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## Adverse selection and moral hazard in group-based lending

Mehrteab, H.T.

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## **Chapter 6 Determinants of Repayment Performance of Group-based Lending Programs**

### **6.1 Introduction**

As discussed in chapter 2, in recent years MFIs have shown an excellent repayment record and are becoming a widely used instrument to provide loans to the poor. Some of these programs have been showing sustainability and extensive outreach to the poor while maintaining high repayment.

The performance of group-based lending programs can be gauged through their outreach to the poorest of the poor, their sustainability and their repayment performance. The focus of this chapter will be on exploring the determinants of repayment performance, taking the case of the two Eritrean microfinance programs.

The effect of joint liability on repayment performance has been theorized widely, attributing higher repayment rates to some of the characteristics of group-based lending, namely peer screening, peer monitoring and enforcement mechanisms. Empirical evidence on the determinants of repayment performance of joint liability lending has shown that peer screening, peer monitoring and enforcement mechanisms do play a role in minimizing repayment problems among group-based lending programs. In this chapter, we add to the empirical literature by testing the dependent variables by splitting up our independent variables into those related to the group leader and those related to the other group members.

The objective of this chapter is to investigate whether the repayment performance of the two Eritrean group-based lending programs is positively influenced by peer-screening, monitoring and enforcement mechanisms – more specifically whether splitting up the independent variables into those related to the group leader and those related to other group members gives a different result than the joint liability lending theory indicates. The chapter will be divided into five sections. Section

6.2 provides a brief review of empirical literature. Section 6.3 focuses on the empirical model we use, and section 6.4 discusses the empirical results. Section 6.5 provides the conclusions.

## **6.2 Group-based lending and repayment performance: a literature review**

One of the measuring devices for the success of group-based lending program is its rate of repayment. Successful programs like the Grameen Bank and the Bancosol show high repayment rates, while reaching millions of poor borrowers. The high repayment performance of these institutions is attributed to their ability to curb the problems arising from asymmetry of information. As mentioned in the literature, group members in joint-liability group-based lending programs screen, monitor, and pressure each other in order not to end up paying for their defaulting colleagues.

Most of the theoretical literature on group-based lending does not deal directly with repayment performance of programs: theoretical models emphasize the role group members play in alleviating adverse selection, moral hazard and enforcement problems. These models have been reviewed extensively elsewhere (see, e.g., Ghatak and Guinnane, 1999; Morduch, 1999b), and there is no need to repeat them here. Accordingly, we concentrate on reviewing available empirical research on repayment performance. Indeed, several studies have empirically analyzed the determinants of group repayment performance. We will shortly discuss the results of these studies below.

Wenner (1995) uses data of 25 groups from FINCA in Costa Rica. He categorizes his data into three types: groups with no loan delinquency, groups with internal loan delinquency only, and groups with external delinquency. Internal delinquency means that one (or more) member(s) did not repay his (their) share, but the group did meet its obligation to the lender. External delinquency means that the group failed to repay to the lender (thus both internal and external delinquency has occurred). Consequently, Wenner has two dependent variables, namely internal

delinquency and external delinquency. Binomial probit, multinomial logit, and Tobit models are used in the analysis. Independent variables measure group characteristics such as informal<sup>1</sup> and formal screening, group savings and other variables such as the group's organizational strength, infrastructure indexes and visits by program officers to groups.

Wenner finds internal delinquency to be related negatively with formal screening and positively with visits. The former suggests that groups who have written codes on how members should behave (formal screening) experience less internal delinquency. The latter result, i.e. visits by credit officer to groups, indicates that more visits generate more internal delinquency, which seems to be an unexpected result. Wenner suggests that a higher number of visits might reflect extra attention given to a perceived 'problem' group. In case of external delinquency he finds formal screening to be negatively related and significant, and informal screening and infrastructure indices to be positive and significant. These results indicate that groups with a written code of group rules and regulations show less external delinquency. On the other hand, groups that are located in areas with good infrastructural facilities show higher external delinquency, indicating that these groups may alternative sources of credit. Informal screening is found to have an unexpected sign, i.e. informal screening instead of being a check against delinquency is positively correlated with delinquency.

Sharma and Zeller (1997) use data of 128 groups from four group-based lending programs in Bangladesh. Their dependent variable is the delinquency rate defined as the proportion of the total loan amount in arrears at the date when repayment should be completed. Their independent variables are related to group, community and lender characteristics. Each of the independent variables is multiplied by loan size. Using a Tobit model they find the following results. The number of

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<sup>1</sup> The informal screening variable has a value of 1 if the individual belonged to a group that screened according to reputation. The formal screening variable has a value of 1 if the individual belonged to a group that had a written code of regulations.

relatives in a group, squared credit rationing<sup>2</sup> and size of loans are found to be positively significant. This result indicates that the more relatives in one group and the higher the degree of credit rationing, the higher the percentage of unpaid loans. Similarly, the larger the value of loans forwarded to members, the higher seems to be the burden, forcing members to delay payments. The findings in case of relatives in a group and squared rationing suggests that relatives in one group, rather than improving peer pressure through social ties, seem to collude against the lender, which can lead to delays in repayment. Likewise, if rationing becomes higher than a specified cut-off level, group members may no longer see the program as a long-term partner and start to delay repayment.

On the other hand, credit rationing, agriculture as a main occupation, variance of land ownership and group initiation, are found to be negatively significant.<sup>3</sup> The results point out that a lower level of credit rationing may generate a greater concern for protecting future access to credit and a lower percentage of unpaid loans. Similarly, groups formed through self-initiation processes may make screening more effective and show better repayment performance. Also, groups with more members who say that agriculture is their principal occupation produce a lower percentage of unpaid loans, indicating that borrowers practicing agriculture may show a better repayment performance. A high degree of variance of land ownership among members leads to a lower percentage of unpaid loans, suggesting that the greater the portfolio diversity of land ownership among members, the lower the covariance of incomes within the group and the higher the repayment rate.

Matin (1997) uses data of 246 borrowers from the Grameen Bank in Bangladesh. His dependent variable is a dummy variable, which equals 1 if the loan is not fully repaid at the due date. He uses independent variables indicating the borrowers' level of education, area of land used,

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<sup>2</sup> The square of credit rationing was used to account for possible non-linearity. Rationing is computed as the difference between the value of the loan applied for and the actual value of the loan received.

<sup>3</sup> This variable indicates who imitated the group formation of a group.

years of membership, alternative credit sources, and several other personal characteristics. Using a logit model Matin finds that education and the area of operated land were negatively significant, suggesting that groups that consist of members who have some schooling and who have land in use below a certain threshold value are less likely to show repayment problems.

In contrast, Matin finds that having a housing loan, the length of membership, other credit sources and total land in use beyond the threshold level are positively significant. These results imply that a member with a housing loan might be burdened by this loan and show delays in his repayments. Similarly, the results indicate that members who have been clients of the lending program for many years might show some slackness in their repayment. Moreover, members who have other credit sources and who have land use above the threshold level have a higher probability of showing repayment problems. This may be attributed to the fact that these borrowers have other credit opportunities or that they have already accumulated so many assets that they value future access to loans from the program less.

Zeller (1998) uses data of 146 groups from six group-based lending schemes in Madagascar. The dependent variable he uses is the repayment rate. Zeller divides the independent variables into community,<sup>4</sup> lender and group variables. Using a Tobit regression model he finds the degree of monetarization, density of input retailers, saving service, group size, and coefficient of variation of land holding in upland rice region, social ties, and internal group rules to be positively significant. These results imply that groups located in areas with high levels of monetarization and a higher density of input retailers show higher repayment rates. Similarly, groups belonging to programs with saving service display higher repayment rate, indicating that saving may increase the financial discipline of group members and/or serve as loan collateral. An increase

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<sup>4</sup> The community level questionnaire includes questions on topics like infrastructure, the community's exposure to risks, access to agricultural input and output markets, the degree of commercialization of major crops, and the existence of informal and formal financial institutions.

in the size of groups can promote economies of scope, scale and risk management. Yet, as has been discussed elsewhere, increasing the size of a group beyond a manageable level may decrease the internal flow of information and increase the cost of monitoring. In this case, however, group size is found to increase the repayment rate. The maximum group size allowed in the sample is ten members. Therefore, the problems related to larger groups may not occur. Similarly, groups with stronger social ties and groups with internal rules and regulations show better repayment rates. Moreover, groups with a higher coefficient of variation of ownership<sup>5</sup> of landholdings show higher repayment rates. This indicates that diversification reduces covariate income risks among group members, which increases the rate of repayment. Yet, the squared coefficient of variation of ownership of upland is negatively significant, which suggests that too much diversification of land owned by group members increases the costs of monitoring, which reduces the repayment rate.

Wydick (1999) uses data of 137 groups from FUNDAP, a group-based lending program in Guatemala. The dependent variable is a dummy variable equaling 1 if a group has a good repayment record (based on lender reports). The independent variables are classified into group social ties, group pressure, and group monitoring and control variables. From several independent variables Wydick finds average distance and knowledge of weekly sales of other members to be the only significant variables. Both variables are peer-monitoring proxies, which were negatively and positively significant, respectively. The results suggest that the longer the average distance in kilometers between group members' businesses, the weaker the monitoring ability and the lower repayment rate. Concerning knowledge of the weekly sales of other members, members are asked if they know the sales of other group members; Wydick find that the more group members know each other's weekly sales, the better the enforcement ability and the higher repayment rate of the group.

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<sup>5</sup> The coefficient of variation of land holding is used to show intragroup risk pooling and diversification of portfolio.

Paxton et al. (2000) use data of 140 groups from PPPCR, a group-based lending program in Burkina Faso. They use a two stage econometric model. The dependent variable in stage one is the individual member's repayment problems; in stage two it is the repayment of the loan through group solidarity. This separation of the dependent variable follows from the structure of the survey they used. The groups were asked whether a member had repayment problems, and if yes, whether or not group solidarity led to repayment of the loan.

In stage one group homogeneity<sup>6</sup> and the group domino effect are found to be positively, and living in urban areas was negatively significant. The results indicate that the higher the degree of homogeneity and the higher the tendency of domino effect of members in a group, the higher the group repayment problems. The positive relationship between group homogeneity and repayment problems indicates that social networks due to the homogeneity of groups does not lead to higher group repayment performance. In contrast, group homogeneity seems to help groups to collide against the lender. Likewise, as more members within groups and other groups start to default, more repayment problems arise, indicating that even members who were able to repay begin to shirk, based on the idea that the marginal benefit of shirking exceeds the marginal benefit of repaying. Similarly, groups in rural areas tend to show higher repayment problems. This may be due to the high degree covariate risk associated with rural agricultural activities in Burkina Faso, forcing members to default during bad harvest seasons.

In stage two group leaders' quality, group training, living in urban areas, other credit sources and group pressure are positively significant, and the local domino effect and the amount of loan cycles are negatively significant. The outcomes point out that groups having higher leadership quality, better training and more peer pressure show higher repayment performance. Similarly, groups in urban areas and with other credit sources also show a better repayment performance. However, groups in areas where many other groups have already defaulted tend to show bad

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<sup>6</sup> Homogeneity is a scale variable describing the similarity of group members in terms of gender, income, ethnicity, occupation, etc.



repayment performance. Similarly, with the increase of the amount of loan cycles the repayment performance of groups deteriorates.

Karlan (2001) uses data on 56 groups from GINCA, group-based lending programs in Peru. The dependent variable is the percentage of unpaid loan amount at the due date. The independent variables are categorized into geographical concentration of members, cultural similarity among members, and control variables. Using a Tobit analysis Karlan finds that geographical concentration and cultural similarities were negatively significant, suggesting that the shorter the average distance between group members and the higher the cultural similarity between them, the lower the percentage of unpaid loan amounts at the end of the first cycle.

In conclusion, empirical studies show that screening, monitoring and enforcement within groups may improve repayment performance. A summary of the empirical studies can be found in the appendix: tables 6-A2 and 6-A3.

### **6.3 The empirical model**

The empirical studies described in section 6.2 are different from our own analysis discussed in sections 6.3-6.4, in the sense that most other papers use data acquired only from one group member as a representative of his/her group. We however have data from at least two members of each group. One of these members is the group leader and the others are members other than the group leader. This allows us to split the information for the independent variables into two separate variables, one related to the group leader and one related to the other group members excluding the group leader.

In our analysis we use three different dependent variables: ARREAR 1, ARREAR 2 and ARREAR 3. All three variables are dummy variables with a value of 0 or 1. ARREAR 1 has a value of 1 if at least one member of a group indicated that he has had repayment problems in the current loan cycle. ARREAR 2 has a value of 1 if at least one member of a group other than the group leader indicated that he has had repayment problems

in the current loan cycle. ARREAR 3 has a value of 1 if the group leader indicated that he has had repayment problems in the current loan cycle. If any of the dependent variables (ARREAR 1, ARREAR 2 or ARREAR 3) is equal to 1, this indicates that at least one group member (or group leader in case of ARREAR 3) reported to have had repayment problems.

We use a logit model to estimate the effects of independent variables in reducing the incidence of repayment problems. These independent variables are grouped into measures of peer monitoring, social ties, peer screening, peer pressure, and other control variables. Table 6-1 provides a complete list of the variables used in the analysis. For each of these variables we use two different versions, those related to the group members, excluding the group leader, and those related to the group leader. As indicated, the reason why we use these two different versions of the independent variables is that group leaders in the two Eritrean programs appear to play an important role in coordinating the activities of the group members and are representatives of the group to the programs (see also chapter 7 of this thesis). Consequently, we want to investigate whether monitoring, screening, pressure and social ties of group leaders affect the repayment performance differently than the other group members. The variables related to group members other than the group leader are given in averages; this is not the case for variables related group leaders.

In the first step of the empirical analysis we aim to use all variables listed in table 6-1 in our empirical investigation. Yet, it turned out we were forced to drop several variables because of the high correlation between some variables. Moreover, some of the variables showed very low variability, so that it was not very useful to include these variables in the analysis. Therefore, in the analysis we only use a subset of the variables listed in table 6-1. Unfortunately, due to the data problems variables measuring screening and pressure had to be deleted from the complete list of variables.<sup>7</sup>

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<sup>7</sup> The full description and correlation analysis we performed to obtain a subset of variables with which we are able to carry out the empirical analysis is presented in the appendix to this chapter, table 6-A4.

*Table 6-1 Description of relevant variables*

<b>PEER-MONITORING</b>	
DIST	= The average distance (in meters) between the group member and other members of the group.
KNACTDUM	Dummy = 1 if group member knows the activities of the other group members.
KNSELDUM	Dummy = 1 if the group member knows the monthly sales of the other group members.
KNPURPDUM	Dummy = 1 if the group member knows for what purpose the other members used the loan.
GRAGRUM	Dummy = 1 if the groups has rules and regulation on how the group should be run.
VISTDUM	Dummy = 1 if the group member regularly visits other group members.
<b>SOCIAL TIES</b>	
BOGROUP	Dummy = 1 if the group member was born in the same area where the survey is held.
KNMEMDUM	Dummy = 1 if the group member knew the other group members before forming the group.
CHGRDUM	Dummy = 1 if the group member has ever been a member of another group.
LIVE	= The number of years the group member has lived in the survey area.
<b>PEER-PRESSURE</b>	
PREDEDUM	Dummy = 1 if the member is ready and willing to pressure other members into repaying.
PREFLING	= How the member feels against defaulting member – anger or sympathy.
PREWDUM	Dummy = 1 if the member thinks sanctioning others is hard.
<b>PEER SCREENING</b>	
INTEGRITY	Dummy = 1 if the member knows the creditworthiness and behavioral integrity of the other members.
<b>PERSONAL CHARACTERISTICS</b>	
AGE	= Age of the group member (in years).
GENDUM	Dummy = 1 if the group member is male.
EDUCATION	= Educational background of the group member, ranging from 1 (illiterate) to 4 (secondary school).
MOSLDUM	Dummy = 1 if the group member is a Muslim.
MARDUM	Dummy = 1 if the group member is married.
INCOME	= Monthly income of the group member (in Nakfas).
<b>CONTROL VARIABLES</b>	
SAMESEX	Dummy = 1 if all group members are of the same sex.
VFACCESS	= The value a group member attaches to having access to loans from the credit program in the future, ranging from 1 (very high) to 4 (very low).
ACORDUM	Dummy = 1 if group member is from SZSCS (Eritrean MFI).
OTHCREDIT	Dummy = 1 if the group member has other sources of credit.
VALOAN	= Value of loan the group member has received in the current loan cycle.
NOMEM	= The number of members in a group.
AINSTAPA	= The monthly repayment of the group member as a percentage of his income

The list of variables used in the analysis is given below. First, we discuss eight “group leader”-specific variables:

- KNMEMDUM = 1 if the group leader knew the other group members before the group was formed;
- AGE = the age of the group leader;
- DIST = the average distance (in meters) between the homestead or business location of the group leader to the other members of the group;
- LIVE = the time (in years) the group leader has lived in the area where the interview was held;
- AINSTAPA = the monthly repayment of the group leader as a percentage of his income;
- VFACCESS = the value the group leader attaches to having access to loans from the lending program in the future, ranging from 1 (very high) to 4 (very low);
- VISTDUM = 1 if the group leader regularly visits the other members of his group;
- EDUCATION = the educational background of the group leader, ranging from 1 (illiterate) to 4 (secondary education).

In addition to these “group leader”-specific variables we have the same eight variables for the other group members. The variable names of these variables are similar; yet, the prefix AV- and the affix -NGL (“not the group leader”) are added to the above mentioned variables, indicating that they refer to averages of other group members.

Second, we use two variables that provide information on the group as a whole:

- GRAGRDUM = 1 if the group has rules and regulation on how the group should be run;
- NOMEM = the number of members in a group.

To summarize the above discussion, we include 18 independent variables (8 leader-specific, 8 non-group leader-specific, 2 group-specific variables) in our empirical model. This model aims at explaining the relationship between repayment performance (ARREAR) on the one hand and

member- and group-specific characteristics on the other hand. The independent variables consist of variables reflecting peer monitoring, social ties and other member characteristics.

The variables DIST, and VISTDUM are related to peer monitoring. They indicate the extent to which group members have information of each other, which may help them to monitor. For DIST we expect the coefficient to have a positive sign: the longer the distance between a member and other group members, the more difficult it is for a member to monitor his peers and the greater the repayment problems. For VISTDUM we expect the coefficient to have a negative sign: if the dummy is equal to 1, the probability of repayment problems falls, since the more a group member visits other group members, the higher is the opportunity to monitor their behavior. The variable GRAGRUM is also related to peer monitoring and enforcement but refers to the group as a whole. For GRAGRUM we expect to find a negative sign: if the dummy is equal to 1, this indicates that the group uses rules and regulations and this helps to reduce the probability of repayment problems.

In addition to the above variables, we have two other variables that assess the existence of social ties: KNMEMDUM and LIVE. These variables show the degree to which individuals within a group have lived in the same vicinity and know each other before the formation of the group. Such information may help group members to screen and monitoring each other's behavior before group formation and to use social sanctions against delaying members, which helps to mitigate repayment problems.

For KNMEMDUM and LIVE we expect a negative sign of the coefficient: if the dummy for KNMEMDUM is equal to 1, it indicates that the interviewee knows the other members, which increases the existence of social ties and reduces the chance of repayment problems. Similarly, for LIVE the longer a group member has lived in the vicinity, the greater his social ties and the lower the probability of repayment problems.

Finally, we have six control variables: AGE, EDUCATION, NOMEM, AINSTAPA and VFACCESS. The variable NOMEM refers to the size of

the group as a whole. For NOMEM we have no explicit expectations: it may have a positive or negative sign depending the theoretical model used/applied.<sup>8</sup> For AINSTAPA we expect to find a positive sign: the higher the amount of a member's installment as a percentage of his income, the more likely it is that this person will have to not cope with repayment problems. For VFACCESS we expect a negative sign: the higher members value future credit assess from the lending program, the lower the chance of repayment problems. Concerning AGE and EDUCATION we have no clear expectations about the sign of the coefficient.<sup>9</sup>

#### **6.4 Empirical results**

As is discussed above, the main aim of this chapter is to investigate whether monitoring and enforcement within group-based lending contracts play a role in mitigating the incidence of repayment problems of groups in Eritrea. The analysis is carried out as follows. We start by estimating the complete model, using logit analysis. The model includes all 18 independent variables discussed above. Next, we delete variables from the model for which we do not find significant coefficients, until we find the best fitting model, that is, the model including only significant coefficients. To achieve this, we delete those variables for which the Z-statistic of the coefficient is less than one. Tables 6-2, 6-3 and 6-4 provide the results of the empirical analysis. The Z-statistics are given in parentheses.

Table 6-2 shows the results when using ARREAR 1 (repayment problems of all members of a group) as the dependent variable. Equations 2-1 to 2-3 show that some of the variables have statistically significant coefficients, indicating that these variables play a role in mitigating repayment

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<sup>8</sup> Theories suggest that the larger the group size, the higher the probability of members to show group solidarity, leading them to support a member in repayment problem (Devereux and Fisher, 1993). On the other hand, the larger the group size, the lower the degree of monitoring among group members, as the chance of free riding increases, which leads to an increased chance of of repayment problems (Armendáriz De Aghion, 1999).

problems. From the variables related to the group leader KNMEMDUM is significant with the expected sign. The other group leader variable found to be statistically significant is VFACCESS, indicating that the higher group leaders value future access to loans from the program, the higher the repayment performance by the group. From the variables related to group members other than the group leader most of them fail to be statistically significant. The only exception is AVINSTNGL, which persists to be statistically significant with the right sign in all equations shown in table 6-2. This variable indicates that the higher the install payment burden of regular group members as a percentage to their income, the higher the probability of repayment problems.

Table 6-3 presents the results when we use ARREAR 2 (repayment problems of group members other than group leader) as our dependent variable. From the variables related to the group leader KNMEMDUM and LIVE are statistically significant. Yet, LIVE has the wrong sign and is therefore dropped from the model in equation 3-2. The other group leader variable found to be statistically significant is VFACCESS with the right sign. From the variables related to group members other than the group leader most of them fail to be significant with the exception of AVINSTNGL and AVKNMNGL. Yet, AVKNMNGL has the wrong sign and is therefore dropped from the model in equation 3-2. AVINSTNGL appears with the expected sign, indicating that the higher the install payment burden of regular group members as a percentage of their income, the higher the probability of repayment problems.

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<sup>9</sup> The complete list of variables used in the analysis with their expected signs is presented in the appendix to this chapter, table 6-A5.

Table 6-2 Logit estimation results using ARREAR 1 as the dependent variable

	2-1	2-2	2-3
<b>GROUP LEADER VARIABLES</b>			
KNMEMDUM	-1.946 (-2.608)***	-1.292 (-2.024)**	-1.192 (-1.948)*
AGE	0.018 (0.722)		
DIST	0.001 (1.118)	0.001 (1.106)	
AINSTAPA	1.025 (0.791)		
VFACCESS	0.953 (2.014)**	1.121 (2.654)***	1.082 (2.684)***
VISTDUM	-0.101 (-0.189)		
LIVE	0.010 (0.561)		
EDUCATION	-0.145 (-0.412)		
<b>OTHER GROUP MEMBERS</b>			
AVKNMNGL	1.650 (1.825)		
AVDISTNGL	-0.864 (-0.171)		
AVAGENGL	-0.021 (-0.642)		
AVLIVNGL	0.015 (0.849)		
AVINSTNGL	2.122 (1.575)*	2.400 (2.536)**	2.376 (2.485)**
AVFACNGL	0.224 (0.630)		
AVISTNGL	-0.748 (-1.099)	-0.443 (-0.703)	
AVEDUNGL	0.177 (0.455)		
<b>OTHER VARIABLES</b>			
GRAGRUM	0.153 (0.273)		
NOMEM	-0.139 (-0.598)		
CONSTANT	-2.992 (-1.031)	-1.906 (-2.009)**	-2.129 (-2.700)***
Number of obs.	102	102	102
Obs. with dependent = 0	68	68	68
% of correctly predicted	79	75	75
McFadden $R^2$	0.19	0.12	0.11



Table 6-3 Logit estimation results using ARREAR 2 as the dependent variable

	3-1	3-2	3-3
<b>GROUP LEADER VARIABLES</b>			
KNMEMDUM	-2.500 (-2.817)***	-1.193 (-1.916)*	-1.117 (-1.869)*
AGE	-0.011 (-0.404)		
DIST	0.001 (0.844)		
AINSTAPA	1.096 (0.857)		
VFACCESS	0.650 (1.502)*	0.735 (1.948)*	0.695 (1.894)*
VISTDUM	0.128 (0.233)		
LIVE	0.050 (2.161)		
EDUCATION	0.125 (0.351)		
<b>OTHER GROUP MEMBERS</b>			
AVKNMNGL	1.523 (1.579)		
AVDISTNGL	0.715 (0.141)		
AVAGENGL	0.015 (0.364)		
AVLIVNGL	0.003 (0.167)		
AVINSTNGL	1.260 (1.005)	1.752 (1.868)*	1.663 (1.876)*
AVFACNGL	-0.243 (-0.643)		
AVISTNGL	-0.801 (-1.286)	-0.738 (-1.105)	
AVEDUNGL	0.382 (1.017)	0.420 (1.109)	
<b>OTHER VARIABLES</b>			
GRAGRUM	0.212 (0.358)		
NOMEM	-0.302 (-1.043)	-0.076 (-0.388)	
CONSTANT	-3.062 (-1.041)	-1.597 (-0.953)	-1.681 (-2.184)***
Number of obs.	102	102	102
Obs. With dependent = 0	74	74	74
% of correctly predicted	84	86	75
McFadden $R^2$	0.19	0.09	0.07

*Table 6-4 Logit estimation results using ARREAR 3 as the dependent variable*

	5-1	5-2	-3
<b>GROUP LEADER VARIABLES</b>			
KNMEMDUM	1.394 (1.051)		
AGE	0.085 (2.796)***	0.066 (2.691)***	0.049 (2.635)***
DIST	0.001 (0.859)		
AINSTAPA	2.237 (1.479)	2.732 (2.277)**	2.239 (2.167)**
VFACCESS	1.488 (2.144)**	1.371 (2.066)**	1.227 (1.879)*
VISTDUM	0.124 (0.141)		
LIVE	-0.049 (-1.912)*	-0.024 (-1.291)	
EDUCATION	-0.271 (-0.517)		
<b>OTHER GROUP MEMBERS</b>			
AVKNMNGL	1.358 (1.168)		
AVDISTNGL	-0.001 (-0.412)		
AVLIVNGL	-0.010 (-0.483)		
AVINSTNGL	1.620 (0.928)		
AVFACNGL	0.624 (1.153)	0.368 (0.981)	
AVISTNGL	-0.164 (-0.147)		
AVEDUNGL	0.287 (0.619)		
<b>OTHER VARIABLES</b>			
GRAGRDUM	-1.045 (-1.060)	-0.897 (-0.934)	
NOMEM	0.212 (0.688)		
CONSTANT	-11.862 (-2.596)***	-7.681 (-4.566)***	-6.893 (-4.121)***
Number of obs.	102	102	102
Obs. with dependent = 0	89	89	89
% of correctly predicted	97	96	91
McFadden $R^2$	0.25	0.18	0.16

Table 6-4 presents the outcomes when using ARREAR 3 (repayment problems of group leaders) as the dependent variable. The results show that some of the variables have statistically significant coefficients, indicating that these variables do play a role in the mitigation of repayment problems. Yet, variables measuring peer monitoring and social ties are not among these. From the variables related to group leader AGE is statistically significant – indicating that the older the group leader, the more repayment problems he may face. The other group leader variables found to be statistically significant are AINSTAPA and VFACCESS. AINSTAPA indicates the monthly install payment of the group leader as a percentage of his income; this shows that the higher the monthly repayment burden of the group leader, the bigger his repayment problems. VFACCESS indicates that the more the group leader values future access of loans from the program, the smaller his repayment problems.

To summarize, tables 6-2 and 6-3 give similar results, showing that a few variables measuring characteristics of the group leader are significant in explaining arrears. In particular, the hypothesis that group leaders in the Eritrean lending programs play a role in compelling members to repay through social ties (KNMEMDUM) is confirmed.

VFACCESS, a variable measuring how much value a member attaches to future access of loans from the program, is found to be significant for the group leader but not for the other group members. This might indicate that group leaders actively monitor other group members and compel them to make their repayments on time. At the same time, the monitoring and social ties variables related to the other group members do not appear to be statistically significant. This may indicate that other group members are staying aloof from monitoring and social ties activities and leave the group leaders to do the job for them. Put differently, in case of the group leaders the monitoring and social ties variables really do measure peer monitoring activities and social ties, whereas in case of the other group members they do not. This may be true if group members free-ride on the efforts made by their group leader to reduce the chance of moral hazard. As is discussed in chapter 4, in the Eritrean programs a group leader has rather an important role to play as a representative of the group to the

program organization and he may generate all kinds of activities that may help improve repayment performance of the group he represents. This may leave little incentives for other group members to monitor group members, especially since these efforts may be costly and time consuming.

Alternatively, the results may indicate that monitoring by and social ties of group leaders are efficient in reducing moral hazard behavior, whereas monitoring by and social ties of other group members are not. Thus, for instance in the case of *KNMEMDUM*, if the group leader knows the other members, he/she really uses this knowledge to monitor and/or puts pressure on other members to repay their debts, which reduces the chance of repayment problems. At the same time, if other group members know other members and this leads to monitoring and pressure, this does not reduce the probability of repayment problems. One explanation for this result could be that group members only feel pressured to behave prudently when the group leader monitors, perhaps because he/she may have more means to sanction moral hazard behavior by group members since he/she is the representative of the group to the program organization.

Alternatively, table 6-4, which is related to the dependent variable ARREAR 3, does give some significant variables (AGE, AINSTAPA and VFACCESS). Yet, these are all variables related to the group leader. Variables measuring monitoring by and social ties of the other members are not found to be significant.

## **6.5 Conclusions**

This chapter has analyzed whether peer monitoring and social ties mitigate the incidence of repayment problems among group members in two group-based lending programs operating in Eritrea. By and large, the variables measuring regular group members' peer monitoring and social ties are found to be statistically insignificant, leading to the conclusion that there is no link between peer monitoring by and social ties of group members other than the group leader on the one hand and the occurrence

of repayment problems on the other hand. In contrast, variables related to the group leader are partially able to explain the repayment performance of groups and of group members other than the group leader. In particular, KNMEMDUM is statistically significant, showing that there is a link between group leaders' knowing other members before the formation of the group, and less probability of repayment problems from occurring.

The comparison between the two categories of variables (group leader versus non-group leader members variables) that is used to explain the incidence of repayment problems in this chapter, suggests that there is evidence – albeit weak – to support the hypothesis that there is a relationship between peer monitoring by and social ties of the group leader on the one hand, and the repayment performance of individual group members on the other hand. This may be due to the role group leaders play in the two Eritrean group-based lending programs. At the same time, theoretical models on group-based lending emphasize the point that peer screening, monitoring and enforcement activities taking place in groups is performed by all group members. The findings in the case of the Eritrean programs provide results that are in contrast with the existing theoretical models on group-based lending.

**APPENDIX: Alternative empirical studies, summary  
statistics and correlation matrices**

*Table 6-A1 Descriptive statistics of the variables used in the empirical analysis*

	Mean	Median	Max	Min	Std. Dev.
<b>DEPENDENT VARIABLES</b>					
ARREAR 1	0.33				0.47
ARREAR 2	0.27				0.45
ARREAR 3	0.12				0.34
<b>INDEPENDENT VARIABLES</b>					
<i>GROUP LEADER VARIABLES</i>					
KNMEMDUM	0.84	1.00	1.00	0.00	0.36
AGE	45.00	44.50	75.00	22.00	11.75
DIST	630.10	325.00	5000	5.00	1056.00
AINSTAPA	0.38	0.33	1.21	0.06	0.23
VFACCESS	1.26	1.00	4.00	1.00	0.56
VISTDUM	0.71	1.00	1.00	0.00	0.46
LIVE	32.71	31.50	75.00	2.00	19.14
EDUCATION	2.19	2.00	4.00	1.00	0.87
<i>OTHER GROUP MEMBERS</i>					
AVKNMNGL	0.82	1.00	1.00	0.00	0.30
AVDISTNGL	373.67	227.50	2766.67	5.00	444.21
AVAGENGL	46.49	47.50	68.50	22.00	9.15
AVLIVNGL	33.00	34.75	67.00	3.50	16.70
AVINSTNGL	0.42	0.34	1.73	0.05	0.25
AVFACNGL	1.45	1.33	5.00	1.00	0.68
AVISTNGL	0.76	1.00	1.00	0.00	0.35
AVEDUNGL	1.82	2.00	3.00	1.00	0.61
<b>OTHER VARIABLES</b>					
GRAGRUM	0.28	0.00	1.00	0.00	0.45
NOMEM	4.48	4.00	8.00	3.00	1.43

Source: own survey

*Table 6-A2 Summary of empirical works on repayment performance of group-based lending programs*

AUTHOR	DATA	MODEL	DEPENDENT VARIABLE	INDEPENDENT VARIABLES
Wenner (1995)	25 groups, FINCA, Costa Rica	1 Binomial probit 2 Multinomial logit 3 Tobit	1 Internal delinquency 2 External delinquency	Group characteristics 1 Informal screen = screening according reputation 2 Written code = group rules and regulations 3 Fvisits = whether a program officer visits a group 4 Infrastructure index = basic infra (0-5). 5 Organizational strength = a factor analysis score
Sharma and Zeller (1997)	128 groups BRAC, ASA, RDAS, Bangladesh	Tobit procedure	Percent unpaid at the due date (the due date is before the survey date)	1 Group characteristics 2 Community characteristics 3 Lender characteristics (Each variable is multiplied by loan size) 1 Dummy = 1 if he had any education 2 Dummy = 1 if he had used a loan for housing 3 Length of membership in years 4 Other source of loans 5 Other personal characteristics
Matin (1997)	246 borrowers, Grameen Bank	Logit procedure	Dummy variable = 1, if the loan is not fully repaid by the due date	1 Community-based variables 2 Program level variables 3 Group level variables 1 Social ties 2 Group pressure 3 Group monitoring 4 Control variables
Zeller (1998)	146 groups, six lending groups Madagascar	Tobit procedure	Percent repayment rate (no further description is given)	1 Geographic proximity 2 Cultural similarities 3 Control variables
Wydick (1999)	137 groups, ACCION- FUNDAP, Guatemala	Logit procedure	Group good repayment record (from the lending institution's records)	1 Group homogeneity 2 Domino effect (within group and on region level) 3 Urban, a dummy variable = 1 for urban 4 Loan cycle 5 Other credits sources 6 Leadership and Training 8 Peer pressure 1 Screening variables 2 Group solidarity 3 Peer pressure and peer monitoring variables
Karlan (2001)	56 groups (30 per group) , FINCA, Peru	Tobit procedure	Default as a percentage of potential loan amount	
Paxton et al. (2000)	140 groups, PPPCR, Burkina Faso	Two-stage econometric model	Stage 1: repayment problems Stage 2: repayment of loan through group solidarity	
Van Tassel (2000)	40 individuals, Bancosol, Bolivia	Descriptive analysis		



*Table 6-A3 Summary of empirical works done on repayment performance and findings*

AUTHOR	DEPENDENT VARIABLE	INDEPENDENT VARIABLES	FINDINGS
Wenner (1995)	1 Internal delinquency 2 External delinquency	Group characteristics 1 Informal screen 2 Written code 3 Infrastructure index 4 Organizational strength 5 Fvisits 6 Group savings	Internal delinquency 1 Code → - ve significant 2 Fvisits → + ve significant External delinquency 1 Code → insignificant 2 Informal screen → + significant 3 Infrastructure → + ve significant
Sharma and Zeller (1997)	Percentage unpaid at the due date (the due date is before the survey date)	1 Group characteristics 2 Community characteristics 3 Lender characteristics (Each variable is multiplied by loan size)	1 Credit rationing → - ve significant (Rationing) <sup>2</sup> → + ve significant 2 Relatives → + ve significant 3 Agriculture → - ve significant 4 Variance of land → - ve insignificant 5 Group initiation → - ve significant 6 Value of loan → + ve significant
Matin (1997)	Dummy variable = 1 if the loan is not fully repaid by the due date	1 Dummy = 1 if he had any education 2 Dummy = 1 if he had a loan used for housing 3 Length of membership in years 4 Other source of loans (NGOs) 5 Other personal characteristics	1 Education → - ve significant 2 Landholding → - ve significant (Landholding) <sup>2</sup> → + ve significant 3 Loan for housing → + ve significant 4 Length of membership → + ve significant 5 Other credit sources → + ve significant
Zeller (1998)	Percentage repayment (no further description is given)	1 Community-based variables 2 Program level variables 3 Group level variables	1 Saving service → + significant 2 Initiated by members → insignificant 3 Group size → + ve significant 4 Cf. of variation of upland → + ve significant (var. of land) <sup>2</sup> → - ve significant 5 Social ties → + ve significant 6 Internal rules → + ve significant 7 Degree of monetarization → + ve significant 8 Density of inputs retails → + ve significant

Wydick (1999)	Group's good repayment record (from the lending institution's records)	<ol style="list-style-type: none"> <li>1 Social ties</li> <li>2 Group pressure</li> <li>3 Group monitoring</li> <li>4 Control variables</li> </ol>	<ol style="list-style-type: none"> <li>1 Distance → - ve significant</li> <li>2 Knowsales → +ve significant</li> </ol>
Paxton et al. (2000)	<p>Stage 1: repayment problems</p> <p>Stage 2: repayment of loan through group solidarity</p>	<ol style="list-style-type: none"> <li>1 Group homogeneity</li> <li>2 Domino effect (within group and on region level)</li> <li>3 Urban</li> <li>4 Loan cycle</li> <li>5 Group history</li> <li>6 Leadership and training</li> </ol>	<p>Stage 1</p> <ol style="list-style-type: none"> <li>1 Group homogen. → + ve significant</li> <li>2 Domino effect → + ve significant</li> <li>3 Urban dummy → - ve significant</li> </ol> <p>Stage 2</p> <ol style="list-style-type: none"> <li>1 Domino effect → - ve significant</li> <li>2 Loan cycle → - ve significant</li> <li>3 Leadership → + ve significant</li> <li>4 Training → + ve significant</li> <li>5 Urban → + ve significant</li> <li>6 Other credits so → + ve significant</li> <li>7 Pressure → + ve significant</li> </ol>
Karlan (2001)	Default as a percentage of potential loan amount	<ol style="list-style-type: none"> <li>1 Geographic proximity</li> <li>2 Cultural similarities</li> <li>3 Control variables</li> </ol>	<ol style="list-style-type: none"> <li>1 Geo.concentration → - ve significant</li> <li>2 Cultural similarity → - ve significant</li> <li>3 Leadership + training → + ve significant</li> </ol>

*Table 6-A4 Correlation coefficients of relevant variables*

	ARREAR I	DIST	AVDISTNGL	KNACTDUM	AVKNATNGL	KNSELDUM	AVKNSLNGL	KNPURPDUM	AVKNPNGL	VISTDUM	AVISTNGL	BOGROUP
ARREAR I	1.000000											
DIST	0.051043	1.000000										
AVDISTNGL	0.057413	0.000644	1.000000									
KNACTDUM	0.163188	0.005378	-0.125175	1.000000								
AVKNATNGL	0.025146	-0.087527	-0.028699	0.115818	1.000000							
KNSELDUM	0.178571	0.132101	-0.042433	0.066607	-0.266927	1.000000						
AVKNSLNGL	-0.041762	0.092272	-0.165989	0.100355	0.044754	0.078936	1.000000					
KNPURPDUM	0.100000	-0.019151	0.010240	-0.046625	0.214729	0.028571	0.043047	1.000000				
AVKNPNGL	-0.050490	0.047491	-0.083125	-0.088172	0.342136	0.074096	0.094717	0.240745	1.000000			
VISTDUM	-0.091287	0.051261	-0.063481	0.004256	0.057089	0.019562	0.136659	-0.091287	0.212018	1.000000		
AVISTNGL	-0.093385	-0.041315	0.040895	-0.071611	0.135895	-0.008231	0.124321	0.140872	0.315408	0.101331	1.000000	
BOGROUP	0.055728	0.128797	0.019672	0.098736	0.204659	-0.121407	-0.089334	0.013932	-0.068232	0.063590	-0.153190	1.000000

Table 6-A4 Continued...

	ARREAR I	DIST	AVDISTNGL	KNACTDUM	AVKNATNGL	KNSELDUM	AVKNSLNGL	KNPURPDUM	AVKNPNGL	VISTDUM	AVISTNGL	BOGROUP
AVBOGRNGL	0.081313	0.028176	0.015434	0.145121	0.123718	-0.057542	-0.001118	-0.042110	-0.023173	-0.061005	-0.052184	0.301757
KNMEMDUM	-0.152499	0.043913	-0.057260	0.129763	0.074570	0.087142	0.093816	-0.060999		0.076566	-0.116352	0.421734
AVKNNGL	0.168078	0.026159	-0.072913	0.086643	0.349126	-0.017616	0.110503	0.072415	0.277060	0.035562	0.223472	0.121438
CHGRDUM	9.63E-18	-0.056270	-0.108803	-0.246148	-0.172518	0.115223	0.001413	0.043994	0.114092	0.200805	0.061626	-0.273773
AVCHGRNGL	-0.002647	0.017459	-0.030607	-0.077268	-0.085569	0.062779	-0.044206	0.064065	0.116566	0.103432	0.209562	-0.259060
LIVE	0.105529	0.013465	-0.036612	0.143911	0.133040	-0.004939	0.017182	0.031295	-0.101050	-0.045775	-0.154509	0.819027
AVLIVNGL	0.045097	-0.059718	-0.089794	0.087041	0.028742	-0.026943	0.018384	-0.068699	-0.067552	-0.023336	-0.091504	0.251312
PREDEDUM	-0.070360	-0.050182	-0.016585	0.032805	0.045079	-0.020103	-0.030288	0.014072	0.036493	0.064229	0.067243	-0.109788
AVPRDENGL	0.085522	-0.082377	-0.018263	0.101146	0.054624	0.039334	2.68E-05	0.043387	0.112517	-0.076040	-0.109448	0.106130
PREFLING	0.088388	-0.080696	0.019131	0.082423	-0.031310	-0.050508	-0.076098	0.035355	0.091689	-0.204407	-0.153492	0.059108
AVPRFNGL	0.113114	0.001827	0.084943	0.065925	0.046438	-0.040398	0.129091	-0.115942	-0.002791	0.085189	-0.043011	-0.059884
PREWDUM	0.130558	0.107343	0.170881	-0.036524	-0.190609	0.043519	0.139247	0.043519	-0.219929	0.018540	-0.026748	-0.133388

Table 6-A4 Continued

	AVBOGRNGL	KNMEMDUM	AVKNNGL	CHGRDUM	AVCHGRNGL	LIVE	AVLIVNGL	PREDEDUM	AVPRDENGL	PREFLING	AVPRFNGL	AVPRFNGL
AVBOGRNGL	1.000000											
KNMEMDUM	0.332256	1.000000										
AVKNNGL	0.110496	-0.006677	1.000000									
CHGRDUM	-0.189288	-0.055909	-0.012439	1.000000								
AVCHGRNGL	-0.198093	-0.175210	0.044803	0.426653	1.000000							
LIVE	0.245139	0.413841	0.002394	-0.265699	-0.289002	1.000000						
AVLIVNGL	0.860061	0.291951	0.113742	-0.086454	-0.179455	0.274517	1.000000					
PREDEDUM	-0.009017	0.042919	0.061782	-0.030954	-0.045076	-0.134316	-0.038960	1.000000				
AVPRDENGL	-0.031011	0.078252	0.013968	-0.095438	-0.058246	0.076737	-0.045346	-0.030527	1.000000			
PREFLING	-0.009710	0.107833	-0.014717	-0.077771	-0.113251	0.027790	-0.071984	-0.024876	0.767470	1.000000		
AVPRFNGL	-0.069378	-0.078702	0.119625	0.043543	0.119405	-0.187522	-0.012513	-0.121370	-0.009202	-0.134973	1.000000	
PREWDUM	-0.066930	-0.092913	-0.014629	0.012764	0.099541	-0.113325	-0.059789	0.073488	-0.230212	-0.164122	0.063995	1.000000

Table 6-A4 Continued

	ARREAR1	DIST	AVDISTNGL	KNACTDUM	AVKNATNGL	KNSELDUM	AVKNSLNGL	KNPURPDUM	AVKNPNGL	VISTDUM	AVISTNGL	BOGROUP
AVPRWNGL	0.085522	-0.08237	-0.018263	0.101146	0.054624	0.039334	2.68E-05	0.043387	0.112517	-0.076040	-0.109448	0.106130
AGE	0.082992	-0.19455	0.002333	0.108236	-0.001720	0.102978	0.066771	-0.035805	-0.041372	-0.117429	-0.030552	0.124345
AVAGENGL	-0.093228	-0.19010	-0.101193	0.013833	-0.055031	0.013122	-0.000107	-0.079088	-0.252653	-0.142410	-0.126350	0.071847
GENDUM	0.041667	-0.10170	-0.026053	0.151532	0.124274	-0.011905	-0.058896	-0.133333	-0.041788	-0.134395	-0.033833	0.211301
AVGENGL	-0.017716	-0.07601	-0.081302	0.036471	0.011788	-0.014406	-0.089579	-0.128917	-0.139731	-0.186603	-0.118442	0.204060
EDUCATION	-0.112378	0.082904	0.116269	-0.230545	-0.111088	0.071096	-0.048067	0.195859	0.045687	0.071811	0.108963	-0.136435
AVEDUNGL	0.014969	0.127513	0.062808	-0.087604	-0.163934	-0.022521	-0.107196	0.035092	0.094976	-0.049193	0.023312	-0.141845
MOSLDUM	0.111350	-0.03378	0.042511	0.117184	0.105324	-0.002272	-0.178038	-0.241788	-0.102000	-0.066797	-0.174276	0.304059
AVMOSLNGL	0.033957	-0.06326	0.012491	0.060924	0.145276	-0.013583	-0.162889	-0.184455	-0.094419	-0.095723	-0.030359	0.192187
MARDDUM	0.087304	-0.05360	-0.119308	0.086296	0.043029	-0.027438	0.070228	-0.069843	-0.085074	-0.047818	0.009506	-0.050599
AVMARNGL	0.092088	-0.03908	0.110448	0.044100	-0.001281	0.046752	-0.028742	-0.014015	-0.096765	-0.096993	-0.045210	0.109344
INCOME	-0.021710	0.019151	0.192834	-0.207505	-0.075717	0.074433	0.154235	0.040163	0.127025	0.042939	0.066770	-0.125671

Table 6-A4 Continued

	AVBOGRNGL	KNMEMDUM	AVKNNGL	CHGRDUM	AVCHGRNGL	LIVE	AVLIVNGL	PREDEDUM	AVPRDENG	PREFLNG	AVPRENGL	AVPRENGL
AVPRWNGL	-0.031011	0.078252	0.013968	-0.095438	-0.058246	0.076737	-0.045346	-0.030527	1.000000	0.767470	-0.009202	-0.230212
AGE	0.016628	0.128234	-0.081596	-0.138483	-0.169753	0.576199	0.104165	-0.149236	-0.002710	-0.007964	-0.271687	-0.048398
AVAGENGL	0.120468	0.041520	0.018130	-0.081671	-0.163030	0.167345	0.494789	-0.125602	0.120049	0.001745	0.020877	-0.047783
GENDUM	0.098410	0.133436	0.085545	-0.260706	-0.375475	0.437521	0.162129	-0.105540	0.068603	0.068746	-0.292212	-0.161989
AVGENGL	0.261131	0.131445	0.149081	-0.158077	-0.250881	0.305970	0.469597	-0.104896	0.096034	-0.001445	-0.083047	-0.104616
EDUCATION	-0.219860	-0.058145	-0.066097	0.129485	-0.024820	-0.304085	-0.280454	0.092624	0.074944	-0.008514	-0.091705	-0.022357
AVEDUNGL	-0.126470	-0.086760	-0.159074	0.031455	0.197651	-0.114761	-0.141758	0.029704	-0.136169	-0.052924	0.025806	0.044199
MOSLDUM	0.174162	0.128568	0.235730	-0.181953	-0.196237	0.324017	0.181725	-0.058199	-0.044064	-0.050616	0.066575	-0.085841
AVMOSLNGL	0.206981	0.050127	0.240767	-0.163135	-0.120682	0.187742	0.214654	-0.065178	-0.170131	-0.131101	0.039447	-0.046816
MARDDUM	0.121481	-0.009320	-0.081433	-0.107544	-0.266619	0.032811	0.099733	0.049141	0.077214	0.123466	-0.102703	-0.003040
AVMARNGL	0.199092	0.034297	0.069350	-0.161247	-0.268162	0.118738	0.256278	-0.253442	0.111117	0.042416	0.109239	-0.060162
INCOME	-0.308244	-0.116702	-0.024255	0.227366	0.088248	-0.099643	-0.263672	-0.028258	0.091988	-0.060125	-0.020259	0.083929

Table 6-A4 Continued

	AVPRWNGL	AGE	AVAGENGL	GENDUM	AVGENGL	EDUCATION	AVEDUNGL	MOSLDUM	AVMOSLNGL	MARDDUM	AVMARNGL	INCOME
AVPRWNGL	1.000000											
AGE	-0.002710	1.000000										
AVAGENGL	0.120049	0.168148	1.000000									
GENDUM	0.068603	0.624613	0.240412	1.000000								
AVGENGL	0.096034	0.266818	0.648867	0.549871	1.000000							
EDUCATION	0.074944	-0.381282	-0.084278	-0.263554	-0.154544	1.000000						
AVEDUNGL	-0.136169	-0.010319	-0.168470	-0.163871	-0.131212	0.082668	1.000000					
MOSLDUM	-0.044064	0.203871	0.248024	0.461306	0.506646	-0.393275	-0.255814	1.000000				
AVMOSLNGL	-0.170131	0.077058	0.179129	0.340476	0.426431	-0.337773	-0.424005	0.754062	1.000000			
MARDDUM	0.077214	0.119903	0.082020	0.474351	0.234235	-0.030835	-0.085333	0.175538	0.120291	1.000000		
AVMARNGL	0.111117	0.045565	0.265374	0.323410	0.468594	-0.050795	-0.237034	0.200832	0.303815	0.145777	1.000000	
INCOME	0.091988	-0.038473	-0.036092	-0.155134	-0.097201	0.365083	0.256108	-0.204267	-0.300319	-0.169064	-0.150183	1.000000



Table 6-A4 Continued

	ARREARI	DIST	AVDISTNGL	KNACTDUM	AVKNATNGL	KNSELDUM	AVKNSNGL	KNPURPDUM	AVKNPNGL	VISTDUM	AVISTNGL	BOGROUP
AVINCNGL	-0.098175	-0.086588	-0.007466	0.019752	-0.035535	0.071758	-0.072152	0.013430	0.035666	0.013516	0.009961	-0.008584
SAMESEX	0.014039	-0.066077	0.198071	-0.147929	-0.050160	-0.032088	-0.034546	-0.120732	-0.148786	0.015379	-0.050571	-0.095446
VFACCESS	0.223297	-0.038118	0.106830	-0.138817	0.170325	0.175448	0.302957	0.066989	0.127262	-0.156278	-0.028518	0.006222
AVFACNGL	-0.028345	-0.107956	-0.140965	-0.042436	-0.018858	-0.073625	0.125778	-0.062360	0.004706	0.035285	0.023641	0.134987
ACORDUM	-0.181115	0.133885	-0.069454	-0.164994	0.029946	0.121407	0.281070	0.128174	0.299787	0.368824	0.330130	-0.208075
OTHCREIT	0.088388	-0.084461	-0.022407	0.082423	-0.182451	0.164150	0.155603	0.035355	-0.080735	0.069929	0.009718	-0.024628
AVOTHNGL	0.104044	-0.043791	0.079419	-0.152130	0.080192	0.311537	-0.054281	0.036623	0.056008	-0.207433	-0.198920	0.009973
VALOAN	0.078804	-0.143740	0.118789	0.005235	-0.066025	0.113193	-0.137904	0.140983	-0.219131	-0.200834	-0.042441	-0.170308
AVLAONGL	0.038292	-0.196377	0.098539	-0.043134	0.164956	0.054919	-0.102568	0.130547	0.150477	-0.044695	0.076836	-0.014525
NOMEM	0.053730	-0.137123	-0.125007	0.204512	0.075993	-0.103970	-0.199062	-0.051776	-0.092538	-0.296964	-0.228603	0.140184
GRAGRDUM	-0.076841	-0.061080	-0.030622	-0.011465	0.088448	0.096600	0.100222	0.089136	0.024301	0.168351	0.046994	0.003426
AINSTAPA	0.184339	-0.113729	0.120967	0.124746	0.091949	-0.088998	-0.223055	0.025073	-0.347954	-0.225479	-0.229987	0.117193
AVINSTGL	0.205409	-0.055682	0.140405	0.102289	0.182399	-0.105155	-0.209985	0.061435	-0.230440	-0.077246	-0.172786	0.225326

*Table 6-A4 Continued*

	AVBOGRNGL	KNMEMDUM	AVKNNGL	CHGRDUM	AVCHGRNGL	LIVE	AVLIVNGL	PREDEDUM	AVPRDENG	PREFLING	AVPRFNGL	AVPRFNGL
AVINCNGL	-0.252607	-0.027385	-0.300280	0.009461	0.010820	0.112987	-0.206345	-0.051254	-0.022579	-0.017539	-0.087099	-0.092128
SAMESEX	0.088933	0.068508	-0.130814	0.125582	0.083471	-0.136756	0.085934	0.084947	-0.126387	-0.039707	0.312434	0.117303
VFACCESS	0.066094	0.059592	0.178829	-0.085503	-0.060493	0.077979	0.034886	-0.047133	0.013042	0.030702	-0.076827	-0.017276
AVFACNGL	-0.042669	0.131133	0.004750	0.141456	0.084248	0.138061	-0.119663	0.080863	0.342814	0.230011	-0.041900	-0.140613
ACORDUM	-0.288748	-0.042492	-0.118090	0.273773	0.236488	-0.231586	-0.227645	0.109788	0.028247	-0.142845	0.100070	-0.072757
OTHCREIT	-0.006473	-0.006740	-0.104410	0.069130	-0.049606	0.029977	0.041231	-0.024876	-0.076698	-0.062500	0.119976	0.097447
AVOTHNGL	0.058824	0.111700	-0.045919	-0.080561	0.055748	0.043719	0.064014	-0.025768	-0.005660	0.035314	-0.159821	-0.030428
VALOAN	-0.010060	-0.124125	-0.065951	0.055882	0.092906	-0.185703	-0.055755	0.024761	0.004377	-0.035113	-0.023414	0.106925
AVLAONGL	0.003400	-0.061521	-0.013196	-0.063095	-0.039196	-0.029018	0.011299	-0.056182	-0.043229	-0.068464	-0.017580	0.034086
NOMEM	0.180201	-0.024953	0.156945	-0.178358	-0.166522	0.208106	0.210683	-0.033680	0.089456	0.150243	-0.004282	-0.039113
GRAGRUM	0.027293	0.152336	0.065084	0.187058	0.004963	-0.072735	0.089023	-0.062716	0.057317	-0.065202	0.073446	-0.034779
AINSTAPA	0.167763	0.036662	0.022527	-0.174952	-0.186715	0.060896	0.016196	0.048837	-0.102319	0.040073	-0.112942	0.171566
AVINSTGL	0.251998	0.095460	-0.004385	-0.175413	-0.159704	0.128003	0.120474	0.002739	-0.054297	0.060876	-0.201865	0.173922

Table 6-A4 Continued

	AVPRWNGL	AGE	AVAGENGL	GENDUM	AVGENGL	EDUCATION	AVEDUNGL	MOSLDUM	AVMOSLNGL	MARDDUM	AVMARNGL	INCOME
AVINCNGL	-0.022579	0.221959	0.036083	0.087551	0.021490	0.089775	0.218047	-0.046902	-0.108845	0.021525	-0.007536	0.161940
SAMESEX	-0.126387	-0.103244	0.053404	-0.248016	-0.044499	-0.219968	-0.059490	0.134882	0.181875	0.028435	-0.095110	-0.050288
VFACCESS	0.013042	0.081673	-0.120472	0.059959	-0.023431	-0.127858	-0.094522	0.004736	-0.042159	0.101372	0.094295	0.048612
AVFACNGL	0.342814	0.037014	-0.040185	0.017465	-0.100608	0.170721	-0.012634	-0.054271	-0.250726	0.055145	-0.019115	0.131758
ACORDUM	0.028247	-0.132769	-0.079457	-0.250775	-0.335746	0.341759	0.152077	-0.530109	-0.555065	0.000973	-0.228215	0.241361
OTHCREIT	-0.076698	-0.000838	0.078024	-0.098209	0.047699	0.087977	0.108795	-0.050616	-0.163757	-0.086426	0.024775	0.179096
AVOTHNGL	-0.005660	0.045937	-0.004190	0.067282	0.079877	-0.106500	0.030654	0.064613	0.070231	0.083422	-0.005485	-0.007499
VALOAN	0.004377	-0.136434	-0.071944	-0.185674	-0.027571	0.203216	0.074182	-0.075144	-0.009293	-0.076753	0.096209	0.255132
AVLAONGL	-0.043229	-0.024803	0.030531	-0.077968	0.010661	0.183190	0.005437	0.046093	0.037324	-0.092423	-0.136163	0.018420
NOMEM	0.089456	0.152149	0.242237	0.277603	0.352003	-0.228818	-0.280916	0.451894	0.571406	0.045373	0.211946	-0.248454
GRAGRDUM	0.057317	-0.153581	0.085700	-0.058912	-0.015037	0.335049	-0.120755	-0.019557	-0.067925	-0.071915	-0.087068	0.127283
AINSTAPA	-0.102319	-0.033480	-0.121087	0.075820	0.072588	-0.084735	-0.037279	0.293666	0.263900	0.082517	0.057203	-0.280440
AVINSTGL	-0.054297	-0.070907	-0.058873	-0.001714	0.022408	0.058647	-0.163282	0.141894	0.184567	0.025576	0.055377	-0.210993

Table 6-A4 Continued

	AVINCINGL	SAMESEX	VFACCESS	VFACINGL	ACORDUM	OTHCREIT	AVOTHINGL	VALOAN	AVLAONINGL	NOMEM	GRAGRDUM	AINSTAPA	AVINSTGL
AVINCINGL	1.000000												
SAMESEX	-0.080992	1.000000											
VFACCESS	-0.039465	0.013584	1.000000										
AVFACINGL	-0.079185	-0.100930	-0.006764	1.000000									
ACORDUM	0.065228	-0.104052	0.099551	0.206788	1.000000								
OTHCREIT	0.410398	-0.124085	-0.043860	-0.013666	0.024628	1.000000							
AVOTHINGL	0.047725	-0.041131	0.425003	-0.033116	-0.021801	-0.064742	1.000000						
VALOAN	0.109309	0.105992	-0.182635	-0.038264	-0.259222	0.191976	-0.060201	1.000000					
AVLAONINGL	0.207582	0.097310	-0.110801	-0.213280	-0.221676	0.053022	-0.039845	0.257569	1.000000				
NOMEM	-0.016401	0.051155	-0.086165	-0.078415	-0.667713	-0.143335	-0.071067	0.130481	0.146148	1.000000			
GRAGRDUM	-0.006710	-0.078101	0.012583	0.022098	0.171288	0.211906	-0.006652	0.126383	0.101147	0.031678	1.000000		
AINSTAPA	-0.061770	0.137580	-0.167763	-0.100129	-0.588878	0.142792	-0.022975	0.480918	0.140290	0.239591	-0.016549	1.000000	
AVINSTGL	-0.214373	0.073631	-0.115735	-0.143235	-0.538823	-0.046696	-0.070401	0.322511	0.390458	0.255912	-0.096113	0.567619	1.000000

*Table 6-A5 List of variables with their expected signs*

<b>INDEPENDENT VARIABLES</b>	<b>EXPECTED SIGNS</b>
<i>GROUP LEADER VARIABLES</i>	
KNMEMDUM	-
AGE	+/-
DIST	+
AINSTAPA	+
VFACCESS	-
VISTDUM	-
LIVE	-
EDUCATION	+/-
<i>OTHER GROUP MEMBERS</i>	
AVKNMNGL	-
AVDISTNGL	+
AVAGENGL	+/-
AVLIVNGL	-
AVINSTNGL	+
AVFACNGL	-
AVISTNGL	-
AVEDUNGL	+/-
<i>OTHER VARIABLES</i>	
GRAGRDUM	-
NOMEM	+/-