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Does the group leader matter?
**The impact of monitoring activities and social ties of
group leaders on the repayment performance of group-
based lending in Eritrea**

Niels Hermes, Robert Lensink and Habteab T. Mehrteab

SOM-theme E: Financial intermediation

Abstract

This paper analyzes whether the effects of monitoring and social ties of the group leader and other group members on repayment performance of groups differ, using data from an extensive questionnaire held in Eritrea among participants of 102 groups. We hypothesize that the monitoring activities and social ties of the group leader have a stronger positive impact on the repayment performance of groups. The results show that social ties of the group leader do have a positive effect on repayment performance of groups, whereas this is not true for social ties of other group members. We do not find evidence for the hypothesis that monitoring activities of the group leader have a stronger positive impact on group repayment performance. All variables measuring monitoring activities, either of the group leader or the other group members, are found to be statistically insignificant.

JEL Classification: D82, G29, O16

Key Words: Group lending, repayment performance, monitoring, social ties, Eritrea

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1. Introduction

In the literature, lack of access to external finance is generally seen as one of the main reasons why many people in developing economies remain poor. Usually, the poor have no access to loans from the formal banking system, because they cannot put up acceptable collateral and because the costs for banks of screening and monitoring the activities of the poor, and of enforcing their contracts, are too high to make lending to this group profitable. Recently, however, the poor in developing economies have increasingly gained access to small loans with the help of so-called microfinance programs. During the past ten years, these programs have been introduced in many developing economies. According to one recent survey of a sample of such programs, 16 per cent of them made use of so-called group lending to provide credit to the poor; they served more than two thirds of all borrowers from the microfinance programs included in the survey (Lapenu and Zeller, 2001).

Group lending programs provide a loan to an individual borrower, who is a member of a borrowing group. The group of borrowers is made responsible for the repayment of the loan of the individual group member: all group members are jointly liable. Non-repayment by the group means that all borrowers in the group will be denied future access to loans from the program. In this way, group lending creates incentives for individual group members to screen and monitor the other members of the group and to enforce repayment, because each individual wants to reduce the risk of having to contribute to the repayment of loans of other members and since he/she wants to ensure access to future loans. Since the group lending structure of joint liability stimulates screening, monitoring and enforcement of contracts among borrowers, the lender no longer has to invest in screening, monitoring and enforcement activities. The group lending structure is also expected to be more effective in providing such activities than the lender, because group members usually live close to each other and/or have social ties; they are therefore better informed about each other's activities. In the literature this is usually referred to as social collateral. One of the expected advantages of group lending programs and joint liability is that since this mechanism stimulates screening, monitoring and enforcement within the group, and since it improves the effectiveness of these

activities due to the fact that members live in the same area and/or are socially tied, repayment of group loans will be higher.

Theoretical models generally confirm that joint liability leads to higher repayment performance due to more and more effective screening, monitoring and enforcement among group members. Most empirical studies on this issue support this view. Yet, most studies look at screening, monitoring and enforcement activities at the group level. In this paper, we analyze the possibility that the intensity and/or effectiveness of such activities differ among different types of group members and that this influences the repayment performance of groups. More specifically, we investigate whether there is a difference between group leaders and other group members in providing these activities and whether this leads to different outcomes in terms of repayment performance.

This analysis has been inspired by our observation that in many group-based lending programs groups have to elect a group leader after a group is formed and that the group leader plays an important role as an intermediary between the group and the program. The special intermediary role of the group leader may provide additional incentives to screen and monitor borrowers and enforce contracts within the group. As far as we know, our research is the first attempt to empirically investigate differences in behavior of different group members and their effect on group performance.

The empirical analysis in this paper uses data from an extensive questionnaire for two Eritrean group-based lending programs. One distinguishing feature of the Eritrean programs is that the group leader plays a prominent role in the functioning of the group. In the empirical analysis we specifically investigate whether this has consequences for the impact monitoring and social ties have on repayment performance of the group. In particular, we separately analyze the impact of monitoring and social ties of group leaders and other group members on repayment performance of groups. The questionnaire we have allows us to distinguish between monitoring activities and social ties of group leaders versus other group members. The focus on these two issues (leaving out screening and enforcement activities) is determined by data availability: the data we have do not allow us to also look at

differences in screening and enforcement behavior of group versus non-group leaders and their impact on repayment performance.

The remainder of the paper is organized as follows. Section 2 provides a review of the empirical literature on the relationship between group-based lending and repayment performance. Section 3 describes the main characteristics of the two group-based lending programs in Eritrea. In section 4 we describe the questionnaire we have conducted and the resulting data set we have used in the empirical part of this paper. In section 5 we present the empirical model we use in this paper, whereas in section 6 we provide descriptive statistics of the sample and discuss the outcomes of the empirical analysis. Finally, in section 8 we summarize the findings and provide some conclusions.

2. Group-based lending and repayment performance: A brief review of the empirical literature

One of the issues that have been discussed extensively in the literature on microfinance in general, and on group-based lending programs in particular, is the repayment performance of groups. Repayment of loans is an important measure for the success of these programs. In the long run, programs may only survive if groups repay the loans they receive. Otherwise, the programs will need continuous external financial support, which may not always be available. Moreover, low repayment rates provide adverse incentives to groups to also not repay their loans (Paxton, Graham and Thraen, 2000). Successful programs like Grameen Bank and Bancosol have shown high repayment rates, as high as 90 to 95 per cent of all loans made to groups. At the same time, these programs are able to reach millions of poor borrowers.

The high repayment performance of these programs is attributed to their ability to curb problems arising from asymmetry of information related to loan contracts. Theoretical models show that 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 members and to ensure access to loans in the future. Most of these models do not deal directly with repayment performance of programs, however. Rather, it is implicitly assumed that the role group members play in

screening, monitoring and enforcement reduces problems of adverse selection and moral hazard, thereby improving repayment performance of groups.¹ Several authors have empirically investigated the predictions of these models. They focus on analyzing the determinants of repayment performance of groups. Below, we will shortly discuss these empirical studies and focus on describing their findings with respect to the relationship between repayment and screening, monitoring and enforcement activities within groups. All studies implicitly assume that if such activities are available to members, or are explicitly carried out by them, this increases repayment performance of their group.

Wenner (1995) provides one of the first empirical studies on the determinants of repayment of groups. He uses data of 25 groups from FINCA, a group-based program in Costa Rica. His analysis indicates that repayment performance of groups improves when groups have written (formal) rules stating how members should behave. This variable implicitly measures screening, monitoring and enforcement activities that take place within the groups. Another variable that is found to determine repayment is the location of groups: if groups are located in remote areas this reduces their possibilities to have access to alternative sources of credit, which stimulates them to ensure group repayment as much as possible in order have future access to loans. Wenner, therefore, seems to find support for the fact that these activities take place within groups and that they increase their repayment performance.

Sharma and Zeller (1997) use data of 128 groups from four group-based lending programs in Bangladesh to study the determinants of repayment. Sharma and Zeller use a number of variables that may measure screening, monitoring and enforcement activities within groups. Their results show the following. First, they show that repayment problems increase when there are more relatives in the same group. This supports the hypothesis that screening, monitoring and enforcement among relatives does not take place or at least is less effective, since relatives may more easily collude against the program and delay repayment. Second, the results

¹ These models have been reviewed extensively elsewhere (see, e.g., Ghatak and Guinnane, 1999; Morduch, 1999)

indicate that if borrowers are more credit rationed this increases repayment performance. This result can be taken as evidence for the fact that group members have more incentives to screen, monitor and enforce if they have no alternative credit sources. Third, they find that groups that were formed using a self-selection process show a better repayment performance.

Matin (1998) uses data of 246 borrowers from the Grameen bank, Bangladesh. In his study he finds that members who have other credit sources and who have land use above some threshold level have a higher probability of showing repayment problems. These outcomes may indicate that since these borrowers have other credit opportunities or that they have accumulated substantial assets, they have less interest having future access to loans from the program, which may reduce their screening, monitoring and enforcement activities. This result is similar to the results of Wenner (1995) and Sharma and Zeller (1997).

Zeller (1998) looks at the repayment performance of six group-based lending programs in Madagascar, based on detailed information from 146 groups. Zeller uses measures of social ties between group members and finds evidence that groups with stronger ties show higher repayment rates. This supports the assumption that group members with stronger ties have more information about each other and are therefore better able to screen, monitor and enforce. Moreover, he finds that groups with internal rules and regulations demonstrate better repayment rates, a result that was also reported in the study by Wenner. As explained, such rules and regulations are indirect measures of screening, monitoring and enforcement activities that take place within the groups.

An influential study is carried out by Wydick (1999), who uses data of 137 groups from FUNDAP, a group-based lending program in Guatemala. Of all the papers in this review, this paper uses one of the most extensive lists of variables measuring screening, monitoring and enforcement within groups. Wydick finds evidence for the fact that the average distance between group members negatively influences repayment performance, whereas the knowledge one member has of the weekly sales of other members is positively related to repayment performance. Both variables are assumed to measure monitoring activities within groups: monitoring

becomes more difficult if the distance between members increases, whereas having knowledge about the sales of other members can be taken as evidence for the fact that members monitor each other.

Another frequently cited study is from Paxton, Graham and Thraen (2000). They have data of 140 groups from PPPCR, a group-based lending program in Burkina Faso. They have a number of variables measuring screening, monitoring and enforcement activities and find significant relations between these variables and repayment performance. First, their results show that the homogeneity of the group in terms of their ethnicity, occupation, income, etc., reduces its repayment performance. This may indicate that if members are more homogeneous they have lower incentives to screen, monitor and enforce each other and/or may start to collude against the program, a result that was reported by Sharma and Zeller (1997). Second, Paxton, Graham and Thraen show that groups that have received better training before they started the program have a better repayment performance. During these training programs members learn, among other things, how to behave and the results of this study indicates that these trainings increase screening, monitoring and enforcement activities. Third, Paxton et al. use a measure of group pressure, which is a proxy for enforcement within groups and find this measure to be positively related to repayment performance. Finally, and especially interesting for our own study, Paxton et al. also include a measure of the quality of the group leader in running the group. This measure also is positively related to repayment performance, which may be seen as evidence for the fact that the group leader plays a prominent role in screening, monitoring and enforcement within the group. This is related to our research we report on in this paper.

Finally, Karlan (2004) uses data of over 1,700 individual members of GINCA, a group-based lending program in Peru and finds the following results. First, he shows that the distance between group members has a negative impact on the repayment performance of a group, a result that result that was reported also by Wydick (1999). Second, Karlan shows that if group members are culturally similar this helps to improve repayment performance, based on the assumption that cultural similarity increases the probability that members know each other and therefore will

be better able to screen, monitor and enforce each other. This result seem to contrast with that of Paxton et al. (2000), who found a negative relationship between a measure of cultural similarity and repayment and explained this result in terms of possible collusion against the program.

Based on the above review, we conclude that empirical studies have provided evidence that screening, monitoring and enforcement activities among group members generally improves the repayment performance of groups. We also conclude, however, that most of these studies look at these activities taking place at the group level. They do not look at differences in the intensity and/or effectiveness of these activities of different types of group members. This is what we will do in the remainder of the paper.

3. Group-based lending in Eritrea and the role of the group leader

Currently, two group-lending programs are operating in Eritrea. The Saving and Micro Credit program (SMCP) is active since 1996 and is part of the Eritrean Community Development Fund (ECDF), a government related fund. The funding for this program comes from the Eritrean government, the World Bank and from grants from a number of individual donor countries. The Southern Zone Saving and Credit Scheme (SZSCS) started in 1994 and was launched by the Agency for Co-operation and Research in Development (ACORD), a British NGO. SMCP has its activities all over the country, whereas SZSCS concentrates its efforts in the southern part of Eritrea.

SMCP works through village banks that administer the provision of loans to solidarity groups at the village level. These village banks are established as follows. First, SMCP officials identify rural areas in which village banks should be established. Next, they organize a meeting with a village community and explain how the program works. The moment the village community agrees to the terms and conditions to be followed a village credit committee is elected. The committee consists of an area administrator who acts as a chairperson and two other members who are responsible for accounts and record keeping. Once the committee is established the village bank may start providing credit. The bank elects its own

officers, creates its own by-laws, manages its loan funds, and reviews and approves loan requests.

By the end of 2002 the program had established 162 village banks and had almost 14,000 members. This amount increased quite substantially since the late 1990s: in 1998 the program had only 6,000 members. Groups in SMCP consist of 3-7 members. Group members are not allowed to have family ties. Individuals are only allowed to borrow after they have accumulated mandatory savings equal to 10 per cent of the sum they want to borrow in the previous three months. The village banks typically provide loans to between 35-105 individuals. The size of the loans ranges between USD70 – USD710.² Loans are extended for a large range of activities, such as small-scale trading, dairy production, purchase of oxen, irrigated horticulture and other agricultural activities. All members of a group are individually liable for repayment of the loan made to the group. The main aim of the use of group lending is that due to the joint liability element, group members may have an incentive to monitor each other and, if necessary, may use pressure to force those members who fail or are unwilling to make repayments on time. In case an individual cannot repay, the other group members including the group leader will have to cover the repayment of the loan. Repayments are made on a monthly basis. In October 1999 the program had 6,223 beneficiaries with USD1.4 million of outstanding loans. Until September 1999 the average reported repayment rate was 98 per cent (Seltene, 1999).

The organizational structure of SZSCS is only slightly different from that of SMCP. SZSCS works through credit and savings committees (CSCs) consisting of representatives of solidarity groups based within the villages. These committees evaluate loan requests from groups they receive from the group leaders and forward them to the program management. Based on the information obtained from the CSCs the program management decides whether or not to give a loan to a group. By 1999 the program had reached 192 villages. Groups in SZSCS consist of 3-7 members. The size of the loans ranges between USD70 – USD570. Initial loans to an individual may

² We converted all data on income, loan size, etc, which in the original data set are given in Nakfa, the official currency of Eritrea, into US dollars (USD) using an exchange rate of USD1 = 14 Nakfas. This was the official exchange rate at the time the data for this research were gathered.

be no higher than USD150. Individuals are only allowed to borrow after they have accumulated mandatory savings equal to five per cent of the sum they want to borrow. The amount of loans they are allowed to borrow increases after they have repaid previous loans, *i.e.* the program makes use of dynamic incentives. For repeat loans the savings requirement may go up to a maximum of 15 per cent of the borrowed sum. Again, loans are provided for activities such as small-scale trading, dairy production, purchase of oxen, irrigated horticulture and other agricultural activities. Some 80 per cent of the borrowers live in rural areas. As in SMCP, in SZSCS all members of a group are individually liable for repayment of the loan made to the group and repayments have to be made on a monthly basis. In 2001 the program had a portfolio of 6,250 loans. The reported repayment rate was 98 per cent.³

The above descriptions of SMCP and SZSCS make clear that the activities and organization of both programs are very similar. Table 1 provides an overview of the main characteristics of both programs, showing that they are indeed similar in most respects. They both are active in rural as well as in urban areas. The borrowers in both programs are active as retailers, farmers, or small-scale producers. Both programs are set up along the lines of the Grameen Bank model. Groups are formed through self-selection. After a group is accepted by one of the two programs, members are required to go through a short training program. Group members regularly meet to discuss issues like the performance of their economic activities and repayment performance of individuals.

<INSERT TABLE 1 HERE>

Groups in both programs have to select a group leader. The group can select anyone of its members to become the group leader. The group leader is the intermediary between the group and the program staff (*i.e.* the program's credit officer and/or the village credit committee or bank). He/she has to regularly report to the program's staff on the performance and sustainability of the group. Moreover,

³ All data on SZSCS are obtained from the ACORD website, and in particular from the page providing information on SZSCS: www.acord.org.uk/h-ert4.htm (consulted on 6 February

he/she has to chair group meetings, collect the install payments from group members and transfer them to the credit officer, visit group members regularly and discusses business and/or group related problems, and call for extra group meetings if repayment problems occur. Being a group leader is a voluntary activity; it does not generate any (financial) remuneration.

Based on this description of tasks, we conclude that the group leader plays a prominent role in the functioning of the group. In particular, several of his/her activities described above seem to be related to monitoring and enforcement of other members. For example, the decision to call for extra group meetings can be seen as an effort to increase monitoring, and perhaps even enforcement efforts by the group leader. Moreover, his/her role of collecting install payments from group members and reporting to the program on the performance of the group provides the group leader additional channels through which information is collected and monitoring and enforcement may take place. This also holds for his/her explicit task, demanded by the program, to regularly visit other members and discuss their problems. These channels are less explicitly available to the other group members.

This leads to us to hypothesize that especially monitoring and enforcement activities within a group may differ between the group leader and the other group members. More precisely, we expect these activities to be more strongly related to repayment performance when performed by the group leader than by the other group members, either because group leaders show a higher intensity of monitoring and enforcement, or because their activities are more effective in promoting repayment of group loans. This hypothesis will be tested in the next sections.

4. The sample

In the year 2000 we conducted a survey among 102 groups, of which 56 were in SMCP and 46 were in SZSCS.⁴ Most of these groups were based in small villages and secondary towns of Eritrea. In the survey we asked questions about the socio-economic characteristics of the group members, as well as about the saving and

2003).

⁴ The complete questionnaire is available upon request from the authors.

repayment performance of individual group members. In addition, we included questions on the group formation process, the existence of social ties, and on processes of screening, monitoring and enforcement within groups. From each group we selected the group leader and one or more other members to answer the questions. Part of the questions was submitted to both the group leader and the other member(s) of each group; another part of the questions was specifically asked to the group leader. We included separate questions for the group leader, since, as was described earlier, we observed that the group leader has a quite important role to play as a representative of the group to the program organization. This set-up of the questionnaire provides us with a unique data set, in which we have information on characteristics and group behavior related to screening, monitoring and enforcement at the individual level. In particular, it allows us to investigate behavior of the group leaders versus that of the other group members, and the impact of this behavior on repayment performance of the groups.

Through the questionnaire we obtained information from 351 group members, of which 102 were group leaders. Of the total sample of group members, 167 were participating in the SZSCS program and 184 in the SMCP program. Within the sample, 196 borrowers were females (56 per cent) and 155 were males. The majority (68 per cent) of the respondents had no or only primary education. The average monthly income of group members was approximately USD75. Trade (63 per cent) and farming (17 per cent) were the main occupations of group members; many of them usually had two (or more) occupations at the same time.

On average groups were composed of 4.5 members, with a median of 4, ranging from a minimum of three to a maximum of seven members. The amount of loan cycles (or loan rounds) groups had completed up to the interview ranged from a minimum of two to a maximum of seven with an average of 3.6 cycles. Group savings were approximately USD155, ranging from just USD20 to USD500. Group loans ranged from USD54 to USD607 with mean and median loan size of USD282 and USD250, respectively. Loan terms varied from three to 24 months. Group members mainly used the loans for working capital purposes. In some cases, the money was used to buy livestock and raw materials. Only 18 respondents reported

they had other sources of credit, such as banks (5), money lenders (2) and relatives (6), next to the loan from the group lending program. Most respondents (337) had never even applied for a bank loan. This seems to indicate that the group members were dependent on the group loans for external funds. Of the total sample, 17 per cent of the group members responded they have had repayment problems in the past.

Of the 102 group leaders, 46 were in a group in the SZSCS program and 56 in a group of the SMCP program; 54 of them were males (53 per cent) and 48 were females. Group leaders income was similar (USD72) to the average income level of all group members in the sample. They were also very similar to the average group member in terms of occupation: 61 per cent of them were active in trade, whereas 15 per cent were active in farming.

5. The empirical model

As was already mentioned above, the empirical literature described in section 2 is different from this paper's work. Whereas most other empirical papers use data acquired only from one group member as a representative of his group, in this paper, we have data from at least two members of each group. One of these members is the group leader and the other (s) is (are) member(s) other than the group leader. This allows us to split the information for the independent variables, such as individual characteristics and group behavior into two separate variables, one related to the group leader and one related to the other group members excluding the group leader.

The specification of the empirical model we use can be summarized as follows:

$$ARREAR = \alpha + \beta GL + \gamma NGL + \delta GROUP + \mu \quad (1)$$

ARREAR is a vector of dependent variables; *GL* is a vector of variables reflecting screening, monitoring and enforcement efforts, social ties and individual characteristics of group leaders; *NGL* is a vector of variables reflecting screening, monitoring and enforcement efforts, social ties and individual characteristics of the

other group members; and *GROUP* is a vector of variables reflecting screening, monitoring and enforcement efforts, and characteristics at the group level.

We use three different dependent variables: *ARREAR 1*, *ARREAR 2* and *ARREAR 3*. All three variables are dummy variables that have 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.

We use a logit model to estimate the effects of independent variables on reducing the incidence of repayment problems. These independent variables are measures of screening and monitoring and enforcement activities, social ties, and other control variables. For each variable 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. The set-up of our empirical analysis allows us to investigate whether screening, monitoring and enforcement activities of group leaders have an impact on the repayment performance that is different from the impact of these activities of the other group members. Also, we are able to investigate whether social ties of group leaders have a different impact on repayment than those of the other group members. As explained before, the existence of these ties is expected to raise the effectiveness of screening, monitoring and enforcement activities, and this way they are expected to improve repayment performance. The variables related to group members other than the group leader are presented in averages; this is not the case for variables related group leaders.

Initially, we aimed at using all variables for which we had information in our empirical investigation. Yet, after carefully analyzing the data we were forced to drop several variables because of high correlation between some of them. Moreover, some variables showed very low variability, which made it not useful to include them in the

analysis. Therefore, in the analysis on which we report in this paper we only use a subset of the variables we had information on.⁵ In particular, due to the data problems, variables measuring screening and enforcement activities had to be deleted from the complete list of variables. This is why the paper only focuses on differences in monitoring activities and social ties of group leaders and other group members and their impact on repayment performance.

The list of variables used in the analysis is given below. First, we discuss eight group leader-specific variables (the vector *GL* in equation (1)). These variables can be divided into three sub-sets:

- Variables measuring monitoring at the individual level:
 - *DIST* = the average distance (in meters) of homestead or business location of the group leader from the other members of the group;
 - *VISTDUM* = 1 if the group leader regularly visits the other members of his group.
- Variables measuring social ties:
 - *KNMEMDUM* = 1 if the group leader knew the other group members before the formation of the group;
 - *LIVE* = the length of time (in years) the group leader has lived in the interview area.
- Control variables measuring personal characteristics of group members:
 - *AGE* = the age of the group leader;
 - *AINSTAPA* = the monthly install payment of the group leader as a percentage of his income;
 - *VFACCESS* = the value group leader attaches to having access to loans from the lending program in the future, ranging from 1 (=very highly value) to 4 (=very low value);
 - *EDUCATION* = the educational background of the group leader, ranging from 1 (= illiterate) to 4 (= secondary).

⁵ The full list of variables for which we have information through the questionnaire, as well as the correlation analysis we performed to obtain the subset of variables we have used in the analysis in this paper, can be obtained from the authors.

Next to the group leader-specific variables, we have the same eight variables for the other group members (the vector *NGL* in equation (1)). The variable names of these variables are similar, yet in some cases shorter. Also, the prefix *AV* is added to the above mentioned variable names, indicating that they refer to averages of other group members. Moreover, *NGL* is added to the name to indicate that a variable relates to the other group members. Thus, for example the variable *KNMEMDUM* for the group leader is transformed into *AVKNMNGL* for the other group members. Finally, we have two group-level variables (the vector *GROUP* in equation (1)):

- *GRAGRDUM* = 1 if the group has rules and regulation on how to run the group;
- *NOMEM* = the amount of members in a group.

Table 2 summarizes the list of variables used in our empirical analysis. Table A2 in the appendix of the paper provides the descriptive statistics of these variables.

<INSERT TABLE 2 HERE>

The variables *DIST* and *VISTDUM* indicate the extent to which group members have information about each other, which may assist them to monitor each other. For *DIST* we expect a positive sign of the coefficient: the longer the distance between a member and other group members the more difficult it is to monitor his peers and the higher the repayment problems. For *VISTDUM* we expect a negative sign of the coefficient: 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 *GRAGRDUM* is also related to monitoring but refers to the group as a whole. For *GRAGRDUM* we expect to find a negative sign: if the dummy is equal to 1 it indicates that the group uses rules and regulations, which may enhance monitoring activities, and this helps to reduce the probability of repayment problems.

The variables *KNMEMDUM* and *LIVE* measure the degree to which individuals within a group are expected to have social ties. *LIVE* indicates to what

extent group members live in the same vicinity; *KNMEMDUM* measures whether they know each other before the formation of the group. Living close to each other and knowing the other members may help to monitor each other's behavior in advance of group formation and use social sanctions against delaying members, which help 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 probability of repayment problems from occurring. Similarly, for *LIVE* the longer a group member has lived in the locality the higher the extent of 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 expect no explicit sign, it may have a positive or negative sign depending the theoretical model used/applied⁶. For *AINSTAPA* we expect to find a positive sign: the higher the amount of a member's install payment as a percentage of his income, the higher the probability this individual faces repayment problems. For *VFACCESS* we expect a negative sign. The higher the value members assign to future credit assess from the lending program the lower the incidence of repayment problems. For *AGE* and *EDUCATION* we have no clear expectations about the sign of the coefficient.

6. Empirical results

The empirical analysis is carried out as follows. We start by estimating the complete model, using logit analysis. The model includes 18 independent variables: eight for the vector *GL*, eight for the vector *NGL* and two for the vector *GROUP*. Next, we delete variables from the model for which we do not find significant coefficients,

⁶ 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 Fische, 1993). On the other hand, the larger the group size, the lower the degree of monitoring among group members, as the likelihood of free riding increases, leading to an increased likelihood of repayment problems (Armendariz de Aghion, 1999).

until we find the best fitting model, that is, the model including only significant coefficients.⁷ To achieve this, we delete those variables for which the Z-statistic of the coefficient is less than one. Tables 3, 4 and 5 provide the results of the empirical analysis. The Z-statistics are given in parentheses.

Table 3 shows the results when using *ARREAR 1* (repayment problems of all members of a group) as the dependent variable. Equations 3-1 to 3-3 indicate that some of the variables have statistically significant coefficients, even after excluding non-significant variables, indicating that these variables do play a role in mitigating repayment 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 the value group leaders give to future access to loans from the program, the higher the repayment performance of groups. 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 3. This variable indicates that the higher the install payment burden of group members other than the group leader as a percentage to their income the higher the probability of repayment problems.

<INSERT TABLE 3 HERE>

Table 4 shows 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

⁷ The econometric strategy we follow here is the so-called general-to-specific approach. Another way of approaching the econometric modeling is to take the specific-to-general (or bottom-up) approach, which starts from a small model, including only theoretically correct variables and then test various specifications of this smaller model. There is discussion about which of these two approaches is preferred (Brooks, 2002). One of the advantages of the approach we have taken is that "...the statistical consequences from excluding relevant variables are usually considered more serious than those from including irrelevant variables." (Brooks, 2002, pp.209-210).

equation 4-2. 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 4-2. *AVINSTNGL* appears with the expected sign indicating that the higher the install payment burden of group members other than the group leader as a percentage of their income, the higher the probability of repayment problems.

<INSERT TABLE 4 HERE>

Table 5 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 monitoring and social ties are not among them. From the variables related to group leader *AGE* is statistically significant indicating that the older the group leader, the higher the repayment problems he faces. 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 and this shows that the higher the monthly repayment burden of the group leader the higher is his repayment problems. *VFACCESS* indicates that the higher the value group leader gives to future access of loans from the program the lower are his repayment problems.

<INSERT TABLE 5 HERE>

Below, we summarize the main results of the empirical analysis and discuss how these results may be interpreted. Table 6 provides an overview of the main results from Tables 3-5.

<INSERT TABLE 6>

Most importantly, the empirical analysis provides statistical evidence for the hypothesis that social ties of the group leader are more strongly related to repayment performance than social ties of other group members. Group leaders in the Eritrean lending programs play a role in compelling members to repay through social ties (*KNMEMDUM* is statistically significant), which leads to better repayment performance. There is no evidence that social ties of the other group members have a similar effect (*AVKNMNGL* is never statistically significant). These results are reported in Tables 3 and 4.

In contrast, we are unable to find evidence for the hypothesis that monitoring of group leaders is more strongly related to repayment performance than monitoring of other group members. None of the monitoring variables (neither for the group leader, nor for the other group members) is found to be statistically significant.

The fact that social ties of the group leader positively affect group repayment, whereas his/her monitoring activities do not, leads us to conclude that social ties of the leader are mainly used to pressure other group members to repay.

How can we explain the results with respect to the different impact of social ties of the group leader versus the other group members on repayment performance? We propose two alternative interpretations.⁸ First of all, this result may indicate that group leaders actively use social ties to compel other group members to make their repayments in due time, whereas the other group members do not. Apparently, the other group members stay aloof from using their social ties activities to pressure their fellow group mates and leave the group leaders to do the job for them. Put differently, in case of the group leaders the social ties variables really do measure 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 occurrence of moral hazard. As was discussed in section 3, in the Eritrean programs a group leader has quite an important role to play as the representative of the group to the

⁸ Our analysis does not allow us to decide which of the two interpretations is most likely to hold in practice.

program organization and he/she may generate all kinds of activities that may help improve repayment performance of the group he/she represents. This may leave little incentives for other group members to put much effort into using their social ties to pressure group members to repay, especially since these efforts may be costly and time consuming.

Alternatively, the results may indicate that social ties of group leaders are efficient in reducing repayment problems, whereas social ties of other group members are not. Thus, if the group leader knows the other members he/she really uses this knowledge to put pressure on other members to repay their debts, which reduces incidences of repayment problems. At the same time, if other group members know other members and this is used to pressure to repay, this does not reduce the probability of repayment problems. Apparently, group members only feel pressured to behave prudently when the group leader pressures them, perhaps because he/she may have more means to sanction repayment problems due to his role as the representative of the group to the program organization.

The final question we have to address then is why an individual may be interested in becoming a group leader? As was stated in section 3, being a group leader is a voluntary activity; it does not generate any (financial) remuneration. There are two possible answers to this question.⁹ First, as the results in summary table 6 clearly show, *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 result is found consistently in all three specifications of the model (Tables 3-5). The result may indicate that a group leader attaches a higher than average value to future access to loans from the program. This encourages an individual to take up the position of the group leader, which allows him/her to put more pressure on repayment of group members due to the special tasks he/she has within the group, such as the regularly contact with the program's staff on the performance and sustainability of the group, the chairing of group meetings, collecting the install payments from group members and transfer

⁹ Again, our analysis does not allow us to decide which of the two interpretations is most likely to hold in practice.

them to the credit officer, regularly visiting group members, and calling for extra group meetings if repayment problems occur.

A second answer may be that an individual may attach a high value to becoming a group leader, even though this does not generate a direct formal reward. Being a group leader may generate a stock of (non-financial) obligations of the other group members to the group leader, which he/she may claim at a later date (Warning and Sadoulet, 1998). Thus, if an individual takes up the task of group leader, he/she may be compensated by future support from one or more other group members in constructing his/her house or in harvesting his/her crops. In a rural society with underdeveloped markets and institutions such non-financial obligations may play an important role in the survival strategy of individuals.

7. Conclusions

This paper has analyzed whether monitoring and social ties mitigate the incidence of repayment problems among group members in two group-based lending programs operating in Eritrea. In particular, the empirical has focused on investigating whether the effects of monitoring and social ties of the group leader and other group members on group repayment differ. Based on the description of the characteristics of the programs in Eritrea and the definition of the role of the group leader in these program, we hypothesize that the monitoring activities and social ties of the group leader have a stronger positive impact on the repayment performance of groups. To the best of our knowledge, this is the first empirical study looking at this issue.

Our empirical results show that social ties of the group leader do have a positive effect on repayment performance of groups, whereas this is not true for social ties of other group members. So, with respect to social ties our hypothesis is supported. We do not find evidence for the hypothesis that monitoring activities of the group leader have a stronger positive impact on group repayment performance. All variables measuring monitoring activities, either of the group leader or the other group members, are found to be statistically insignificant.

The importance of our results, we believe, is twofold. First of all, they show that when studying repayment performance of group-based programs, it is important

take into account differences in behavior of individual group members to explain why a group repays or not. We have shown that these differences exist between the group leader and the other group members. Secondly, the results of this study actually do seem to question existing theoretical models of how group-based lending works. Whereas most models assume that all group members perform monitor and enforcement activities and that it effectively leads to improving repayment performance, this study suggests that this may not be true. Our results do seem to suggest that, at least in the Eritrean case, a model of delegated monitoring exists, where the group leader is the delegated monitor of the microfinance program.

Further research on the issues addressed in this paper could go a number of ways. We suggest two here. First, the methodology proposed in our study to separately look at the group leader and the other group members when it comes to monitoring and enforcement activities, should also be applied for other programs in other countries to see whether the results from this study can be generalized. Second, theoretical as well as empirical studies could verify whether the delegated monitoring model, to which our results seem to be related most, is superior or not in terms of reducing repayment problems as compared to other group-based lending practices.

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Table 1: Comparing the Characteristics of the Two Eritrean Group-lending Programs (as of 2002)

	<i>SMCP</i>	<i>SZSCS</i>
Membership	14,000	9,000
Average loan balance (in Nafkas)	1,658	1,897
Typical loan term	One year	One year
Percent female members	45	51
Mostly rural or urban?	Mostly rural	Mostly rural
Group-lending contracts?	Yes	Yes
Collateral required?	No	No
Compulsory savings before loans are made?	Yes	Yes
Voluntary savings emphasized?	No	No
Progressive lending?	Yes	Yes
Regular repayment schedules	Monthly	Monthly
Target clients for lending	Poor	Poor
Currently financially sustainable?	No	No
Nominal interest on loans (annually)	16%	14%

Table 2: Description of the independent variables used in the analysis

Variable name	Type	Explanation
DEPENDENT VARIABLES		
<i>ARREAR 1</i>		1 if at least one member of a group indicated that he has had repayment problems in the current loan cycle
<i>ARREAR 2</i>		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
<i>ARREAR 3</i>		1 if the group leader indicated that he has had repayment problems in the current loan cycle
GROUP LEADER VARIABLES (= vector GL)		
<i>KNMEMDUM</i>	Social ties	1 if the group leader knows the other group members before forming the group
<i>LIVE</i>	Social ties	Number of years the group leader has lived in the survey area
<i>DIST</i>	Monitoring	Average distance (in meters) between the group leader and other members of the group
<i>VISTDUM</i>	Monitoring	1 if the group leader regularly visits other group members
<i>VFACCESS</i>	Personal/ control	The value the group leader attaches to having access to loans from the credit program in the future; ranges from 1 (= very high) to 4 (= very low)
<i>AINSTAPA</i>	Personal/ control	Monthly install payment of the group leader (% of income)
<i>AGE</i>	Personal/ control	Age of the group leader (in years)
<i>EDUCATION</i>	Personal/ Control	Educational background of the group leader; ranges from 1 (= illiterate) to 4 (= secondary school)
OTHER GROUP MEMBERS (= vector NGL)		
<i>AVKNMNGL</i>	Social ties	1 if the group member knows the other group members before forming the group
<i>AVLIVNGL</i>	Social ties	Number of years the group member has lived in the survey area
<i>AVDISTNGL</i>	Monitoring	Average distance (in meters) between a group member and other members of the group
<i>AVISTNGL</i>	Monitoring	1 if the group member regularly visits other group members
<i>AVFACNGL</i>	Personal/ control	The value the group member attaches to having access to loans from the credit program in the future, ranging from 1 (= very high) to 4 (= very low)
<i>AVINSTNGL</i>	Personal/ control	Monthly install payment of the group member (% of income)
<i>AVAGENGL</i>	Personal/ control	Age of the group member (in years)
<i>AVEDUNGL</i>	Personal/ Control	Educational background of the group member; ranges from 1 (= illiterate) to 4 (= secondary school)
OTHER VARIABLES (= vector GROUP)		
<i>GRAGRDUM</i>	Group/ control	1 if the group has rules and regulation on how to run the group
<i>NOMEM</i>	Group/ control	Number of members in a group

Table 3: Logit estimation results using ARREAR 1 as the dependent variable

	3-1	3-2	3-3
GROUP LEADER VARIABLES			
<i>KNMEMDUM</i>	-1.946 (-2.608)***	-1.292 (-2.024)**	-1.192 (-1.948)*
<i>AGE</i>	0.018 (0.722)		
<i>DIST</i>	0.001 (1.118)	0.001 (1.106)	
<i>AINSTAPA</i>	1.025 (0.791)		
<i>VFACCESS</i>	0.953 (2.014)**	1.121 (2.654)***	1.082 (2.684)***
<i>VISTDUM</i>	-0.101 (-0.189)		
<i>LIVE</i>	0.010 (0.561)		
<i>EDUCATION</i>	-0.145 (-0.412)		
OTHER GROUP MEMBERS			
<i>AVKNMGL</i>	1.650 (1.825)		
<i>AVDISTNGL</i>	-0.864 (-0.171)		
<i>AVAGENGL</i>	-0.021 (-0.642)		
<i>AVLIVNGL</i>	0.015 (0.849)		
<i>AVINSTNGL</i>	2.122 (1.575)*	2.400 (2.536)**	2.376 (2.485)**
<i>AVFACNGL</i>	0.224 (0.630)		
<i>AVISTNGL</i>	-0.748 (-1.099)	-0.443 (-0.703)	
<i>AVEDUNGL</i>	0.177 (0.455)		
OTHER VARIABLES			
<i>GRAGRUM</i>	0.153 (0.273)		
<i>NOMEM</i>	-0.139 (-0.598)		
<i>CONSTANT</i>	-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

Notes: The Z-statistics are given in parentheses. Explanation of the variable names can be found in table 2. *, **, *** denote statistical significance at the 10, 5 and 1 per cent level.

Table 4: Logit estimation results using ARREAR 2 as the dependent variable

	4-1	4-2	4-3
GROUP LEADER VARIABLES			
<i>KNMEMDUM</i>	-2.500 (-2.817)***	-1.193 (-1.916)*	-1.117 (-1.869)*
<i>AGE</i>	-0.011 (-0.404)		
<i>DIST</i>	0.001 (0.844)		
<i>AINSTAPA</i>	1.096 (0.857)		
<i>VFACCESS</i>	0.650 (1.502)*	0.735 (1.948)*	0.695 (1.894)*
<i>VISTDUM</i>	0.128 (0.233)		
<i>LIVE</i>	0.050 (2.161)		
<i>EDUCATION</i>	0.125 (0.351)		
OTHER GROUP MEMBERS			
<i>AVKNMNGL</i>	1.523 (1.579)		
<i>AVDISTNGL</i>	0.715 (0.141)		
<i>AVAGENGL</i>	0.015 (0.364)		
<i>AVLIVNGL</i>	0.003 (0.167)		
<i>AVINSTNGL</i>	1.260 (1.005)	1.752 (1.868)*	1.663 (1.876)*
<i>AVFACNGL</i>	-0.243 (-0.643)		
<i>AVISTNGL</i>	-0.801 (-1.286)	-0.738 (-1.105)	
<i>AVEDUNGL</i>	0.382 (1.017)	0.420 (1.109)	
OTHER VARIABLES			
<i>GRAGRDUM</i>	0.212 (0.358)		
<i>NOMEM</i>	-0.302 (-1.043)	-0.076 (-0.388)	
<i>CONSTANT</i>	-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

Notes: The Z-statistics are given in parentheses. Explanation of the variable names can be found in table 2. *, **, *** denote statistical significance at the 10, 5 and 1 per cent level.

Table 5: Logit estimation results using ARREAR 3 as the dependent variable

	5-1	5-2	-3
GROUP LEADER VARIABLES			
<i>KNMEMDUM</i>	1.394 (1.051)		
<i>AGE</i>	0.085 (2.796)***	0.066 (2.691)***	0.049 (2.635)***
<i>DIST</i>	0.001 (0.859)		
<i>AINSTAPA</i>	2.237 (1.479)	2.732 (2.277)**	2.239 (2.167)**
<i>VFACCESS</i>	1.488 (2.144)**	1.371 (2.066)**	1.227 (1.879)*
<i>VISTDUM</i>	0.124 (0.141)		
<i>LIVE</i>	-0.049 (-1.912)*	-0.024 (-1.291)	
<i>EDUCATION</i>	-0.271 (-0.517)		
OTHER GROUP MEMBERS			
<i>AVKNMNGL</i>	1.358 (1.168)		
<i>AVDISTNGL</i>	-0.001 (-0.412)		
<i>AVLIVNGL</i>	-0.010 (-0.483)		
<i>AVINSTNGL</i>	1.620 (0.928)		
<i>AVFACNGL</i>	0.624 (1.153)	0.368 (0.981)	
<i>AVISTNGL</i>	-0.164 (-0.147)		
<i>AVEDUNGL</i>	0.287 (0.619)		
OTHER VARIABLES			
<i>GRAGRDUM</i>	-1.045 (-1.060)	-0.897 (-0.934)	
<i>NOMEM</i>	0.212 (0.688)		
<i>CONSTANT</i>	-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

Notes: The Z-statistics are given in parentheses. Explanation of the variable names can be found in table 2. *, **, *** denote statistical significance at the 10, 5 and 1 per cent level.

Table 6: Summary results of the logit estimations using different definitions of ARREAR as the dependent variable

	<i>AREAR 1</i>	<i>ARREAR 2</i>	<i>ARREAR 3</i>
<i>GROUP LEADER VARIABLES</i>			
<i>KNMEMDUM</i>	-1.192 (-1.948)*	-1.117 (-1.869)*	
<i>AGE</i>			0.049 (2.635)***
<i>AINSTAPA</i>			2.239 (2.167)**
<i>VFACCESS</i>	1.082 (2.684)***	0.695 (1.894)*	1.227 (1.879)*
<i>OTHER GROUP MEMBERS</i>			
<i>AVINSTNGL</i>	2.376 (2.485)**	1.663 (1.876)*	
<i>CONSTANT</i>	-2.129 (-2.700)***	-1.681 (-2.184)***	-6.893 (-4.121)***
Number of obs.	102	102	102
Obs. with dependent = 0	68	74	89
% of correctly predicted	75	75	91
McFadden R^2	0.11	0.07	0.16

Notes: The Z-statistics are given in parentheses. Explanation of the variable names can be found in table 2. *, **, *** denote statistical significance at the 10, 5 and 1 per cent level.

APPENDIX

Table A2: Descriptive statistics of the variables used in the empirical analysis

Variable name	Mean	Median	Maximum	Minimum	Standard Deviation
<i>DEPENDENT VARIABLES</i>					
<i>ARREAR 1</i>	0.33	0	1	0	0.47
<i>ARREAR 2</i>	0.27	0	1	0	0.45
<i>ARREAR 3</i>	0.12	0	1	0	0.34
<i>GROUP LEADER VARIABLES</i> (= vector <i>GL</i>)					
<i>KNMEMDUM</i>	0.84	1	1	0	0.36
<i>LIVE</i>	32.71	31.50	75.00	2.00	19.14
<i>DIST</i>	630.10	325.00	5000	5.00	1056.00
<i>VISTDUM</i>	0.71	1	1	0	0.46
<i>VFACCESS</i>	1.26	1.00	4.00	1.00	0.56
<i>AINSTAPA</i>	0.38	0.33	1.21	0.06	0.23
<i>AGE</i>	45.00	44.50	75.00	22.00	11.75
<i>EDUCATION</i>	2.19	2	4	1	0.87
<i>OTHER GROUP MEMBERS</i> (= vector <i>NGL</i>)					
<i>AVKNMNGL</i>	0.82	1	1	0	0.30
<i>AVLIVNGL</i>	33.00	34.75	67.00	3.50	16.70
<i>AVDISTNGL</i>	373.67	227.50	2766.67	5.00	444.21
<i>AVISTNGL</i>	0.76	1	1	0	0.35
<i>AVFACNGL</i>	1.45	1.33	5	1	0.68
<i>AVINSTNGL</i>	0.42	0.34	1.73	0.05	0.25
<i>AVAGENGL</i>	46.49	47.50	68.50	22.00	9.15
<i>AVEDUNGL</i>	1.82	2	3	1	0.61
<i>OTHER VARIABLES</i> (= vector <i>GROUP</i>)					
<i>GRAGRUM</i>	0.28	0	1	0	0.45
<i>NOMEM</i>	4.48	4	8	3	1.43