empirically examine the efficacy of the proxies employed in predicting repayment and attrition. The purpose is to be able to predict group outcomes at the end of the term of the loan (in 2008) in three categories: ‘live’ (groups that were able to repay their loan and chose to take a further loan); ‘closed’ (groups that were able to repay their loan and chose not to take a further loan); and ‘arrears’ (groups that had an outstanding amount to settle as on the due date).

Overall the framework and proxies employed provide an effective way to predict the three outcomes. Default in particular is correctly predicted 9 out of 10 times, even with a reduced set of variables that excludes loan use, suggesting that there is considerable scope for MFIs to effectively assess credit risk, despite rural areas being information-constrained environments. An effective means to appraise borrower repayment capacity is a fundamental requirement for the sustainable delivery of credit by MFIs. The use of standardized frameworks to collect information on borrowers would also facilitate easier sharing of information between MFIs in the context of recent moves toward industry self-regulation in India.

Through better screening procedures, the extent of information asymmetry and adverse selection of borrower groups by MFIs would also be reduced. The latter raises the cost of borrowing for all groups, including those that are better able and inclined to repay, and ultimately produces the inefficient outcome of sub-optimal levels of investment and output in the rural economy. Through effective credit risk assessments, the cost of credit can be better aligned with ability to repay, with well-performing groups being able to access credit at progressively more attractive terms.

The results of the present study are timely as the microcredit sector in India came under severe scrutiny in the year 2010 after a crisis unfolded in the southern state of Andhra Pradesh, on account of allegedly irresponsible lending practices by MFIs. Specifically, the debates in policy and media circles can be summed up in the following five inter-related themes:

- (i) Market saturation – Are there too many lenders competing for clients in the same region?
- (ii) Organizational sustainability - Is increasing competition leading to multiple borrowing by clients and poor repayments, with implications for the sustainability of MFIs?

- (iii) Consequences to the borrower – Is there rising over indebtedness among rural borrowers due to borrowing from multiple MFIs?
- (iv) Sector regulation - Should mechanisms be put in place that prevent over-lending, such as credit bureaus for information sharing between MFIs on levels of debt among borrowers and repayment history? Should there be caps on interest rates charged by MFIs?
- (v) Economy-wide implications – Is lending to poor borrowers in excess of their repayment capacity likely to have adverse impacts in the wider economy given the large infusions of capital into the sector both from within the country and abroad?

Andhra Pradesh accounts for more than one-third of all microcredit borrowing in the country. Lenders in the state were accused of using aggressive strategies for client acquisition in the face of intense competition, charging high interest rates and using coercive means to enforce repayments. Several media reports asserted that MFIs had advanced loans not in keeping with the repayment capacity of clients and without checks on pre-existing debt levels, leading to over-indebtedness and, at the extreme, debt-related suicides. This resulted in political and activist intervention to protect borrowers, which in turn led to mass defaults and a drying up of bank lending to MFIs in the state.

A newspaper report authored by several academic economists noted, however, that several of the claims have not been systematically investigated and that the negative publicity could seriously harm an industry with much positive potential: “In 2007, there were about 8 million borrowers and around Rs 40 billion in microcredit in the country. Today there are over 25 million borrowers and around Rs 225 billion. This expansion has been accompanied by anecdotal evidence of over-indebtedness of clients due to careless lending practices, largely rooted in the inability of MFIs to verify clients’ amount of outstanding debt with other institutions. There have been rumours of debt-

related suicide, though no systematic investigation into the claims” (Banerjee et al., November 2010).

The present study sheds some empirical light on the debates, albeit within the context of a single MFI in a particular state. With regard to the implications of the rising number of MFIs for repayments, we find that prior SHG membership is associated with a greater likelihood of subsequent arrears. However, the incidence of prior membership in the base year – 2003 - was relatively low: 3% for arrears groups, 1% for closed groups and 4% for live groups. The incidence of membership of other SHGs at the end of the term of the loan, in 2008, appears higher (Table 9). The highest share is found in closed groups – 10% - followed by arrears groups (6%) and live groups (1%). While membership of other SHGs in the closed groups is not as much a concern given that these groups had repaid their Madura loan in 2008, the incidence of membership of other SHGs in arrears groups signals the need for information sharing between MFIs.

Table 9. Other Sources of Borrowing over the Term of the Madura Loan

Source of Borrowing	Closed	Live	Arrears
Cooperative Bank	0.02	0.00	0.02
Other SHG	0.00	0.01	0.01
Relatives/friends	0.04	0.02	0.04
Village money lender	0.07	0.07	0.05
Pawn shop	0.01	0.00	0.00
Other source	0.01	0.01	0.00
Membership of other SHG as on 2008	0.01	0.10	0.07

Note: This table shows the average share in each category who had taken a loan from each source.

The analysis in the present study also finds that the absence of credit constraints among borrowers is associated with an ‘arrears’ outcome, and therefore poses a greater risk to MFIs. Given the lack of credit constraints for members in these groups, it is not surprising that the largest incidence of subsequent borrowing over the term of the Madura loan occurs in arrears groups, suggesting a

greater propensity to enter into a state of over-indebtedness. However, we find that such borrowing occurs largely through the village money lender and from friends and relatives rather than through other MFIs (Table 9), with the caveat that there is likely to be under-reporting of borrowing from other MFIs over the term of the Madura loan as this is prohibited as per Madura rules. On the basis of this data, however, we cannot conclude that debt levels among borrowers are largely attributable to the MFI sector.

It is also worth mentioning in this regard that the use of loans for repaying other debts is not associated with poor repayment by MFIs. This is consistent with the findings of a previous study that has shown, using a dataset of clients from seven Indian MFIs, that multiple borrowing is associated with equal or better repayment than single borrowing (Krishnaswamy, 2007). Instead, our study suggests that the use of loans for consumption appears to be associated with a greater likelihood of an arrears outcome.

Overall therefore our findings suggest that there is a case for information sharing between MFIs, particularly regarding repayment history of borrowers. Levels of borrower debt, however, appear to exist regardless of the MFI sector and are likely have deep roots in the traditional village money lending systems. Insofar as loans from MFIs would allow members to repay their existing debts, the MFI sector might be able to help release them from debt burdens at high rates of interest.

Those of a very low economic status who use the loans for consumption smoothing, however, appear at risk of an arrears outcome. As long as there is no information sharing between lenders, these borrowers might be able to obtain loans from successive MFIs and persist with non-repayment. However, once these sources have been exhausted they are likely to drop out of the MFI

sector and rely on traditional sources of credit once again. It might be reasonable to conjecture that the volume of credit extended to these borrowers by the MFI sector is not sufficient for them to meet consumption requirements and find productive avenues for investment, given their very low socio-economic status. However, given their poor financial habits, weak business performance and disincentives for repayment, more credit might not lead to improved outcomes and is also unlikely to be financially viable for lenders. This suggests that measures beyond credit that aim to build human capital (through basic education and skills training that improve employability in sectors beyond manual and agricultural labour), augment incomes, and inculcate financial discipline are essential for poverty alleviation in the long run, particularly for those of the lowest socio-economic status. In the short run, however, it is possible that microcredit, albeit with poor repayment rates in this segment, has a welfare-enhancing impact.

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Endnotes

^I In December 2011, the RBI explicitly created a separate category of NBFCs known as NBFC-MFIs defined as follows: An NBFC-MFI is a non-deposit taking NBFC having not less than 85% of its assets in the nature of qualifying assets which satisfy the following criteria: (a) loan disbursed by an NBFC-MFI to a borrower with a rural household annual income not exceeding Rs. 60,000 or urban and semi-urban household income not exceeding Rs. 1,20,000; (b) loan amount does not exceed Rs. 35,000 in the first cycle and Rs. 50,000 in subsequent cycles; (c) total indebtedness of the borrower does not exceed Rs. 50,000; (d) tenure of the loan not to be less than 24 months for loan amount in excess of Rs. 15,000 with prepayment without penalty; (e) loan to be extended without collateral; (f) aggregate amount of loans, given for income generation, is not less than 75 per cent of the total loans given by the MFIs; (g) loan is repayable on weekly, fortnightly or monthly instalments at the choice of the borrower. Source: RBI circular titled “Introduction of New Category of NBFCs - ‘Non-Banking Financial Company-Micro Finance Institutions’ (NBFC-MFIs) – Directions”.

^{II} Specifically, two *contiguous* districts were purposively sampled, with a view to maximizing the “similarity” of population characteristics within the zone and maximizing inter-zonal differences.

^{III} The zones are ‘Chennai’ (North), ‘Coastal’ (East), ‘Coimbatore’ (West), and ‘Madurai’ (Centre and South). (Please note: Madurai and Coimbatore are the names of two districts in the state of Tamil Nadu and also the names given to two of the geographical ‘zones’ of the state in the Tamil Nadu Human Development Report (2003)).

^{IV} The largest zone is ‘Madurai’, which covers the central and southern parts of the state.

^V Specifically, the coastal district of Kanyakumari had to be dropped since most members were untraceable following the 2004 Indian Ocean Tsunami, and there was a further shortfall in two other districts.

^{VI} The principal amount and interest owed in a group loan is typically divided by the number of weeks until the end of the term of the loan and repayments are scheduled at regular intervals (such as weekly, bi-monthly, etc), to begin soon after loan disbursement.

^{VII} A rare example is Gadenne and Vasudevan (2007) who examine loan use patterns in “mature SHGs” (at least five years old or more) in the southern states of Karnataka and Tamil Nadu in India and find that 60% of all loan money is used economic activities, followed by 16% for consumption. The authors note, however, these results cannot be assumed to reflect loan use patterns of all SHGs given the specific age and location of the SHGs and the fact that the groups were promoted by two high quality NGOs.

^{VIII} For an updated list of the various activities and current targets of priority sector lending, see: <http://www.rbi.org.in/scripts/FAQView.aspx?Id=8>

^{IX} We have omitted the ‘ownership of dwellings’ variable as an indicator of standard of living as qualitative interviews indicated that households often move to rented accommodation of a better standard at higher levels of income. The correlation matrix of dwellings attributes provides some evidence in support of this, since owned dwellings are associated with poorer quality of roofing, flooring, and a lack of toilet facilities. Therefore home ownership cannot be interpreted as a sign of greater wealth as might be assumed in an urban scenario.

^X Therefore an agent can be credit constrained both due to supply-side factors that result in an inability to access credit (lack of credit granting institutions or unwillingness on the part of institutions to lend) and demand-side factors that lead to unwillingness to access credit (such as risk aversion and the high transaction costs in obtaining credit).

^{XI} Quisumbing and Boucher (2006) note that those with ‘credit constraints’ include those who are unable to borrow entirely and those who are unable to borrow as much as they need. Therefore, our definition of those who are unconstrained could, in principle, include those who faced partial constraints.

^{XII} Marginal effects are calculated using STATA 11 and represent the ‘average marginal effect’ of each independent variable, which is the average of the marginal effect of the variable, calculated at every observation in the sample.

^{XIII} We could consider defining group trajectories in terms of two outcomes rather than three, based on a single dimension: repayment. That is, we would need to combine live and closed groups into a single category (as both repaid) and compare with the arrears groups. To check whether pooling live and closed groups is possible, we use the Cramer-Ridder test, which examines whether the coefficients across the various categories in an MLM analysis are significantly different from one another (Cramer and Ridder, 1991). We find by the test that all three categories are significantly different from one another, suggesting that a multinomial analysis in terms of three outcomes is necessary.

^{XIV} Perhaps the only variable in this category that produces a counter-intuitive result is the average incidence of ‘land ownership’ within a group, where the presence of a larger number of land owners on average has a negative association with a live outcome and a positive association with group closure. Specifically, with every additional member within a group who owns land the likelihood of a live outcome falls by 6 percentage points and the likelihood of closure increases by a similar amount (6 percentage points). An inspection of the acreage data reveals, however, that while the average incidence of land ownership within groups is in fact the highest in the arrears category (24%) compared to closed groups

(17%) and live groups (15%), the average size of landholdings is significantly higher in live groups (3 acres) compared to closed and arrears groups (approximately 1.8 acres each). Therefore a binary measure of ownership without taking into account the size of holdings could produce misleading inferences at first sight.

^{xv} Qualitative discussions, particularly in arrears groups, showed for instance that several women had husbands who were alcoholics and this appeared to hinder the woman's ability to successfully control her finances and repay the loan.

^{xvi} In interpreting these figures, it is necessary to bear in mind that there is a likelihood of over-reporting of the usage of loans for economic activities (which would also explain the inability to provide details among a large share of members who report the use of loans for economic activities), given the emphasis by Madura and several other SHG initiatives on the use of loans for productive activities. At the same time, members might also plead that their businesses had failed in order to justify non repayment and the estimates on closures could also suffer from a similar upward bias. Nevertheless, on the basis of the self-reported estimates, it appears that the use of loans for economic activities lies anywhere between 19% and 40% in these groups and based on the conservative estimate – 19% - nearly half the businesses are reported to have failed or been abandoned.

APPENDIX

Table A1. A Comparison of Results (Marginal Effects of Variables) for Live Groups under Three Scenarios

VARIABLES	Scenario 1		Scenario 2		Scenario 3	
	dy/dx	P>z	dy/dx	P>z	dy/dx	P>z
MEMBER CREDIT RISK						
Age	0.02	0.45	0.00	0.96	0.00	0.80
Education_Noneto3rd	-0.27	0.53	-0.27	0.40	-0.36	0.18
Log HH Income	0.08	0.02	0.01	0.51	0.00	0.97
Daily-wage worker	0.34	0.67	0.02	0.96	-0.26	0.50
Member earning	2.42	0.01	0.89	0.02	0.64	0.01
Member from village	1.46	0.02	0.63	0.03	0.41	0.07
Dwellings score (>3)	0.02	0.94	0.51	0.12	0.39	0.14
Durables score (>4)	0.88	0.13	0.18	0.53	-0.04	0.83
Own land in village	-1.1	0.03	0.41	0.13	0.38	0.09
Family support	1.5	0.06	0.82	0.05	0.54	0.06
Prior SHG member	0.49	0.25	0.46	0.65	0.21	0.77
Other credit in 2003	-1.48	0.06	-0.36	0.43	-0.19	0.59
Regular savings	0.51	0.15	0.33	0.19	0.33	0.11
Prior loan refusal	-2.61	0.02	-0.73	0.22	-0.32	0.46
Income shocks	4.97	0.01				
LOAN USE						
Loan-economic use	-1.03	0.09	-0.27	0.52		
Loan – repay debts	1.94	0.22	0.13	0.89		
Loan– home repairs	1.66	0.03	0.48	0.44		
Loan use – all other	-1.62	0.05	-0.38	0.43		
GROUP DYNAMICS						
Peer selected	1.05	0.01	0.30	0.07	0.27	0.08
Joining_neighbours	0.05	0.1	0.02	0.25	0.03	0.14
Religion_HHI	-0.85	0.05	-0.02	0.95	0.15	0.62
Caste_HHI	0.29	0.52	-0.07	0.80	-0.12	0.66
Occupation_HHI	-0.58	0.56	-0.11	0.84	0.25	0.61
Intra-group lending	0.02	0.96				

Table A2. A Comparison of Results (Marginal Effects of Variables) for Closed Groups under Three Scenarios

VARIABLES	Scenario 1		Scenario 2		Scenario 3	
	dy/dx	P>z	dy/dx	P>z	dy/dx	P>z
MEMBER CREDIT RISK						
Age	0	0.99	0.00	0.97	0.01	0.68
Education_Noneto3rd	-0.22	0.56	-0.02	0.95	-0.04	0.88
Log HH Income	-0.05	0.11	0.00	0.84	0.02	0.31
Daily-wage worker	0.48	0.57	0.21	0.72	0.30	0.57
Member earning	-0.45	0.35	-0.16	0.63	0.14	0.59
Member from village	-0.85	0.04	-0.34	0.29	-0.16	0.55
Dwellings score (>3)	0.25	0.45	-0.30	0.32	-0.26	0.32
Durables score (>4)	0.2	0.63	0.30	0.29	0.49	0.04
Own land in village	1.16	0.02	-0.18	0.55	-0.06	0.83
Family support	1.5	0.07	-0.02	0.96	0.24	0.45
Prior SHG member	-2.46	0.01	-1.93	0.32	-1.61	0.24
Other credit in 2003	0.42	0.46	-0.20	0.67	-0.38	0.27
Regular savings	-0.47	0.17	-0.29	0.26	-0.30	0.17
Prior loan refusal	1.85	0.01	0.80	0.15	0.20	0.69
Income shocks	-4.28	0				
LOAN USE						
Loan-economic use	1.14	0.05	0.60	0.15		
Loan – repay debts	-1.7	0.22	0.10	0.93		
Loan– home repairs	-0.09	0.89	0.33	0.64		
Loan use – all other	1.47	0.05	0.55	0.25		
GROUP DYNAMICS						
Peer selected	-0.57	0.07	-0.14	0.41	-0.08	0.59
Joining_neighbours	0.02	0.43	0.01	0.66	0.01	0.63
Religion_HHI	0.15	0.75	0.03	0.92	-0.07	0.83
Caste_HHI	-0.45	0.26	-0.12	0.68	-0.10	0.72
Occupation_HHI	-0.94	0.38	-0.53	0.46	-0.66	0.30
Intra-group lending	-1.41	0.04				

Table A3. A Comparison of Results (Marginal Effects of Variables) for Arrears Groups under Three Scenarios

VARIABLES	Scenario 1		Scenario 2		Scenario 3	
	dy/dx	P>z	dy/dx	P>z	dy/dx	P>z
MEMBER CREDIT RISK						
Age	-0.02	0.37	0.00	1.00	-0.01	0.40
Education_Noneto3rd	0.49	0.18	0.29	0.30	0.41	0.11
Log HH Income	-0.03	0.32	-0.01	0.65	-0.02	0.24
Daily-wage worker	-0.82	0.28	-0.23	0.58	-0.03	0.95
Member earning	-1.97	0.01	-0.73	0.01	-0.78	0.00
Member from village	-0.62	0.14	-0.29	0.25	-0.25	0.27
Dwellings score (>3)	-0.27	0.37	-0.20	0.36	-0.13	0.54
Durables score (>4)	-1.08	0.03	-0.48	0.04	-0.44	0.02
Own land in village	-0.06	0.89	-0.23	0.41	-0.32	0.20
Family support	-3	0	-0.80	0.01	-0.78	0.01
Prior SHG member	1.97	0.02	1.47	0.15	1.39	0.08
Other credit in 2003	1.07	0.11	0.56	0.14	0.57	0.06
Regular savings	-0.05	0.89	-0.05	0.84	-0.04	0.85
Prior loan refusal	0.75	0.4	-0.08	0.89	0.12	0.81
Income shocks	-0.69	0.59				
LOAN USE						
Loan-economic use	-0.11	0.75	-0.33	0.23		
Loan – repay debts	-0.23	0.84	-0.23	0.79		
Loan– home repairs	-1.57	0.03	-0.81	0.13		
Loan use – all other	0.15	0.76	-0.18	0.61		
GROUP DYNAMICS						
Peer selected	-0.48	0.07	-0.16	0.27	-0.19	0.19
Joining_neighbours	-0.07	0.07	-0.03	0.10	-0.04	0.07
Religion_HHI	0.71	0.17	-0.01	0.96	-0.08	0.79
Caste_HHI	0.17	0.6	0.20	0.40	0.22	0.33
Occupation_HHI	1.52	0.13	0.64	0.22	0.42	0.51
Intra-group lending	1.39	0.03				