Determinants of Moral hazard in Microfinance: Empirical Evidence from Joint Liability Lending Schemes in Malawi

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Abstract

Moral hazard is widely reported as a problem in credit and insurance markets, mainly arising from information asymmetry. Although theorists have attempted to explain the success of Joint Liability Lending (JLL) schemes in mitigating moral hazard, empirical studies are rare. This paper investigates the determinants of moral hazard among JLL schemes from Malawi, using group level data from 99 farm and non-farm credit groups. Results reveal that peer selection, peer monitoring, peer pressure, dynamic incentives and variables capturing the extent of matching problems explain most of the variation in the incidence of moral hazard among credit groups. The implications are that Joint Liability Lending institutions will continue to rely on social cohesion and dynamic incentives as a means to enhancing their performance which has a direct implication on their outreach, impact and sustainability.

Key words: moral hazard, joint liability, dynamic incentives, group lending, Malawi

1.0 Introduction

Imperfect information causes at least four problems in credit markets, namely, adverse selection, moral hazard, lack of insurance and lack of enforcement. It is now common knowledge that, moral hazard, coupled with the lack of collateral by the poor is the key reason why credit markets fail for them. The problem of moral hazard may arise when individuals engage in risk sharing under conditions such that their privately taken actions affect the probability distribution of the outcome. It occurs in a principal-agent relationship when actions taken by an agent are not pareto-optimal.

Joint Liability Lending (JLL) is celebrated as a contractual innovation that has achieved the apparent miracle of enabling previously marginalized borrowers to lift themselves up by their own bootstraps by creating ´social collateral' to replace the missing physical collateral

that excluded them from access to more traditional forms of finance (Conning 2000). Nevertheless, the problem with joint liability lending programs is that the poor are given access to credit without collateral, and in the event of default, they can not be punished beyond a mere denial of future access to credit. This form of *limited liability* can induce borrowers to take risky decisions.

Among the most notable theories of moral hazard are models by Stiglitz (1990) and Ghatak and Guinane (1999). Stiglitz shows how peer monitoring under joint liability lending can be used to mitigate moral hazard. Through JLL, it is assumed that group members, who are jointly liable to the loan, will be induced to monitor each other's investment decisions and effort, thereby, reducing the cost of monitoring by the lending institution and consequently mitigating moral hazard. Thus, borrowers are given tasks of both managing their loan, and monitoring peers to ensure that they take safe decisions that would protect them from falling into repayment problems. However, in reality, monitoring can be costly and thus the assumption made by Stiglitz can not hold.

As a diversion from a model by Stiglitz, Ghatak and Guinane (1999), propose a modification on the assumptions of costless monitoring, by showing that peer monitoring is costly. Further, they show the condition under which optimal contracts can still be achieved taking into account the cost of monitoring. They also add that a borrower's willingness to repay the loan will depend on how they value the access to further loans from the same institution. Ghatak and Guinane observe that if a borrower's project yields enough output so that he/she is able to repay the loan, he/she will do it only if the benefit of defaulting, the interest, is less than the (discounted) net benefit of continued access to credit. This raises the question: `to what extent does the value of future access to credit reduce the incidence of moral hazard? Following the proposed theories of moral hazard, only a limited number of empirical studies have been conducted to test their validity.

In Malawi Moral hazard is common occurrence among credit groups. Diagne et al (2000) note that peer monitoring rarely occurs in credit groups from Malawi and that when it occurs it does not lead to improvements in repayment because the main reason for default in the Malawi Rural Finance Company (MRFC) credit groups is the unwillingness to repay (moral hazard) and not the inability to repay. The unwillingness to repay was found to be the first cause of default among the MRFC credit groups. It accounted for 25 percent of all defaults in MRFC credit groups. However, no study has been conducted in Malawi to assess the driving forces behind such high incidences of moral hazard. Thus, the objective of this paper is to examine the extent to which moral hazard occurs in credit groups and analyse determinants of the likelihood of its occurrence. It is an attempt to contribute to moral hazard literature by testing the extent to which peer selection, peer monitoring, social ties, peer pressure, dynamic incentives and matching problems influence the incidence of moral hazard. We adopt a theoretical framework proposed by Ghatak and Guinane(1999) with some extensions proposed by Diagne (1998) and Paxton (1996). We use data from Malawi, collected by the International Food Policy Research Institute (IFPRI) in 2000. The data comes from 99 credit groups, all of which are beneficiaries of the Malawi Rural Finance Company's (MRFC) farm and non-farm loans. In section 2 we present a brief review of literature. The theoretical and empirical framework is presented in section 3. In section 4 we present and discuss results, while section 5 concludes.

2.0 Moral hazard in group based credit: a review of related research

A very limited number of empirical studies have been conducted on determinants of moral hazard in JLL schemes. Among the few attempts are studies by Wydick (1999) and Hermes et al (2005). Wydick assesses the incidence of moral hazard among credit groups in Guatemala and provides evidence that joint liability works because of social cohesion and better information flow. Nevertheless, the study fails to assess the extent to which other key

variables of group dynamics such as, dynamic incentives, sanctions and matching problems influence the incidence of moral hazard. Hermes et al (2005) study the incidence of moral hazard among credit groups from Eritrea and observe that social ties and peer monitoring are key factors influencing the likelihood of moral hazard among borrowers.

The role of peer selection in mitigating adverse selection and hence moral hazard is discussed by Ghatak (1999). Ghatak argues that despite information asymmetry, joint liability lending allows for pareto superior equilibrium in credit markets if group formation is conducted appropriately. Ghatak shows how groups formed through self selection will result into members with homogenous quality. Ghatak shows that through the assortative matching process, groups end up with less risk borrowers, directly reducing moral hazard, which leads to a lower equilibrium interest rate leading to a Pareto-superior outcome relative to individual lending.

The significance of peer monitoring in improving repayments in group credit is highlighted by a number of authors. Stiglitz (1990), for example, observes that the major problem facing MFIs is ensuring that borrowers exercise prudence in the use of the funds so that the likelihood of repayments is enhanced. Stiglitz notes that a partial solution to this problem is peer monitoring: giving neighbours or group members the responsibility to monitor each other. The incentive for peer monitoring comes from the fact that peers are supposed to pay loans for any defaulting group members. Studying the incentive rationale for the use of group lending as a method of financing liquidity-constrained entrepreneurs, Che (2002) observes that the joint liability lowers the liquidity risk of default but creates a free-riding problem. Che points out that in the static setting, the free-riding problem dominates the liquidity risk effect, thus making group lending unattractive. However, when the projects are repeated over time, the joint liability feature provides the group members with a credible

means of exercising peer monitoring and sanctioning, which can make the group lending attractive, relative to individual lending.

In contrast to the emphasis on peer monitoring, Fuglesgang et al., (1993) argue that the monitoring by lending institutions is all that matters most when it comes to improving repayment rates. They observe that even micro lenders that are famous for the joint liability methodology such as the Grameen of Bangladesh do in fact also rely heavily upon highly motivated and locally recruited loan staff officers as monitors and organizers. Following this observation, Conning (2000) questions whether such delegated monitors might not be just as good at monitoring, and perhaps better at enforcing loan repayment than peer monitors, in which case joint liability clauses my be superfluous or may be serving other purposes.

The role of peer pressure is discussed by Diagne (1998). Diagne proposes a peer pressure model in which borrowers are incompletely informed about their partners willingness to apply or tolerate social sanctions and shows how peer pressure can be used to mitigate default in situations where potential defaulters are intolerant of sanctions. An extension of the model by Diagne (1998) and Paxton (1996) further proposes the importance of dynamic incentives and incentive match in inducing safe behaviour among borrowers.

The role of sanctions in enhancing the willingness of individuals to repay their loans is also discussed in Besley and Coate (1995). They show how moderately successful group members may wilfully decide not to repay their loans because of the burden of having to repay the unsuccessful members´ loan. They note however, that in the presence of strong social ties among group members, wilful default is minimized because potential defaulters are afraid of facing sanctions from both the bank and the community. Ahlin and Townsend (2003) further attempt to modify existing models on repayment and moral hazard by testing some unexamined dimensions of the models. One such test is the introduction of productivity differences across groups. Based on the assumption that the production function can be

decomposed multiplicatively into a piece related to the risk factor and a piece related to productive inputs, such as loaned capital and human capital, they assign the derivative of the utility difference with respect to human capital. In their empirical analysis they find that productivity represented by the average level of education positively influences repayment. However the average land holding size (another productivity variable considered in the model) had no impact on repayment performance. In the next section we present a theoretical framework on moral hazard and its extensions.

3.0 Theoretical and empirical framework

Following Salanie (2000), the standard moral hazard model assumes that the principal cannot directly observe the effort level of the agent. Once a contract has been signed the agent must choose between n possible actions $a_i,.....,a_n$ .These actions produce one among m outcomes which we may denote $x_1,.....,x_m$. Assume further that when the agent chooses action a_i, the Principal observes the outcome x_j with a probability p_{ij} that is positive. The agent receives a wage w_j when the Principal observes the outcome x_j. The income for the principal is $(x_j - w_j)$. The specification for the Agent's von Neumann-Morgenstern utility function can be written as:

$u(w) - a$, where u is increasing and concave. Assuming neutrality for the principal as in most of the literature, his von Neumann-Morgenstern utility function is written as

$x - w$. When the Principal offers a contract w_j the agent's utility maximization problem can be written as : $\underset{i=1,.....n)}{Max}\left(\sum_{j=1}^{m} p_{ij}u(w_j) - a_i\right)$

If the Agent chooses a_i then the (n-1) incentive constraints is

$$\sum_{j=1}^{m} p_{ij}u(w_j) - a_i \geq \sum_{j=1}^{m} p_{kj}u(w_j) - a_k \qquad (IC_k)$$

where k=1, …..n and $k \neq i$.

The agents' utility maximization problem is also subject to the following (individual rationality constraint) participation constraint:

$$\sum_{j=1}^{m} p_{ij} u(w_j) - a_i \geq \underline{\mu} \qquad \text{(IR)}$$

where $\underline{\mu}$ is the utility derived from taking an outside option. Building on the basic principles stated in the standard model specified above, Stiglitz (1990) proposes a moral hazard model for credit markets which can be presented in two stages. First the model is presented under individual lending and then later a scenario under group lending is presented. The model shows that joint liability lending can be used to mitigate the moral hazard problem among group members. The model starts by assuming a single borrowers´ loan (individual liability) under the assumption that borrowers are risk neutral. Output takes two values, high Y^H and low Y^L. Normalizing the low output values to 0, the output is high with probability p and 0 otherwise. Assuming that each projects requires 1 unit of capital, then the repayment to the lender plus interest equals $\rho > 1$. Borrowers will only be willing to borrow if the utility from borrowing (which results from the payoffs) is no smaller than some utility $\underline{\mu}$ that represents the utility the agent can obtain by taking on an outside option. This participation constraint, which also implies that the projects are socially profitable, can be expressed as follows:

$$pY^H - \rho \geq \underline{\mu}$$

Borrowers choose actions, which can be thought of as a level of effort $p \in [0,1]$, for which they incur a disutility cost of $\frac{1}{2}\gamma p^2$ (where γ >0). Following this specification a social

surplus and the equilibrium p which is subject to moral hazard can be computed. Under individual lending the following equilibrium value of p will be chosen[4]

$$p = \frac{Y^H + \sqrt{(Y^H)^2 - 4\rho\gamma}}{2\gamma}$$

Under joint liability scenario it is assumed that when a borrower's project fails the partner is liable for the amount q. This is an incentive for each member to care about the safety of the project chosen by the peers and it is acknowledged as a justification for peer monitoring. If one of the members chooses an action p' then the payoff function of a borrower who chooses action p is

$$\max_{(p)} pY^H - rp - qp(1-p') - \frac{1}{2}\gamma p^2.$$

Assume that the borrower chooses action p to maximize his individual payoff, taking his partner's action p' as given. Then her best response function is given by:

$$p = \frac{Y^H - r - q}{\gamma} + \frac{q}{\gamma}p'.$$

At the equilibrium the p under joint liability just like under individual liability has two values while the denominator of the joint liability expression is lower than that of the individual liability. The model shows how the equilibrium value of p and hence repayment rate is higher under joint liability compared to individual lending.

The model outlined above assumes that members can monitor each others actions perfectly at no cost, as well as they enforce any agreements regarding their choice of p. However, in reality, peer monitoring can be costly. In addition, joint liability lending allows for the imposition of sanctions on group members that renege their repayment promises. Ghatak and Guinnane (1999) therefore, make an extension of this model by including the

[4] For details read Ghatak and Guinane (1999)

cost of monitoring and considerations for the impact of sanctions in choosing the level of p[5]. Diagne (1998) further make extensions to the model by including the impact peer pressure and dynamic incentives in inducing repayment. Ahlin and Townsend (2003) propose the inclusion of productivity differences across groups and show how high productivity leads to a reduction in moral hazard through an increase in payoffs for safe projects.

Following the theoretical framework stated above, the empirical strategy focuses on testing whether or not particular covariates, vector $X=(X_1\ldots\ldots\ldots..X_n)$ are associated with the incidence of moral hazard. The probability of moral hazard in a specific group g as a function of covariates can be written as $P(H^g=1 \mid X^g)$. This leads to the following likelihood function:

$$\prod^{G} P(H^g = 1 \mid X^g)^{Hg} [1 - P(H^g = 1 \mid X^g)^{1- Hg}$$

The moral hazard model $P(H^g=1 \mid X^g)$ can thus be written as a function $P(B' X^g)$, where B is an Mx1 vector of parameters and X^g is an Mx1 vector containing group g´s values for the M covariates. A probit specification of the following form is estimated:

$$\Pr(y=1 \mid x) = \alpha + \sum_{i=1}^{Pr=2} \beta_{1i} x_{1i} + \sum_{i=1}^{Scr=4} \beta_{2i} x_{2i} + \sum_{i=1}^{pm=3} \beta_{3i} x_{3i} + \sum_{i=1}^{st=6} \beta_{4i} x_{4i} \sum_{i=1}^{pp=2} \beta_{5i} x_{5i} + \sum_{i=1}^{Dinc=2} \beta_{6i} x_{6i} + \\ + \sum_{i=1}^{Im=3} \beta_{7i} x_{7i} + \sum_{i=1}^{Ctr=5} \beta_{8i} x_{8i}$$

Where:

x_1´s are a set of variables (Pr=2) that measure group productivity

x_2´s are a set of variables (Scr=4) that measure the quality of screening

x_3´s are a set of variables (pm=3) that measure the quality of peer monitoring

x_4´s are a set of variables (St=6) that measure the strength of social ties within the group

x_5´s are a set of variables (Pp=2) that measure the quality of peer pressure

x_6´s are a set of variables (Dinc=2) that measure the quality of dynamic incentives

[5] For details read Ghatak and Guinane (1999)

x_7 ´s are a set of variables (Im=3) that the proxy the degree of incentive match

x_8 ´s are a set of variables (Ctr=5) that are control variables

The study is based on data collected by the International Food Policy Research Institute (IFPRI) in 2000 form 99 credit groups of the Malawi Rural Finance Company (MRFC). The data was collected using a structured questionnaire administered to a group leader. The incidence of moral hazard in each credit group was captured by asking the chairperson of each group about whether some members had defaulted wilfully, or whether they had misused loan funds that were meant for an investment. Explanatory variables in the model are described in detail in *Table1*.

4.0 Empirical results and discussion

The maximum likelihood probit estimates of the above moral hazard equation are presented in *Table 2*. In line with a priori expectations, results indicate that groups formed through peer selection have a lower incidence of moral hazard. This implies that peer selection enables group to screen risky borrowers which in concurrence with Ghatak's theory of adverse selection. Ghatak (1999) observes that self selection process leads to the emergence of a pool of safe borrowers which can lead to a reduction in the likelihood of moral hazard. Both peer monitoring variables are significant and their signs conform to the a priori expectations. First the proportion of group members reporting that they do not know the composition of the group has a positive and significant coefficient. This signifies the non-occurrence of monitoring in some groups, which increases the likelihood of moral hazard. The presence of individuals with joint enterprises has a reducing effect on the incidence of moral hazard. This conforms to a priori expectations that moral hazard is less likely in groups with joint enterprises because members are more likely to monitor each other's investment decisions and the levels of output. Only one of the variables measuring levels of social ties ,

the number of villages from which group members come is significant, with an a priori expected sign. As a spatial variable, this implies that groups with members from villages that are further apart face difficulties in peer monitoring. Secondly, the members from different villages are less likely to exhibit strong pre-existing social ties, such that they may not know each other well which would lead to the inclusion of risky borrowers within the group.

The presence of peer pressure has a significant and negative impact on the incidence of moral hazard. This is in conformation to our a priori expectation. This finding also conforms to the finding by Wydick (1999), in which he observes that the willingness to apply peer pressure has a significant effect on reducing moral hazard within borrowing groups from Guatemala. The presence of social sanctions returned a conflicting sign and but it is insignificant.

The dynamic incentives captured by the willingness to pay a full value of defaulted loans, which is also a measure of the willingness to accept full joint liability is negative and significant. The implication is that the full joint liability clause is a key mechanism through which the incidence of moral hazard can be minimized. The variable capturing the preference for limited liability where individuals are only required to pay 10 percent penalty is insignificant. The findings are consistent with a priori expectations in that full joint liability strengthens togetherness in the group which makes it less likely that individuals would want to harm each other through default. The presence of members from past failed programs in a group has a significant and positive coefficient. This conforms to a priori expectations that members that have ever participated in previously failed credit programs where loans were not rigorously collected have a tendency to take risky actions that have a negative impact on repayment. In the same context, Buckley (1996) discusses the abandonment of offers in joint liability lending programs. Buckley notes that a problem arises with JLLIs in that the institution sometimes keeps the group but abandons the joint liability which is the pillar of

group lending. Buckley likens the situation to the abandonment of joint liability in Smallholder Agricultural Credit Administration (SACA) in Malawi. He notes that at first SACA lent to individuals under joint liability and the repayment was good. However, in 1992 SACA adopted a policy of allowing any individual that had repaid his or her *own* loan to access further credit even if one or more of the borrowers in his/her group was in default. This led to a severe drop in repayment rates. Both variable capturing mismatching problems conform to a priori expectations by returning positive and significant coefficients. First, the presence of new members in a group is likely to introduce a matching problem as the loan demand for new members may not match those of old members due to differences in the levels of business skills. This in turn makes it difficult for the lending institutions meet the loan demand for such a diverse group of individuals leading an erosion of incentives for repayment among members whose loan supply does not create the incentive to repay. Second, the variable that measures the age of a group has a positive effect on moral hazard. Again this is related to the matching problem in loan cycles proposed by Paxton (1996). In the first meeting every one agrees to the terms and conditions of the loan. However as members continue to receive loans from a lending institution, they develop skills at different levels. This leads to a diversity in their loan requirements which in turn makes it difficult for the lender to match the demand and supply of credit among group members. As more members become unsatisfied, the incentive for repayment declines leading to moral hazard. Both productivity variables had no significant impact on the incidence of moral hazard, although they returned expected signs. The maximum loan size available to the group increases the likelihood of moral hazard. This is consistent with theoretical proposition by Stiglitz(1990) in which it is observed that the expected utility of risky projects increases faster in loaned funds than that of a safe project. This assumes that an increase in the loan

size increases the relative attractiveness of risky projects leading to moral hazard. Other control variables such as group size and program dummies were insignificant.

5.0 Conclusions and Policy Implications

The main aim of this study is to examine the incidence of moral hazard and investigate factors that explain the variation in its occurrence among credit groups. The paper has examined a wide range of factors related to group dynamics and assessed their relationship with the occurrence of moral hazard among credit groups. We note that in Malawi, despite the high potential of joint liability lending in mitigating moral hazard, the mechanism is still prone to moral hazard. About 40 percent of the credit groups reported that they experienced misuse of funds by some of their group members. Our analysis shows that peer selection, peer monitoring, peer pressure and social ties reduce the likelihood of the incidence of moral hazard. These findings offer support to theoretical propositions by Ghatak and Guinane (1999) and Diagne (1998). Indicating the significance of the matching problem, results show that the number of new members in a group and the number of loan cycles lead to a rise in the incidence of moral hazard. This finding is consistent with the proposition by Paxton (1996). Normally, new members join the group because either some old members are excluded from the group for non-compliance, or they left wilfully. In microfinance literature, the number of dropouts from the program is a strong indicator of whether or not the financial services needs for the beneficiaries are being met. To reduce the problem of high dropouts which leads to replacements by new members, microfinance institutions require constant appraisals of their activities to ensure that they address the needs of their clientele.

With regards to dynamic incentives, model results show that the full joint liability as captured in the willingness of group members to pay a full amount of defaulter's loan has great potential as lending technology that can be used to minimize the incidence of moral hazard. The limited liability, chosen by those that are only willing to pay a 10 percent penalty

for default works against repayment in that it increases the incidence of moral hazard. Results reveal that while paying attention to dynamic incentives and matching problems peer selection must be enhanced at group formation to reduce problems of adverse selection, which may arise when outsiders such as credit officers are given the mandate to create credit groups. Considering the significance of peer monitoring, peer pressure and social ties in mitigating moral hazard, joint liability lending institutions must continue relying on social cohesion in order to simultaneously address problems of low outreach, limited impact and lack of financial self sustainability.

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Table 1: Descriptive Statistics

Dependent Variables	**Description**	**Mean**	**S.D**
Productivity			
AVGLAND	Average land holding of group members in hectares	3.17	1.471
EDUCATION	Average years of formal education of group members	4.72	1.533
Screening			
SCREEN	Whether some individuals who wanted to join the group rejected	0.439	0.490
FASCREEN	Group was formed by the Agricultural extension worker (1=yes, 0=no)	0.46	0.499
PEERSELECT	Whether group was initiated by peers (1=yes, 0=no)	0.241	0.428
VHSCREEN	Group was formed by the Village headman (1=yes, 0=no)	0.12	0.321
Peer monitoring			
JOINTENTERP	Members have joint enterprises (1=have joint enterprises)	0.6	0.533
GCOMPNAI	Percentage of group members not knowing group composition	0.066	0.147
GLONCNAI	Percentage of member not knowing loan characteristics		
Social ties			
COWEALTHOMO	An index of wealth heterogeneity (1=Group is homogenous)	0.14	0.343
VILLAGENUMBER	Number of villages from which members come	2.76	2.039
PMFAMVG	At least one member is from the family of a village headman (1=yes)	0.82	0.383
POLITCLAN	Number of members from the clan of a politician	0.61	1.083
CHAIRFAMILY	Number of members from the family of club chair person	1.50	3.012
GENDERHOMO	Whether gender composition of the group is mixed (1=yes, 0=no)	0.57	0.496

Peer pressure			
PRESUDUEDATE	Whether group exerted pressure before due date (1=yes)	0.14	0.349
LEFEXCMG	Number of members that were excluded from group (sanctions)	0.27	1.080
Dynamic Incentives			
CONTRIBPAY	Whether would be willing to pay full cost of defaulters loan (1=yes, 0=no)	0.46	0.500
PAYPENATY	Would only be willing to pay ten percent penalty	0.37	0.485
PAST SACA	At least one member was from past failed credit programs (1=yes, 0=no)	0.78	0.415
Incentive Match			
NEWMMBAVG	Number of new members in the group	1.41	2.732
LONCYCLE	The loan cycle for which loan was received (1-5)	2.74	1.051
Control Variables			
GPSIZE	Number of members at the start of the season in a credit group	16.84	5.563
CREDLIMIT	Average Credit limit in a group per individual	4642.38	3822.1
MAIZE	Dummy for maize credit group (1=maize, 0=otherwise)	0.19	0.393
COTTON	Dummy for cotton credit group (1=maize,0=otherwise)	0.042	0.201
NON-FARM	Dummy for non-farm credit group (1=maize 0=otherwise)	0.30	0.462

Source: Own calculation from IFPRI/RDD survey 1999

Table 2: Determinants of Moral hazard-Maximum likelihood Probit estimates

Variable		Measure	Coeff.	Z-statistic
Productivity	Average land holding	Number of hectares	-0.215	-1.54
	Average years of education	Years of education	-0.201	-1.31
Screening	Evidence of screening	Dummy	-0.042	-0.11
	Groups formed by extension officer	Dummy	-0.319	-0.63
	Groups formed by self selection	Dummy	-0.838*	-1.66
	Groups formed by village chief	Dummy	-0.311	-0.5
Peer monitoring	Have Joint enterprises	Dummy	-0.608*	-1.87
	Don't Know group composition	% of total members	3.266*	1.77
Social ties	Number of villages members	Number of villages	0.377***	3.39
	Members related to Chief	Dummy	-0.251	-0.58
	Members related to group chair	Number of people	-0.046	-0.77
Peer pressure	Peer pressure	Dummy	-1.025**	-2.02
	Sanctions	Number sanctioned	0.279	1.3
Dynamic incentive	Pay full joint liability	Dummy	-1.311**	-2.36
	Pay 10 percent penalty	Dummy	-0.265	-0.5
	Member from failed programs(SACA)	Dummy	1.200**	2.25
Matching problem (incentive match)				
	New members	Number of members	0.306***	3.23
	Loan cycle	Number of cycles	0.478**	2.51
Control	Group size	Number of members	0.025	0.68
	Loan size	Amount in MK	0.001**	2.0
	Maize group	Dummy	-0.694	-1.08
	Cotton group	Dummy	-0.654	-1
	Non-farm group	Dummy	0.211	0.44
Constant			-1.436	-1.28
Total of observation		99		
Observation with dependent =0		58		
% Correctly predicted		72.73		
Wald chi2(23)		44.72		
Prob > chi2		0.009		
Pseudo R2		0.3315		
Log pseudo-likelihood		45.64		

Source: Own calculation from IFPRI/RDD survey 1999
Note: * P<0.10; ** P<0.05; *** P<0.01 ,