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**DETERMINANTS OF REPAYMENT PERFORMANCE IN  
CREDIT GROUPS: THE ROLE OF PROGRAM DESIGN,  
INTRA-GROUP RISK POOLING, AND SOCIAL COHESION  
IN MADAGASCAR**

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## **ABSTRACT**

Group lending has received much attention in recent years because of its perceived potential in providing financial services to poor households that lack traditional collateral. The analysis in this paper focuses on the effects of program design, community and group characteristics on the repayment performance of groups, using a data set on groups from six different lending programs in Madagascar. The results show that socially cohesive groups pool risks by diversifying the members' asset portfolio so that their repayment performance is improved even in communities with high-risk exposure.

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# **DETERMINANTS OF REPAYMENT PERFORMANCE IN CREDIT GROUPS: THE ROLE OF PROGRAM DESIGN, INTRA-GROUP RISK POOLING, AND SOCIAL COHESION IN MADAGASCAR\***

## **1. INTRODUCTION**

Since the 1970s, group lending programs have been promoted in many developing countries. A common characteristic of group lending is that the group obtains a loan under joint liability, so each member is made responsible for repayment of loans of his or her peers. Most schemes give subsequent credit only if the group has fully repaid its previous loan. The joint liability, but possibly more so, the threat of losing access to future credit, incites members to perform various functions, including screening of loan applicants, monitoring the individual borrower's efforts, fortunes, and shocks, and enforcing repayment of their peers' loans.

When performance is measured with a repayment rate, group lending shows a mixed success (Huppi and Feder 1990). The existing theoretical models of peer monitoring deduce that the repayment performance in group-lending programs is positively related to the homogeneity of members with respect to the riskiness of their projects (Stiglitz 1990; Devereux and Fishe 1993; Besley and Coate 1995). There is little empirical evidence to confirm or reject the models' hypotheses.

The purpose of the paper is to quantify the effect of intra-group pooling of risky assets or projects by controlling for community-level and program design factors that influence the repayment rate of group loans. The descriptive and econometric analysis is based on a random sample of 146 groups from six different group-lending programs in Madagascar. Apart from external rules governing member eligibility, the formation of these groups is

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basically an endogenous process. Thus, individuals are allowed to self-select each other with their preferred peers. Most Malagasy households grow rice in irrigated lowlands or terraces. However, rainfed upland constitutes more than half of total landholdings in the sample households. Since the returns from upland are highly variable, upland can be considered a risky asset, while irrigated lowland for rice cultivation is an asset yielding relatively safe returns. The econometric analysis of repayment rates rejects the hypothesis that groups consisting of members with homogenous risk exposure have higher repayment rates. On the contrary, with an increasing coefficient of variation of possession of upland between members, repayment rates of group-lending schemes significantly improve. The results indicate that groups exploit scope and scale economies of risk by pooling risks and by entering into informal insurance contracts. The analysis confirms the role of social cohesion and other major hypothesized determinants that have been postulated in the recent literature on determinants of group repayment.

The paper is structured as follows. In Section 2, I briefly review the rationale for group lending, and discuss the major hypotheses found in the literature concerning the determinants of repayment rates in group lending. In Section 3, I present the sample design and major characteristics of the formation, structure, and conduct of the group-based credit schemes. The results of the regression model are presented and discussed in Section 4. The paper concludes with implications for policy and future research.

## **2. RATIONALE AND REPAYMENT PERFORMANCE OF GROUP LENDING**

In group-lending programs, the functions of screening, monitoring, and the enforcement of repayment are, to a large extent, transferred from the bank agent to group members. The financial intermediary reduces recurrent lending transaction costs by replacing a multiple of small loans to individuals with a larger group loan (Bhatt 1988; Adams 1988). This reduction in transaction costs enables financial intermediaries to bank with poorer loan applicants, who demand small loans and who would not receive any credit under an individual loan contract because of excessive unit transaction costs of tiny loans. Thus, the bank can potentially realize economies of scale through group lending, while poor households gain access to formal loans.

The cost of forming and training the groups, however, constitutes a significant initial investment. In most, if not all, group-lending programs, these start-up costs are covered entirely by government or donor funds, as banks appear, thus far, to be unwilling to shoulder the investment risks of forming member-based financial institutions at the community level. Banking institutions cannot be assured that the group, once formed, maintains a long-term business relationship in order to amortize the bank's investment in human and institutional capital. The group may well decide, in the future, to switch to a competing financial institution that offers more attractive services. Many programs try to avoid such unloyal client behavior by restricting members from participating in other group-based credit and savings programs. The enforcement of these restrictions proves difficult and costly in practice: members of one group often contract in other programs, and sometimes an entire group switches from one program to another. The possibility of switching from one program to the other could inhibit private investors from forming their network of groups, since they cannot be sure whether they or their competitors reap the benefits of this investment. This kind of market failure may constitute one of the arguments that could justify public

investment and subsidies for the formation of member-based financial institutions at the community level.

Probably the most important rationale for group lending is the information and monitoring advantages that member-based financial institutions at the community level have, compared to individual contracts between a bank and borrower. Stiglitz (1990) and Varian (1990) discuss these perceived advantages of collective action in screening loan applicants and monitoring borrowers. The main argument is that, compared to socially and physically distant bank agents, group members obtain, at a lower cost, information regarding the reputation, indebtedness, and wealth of the loan applicant and about his or her efforts to ensure the repayment of the loan. Zeller (1994) shows that members of formal groups—similar to informal lenders—consider the peer's indebtedness in the informal market as a major determinant of credit rationing. Thus, group members are able to stress sensitive information the same as informal lenders.

In addition, groups may also have a comparative advantage in enforcement of loan repayment. Given the limited legal systems in rural areas of developing countries, the formal lender usually has limited options to compel repayment from delinquent borrowers. Nonresident bank agents have little leverage and perhaps also little incentive in actually going to a village and seizing collateral. Group members can potentially employ social sanctions or seize physical collateral from the defaulter (Besley and Coate 1995). Furthermore, group members appear to be in a much better position to assess the reason for default, and to offer insurance services to members who are experiencing shocks beyond their control.

On the other hand, several factors may undermine the repayment performance of group lending under joint liability. First, since the risk of loan default by an individual is shared by his or her peers, a member may choose a riskier project compared to that in the case of an individual contract, and may count on other members to repay his or her loan. To avoid this adverse selection of risky projects, the peers can opt to assess the riskiness of each other's

projects. Second, repayment incentives for a good borrower will vanish under joint group liability, when he or she expects that significant number of peers will default. Besley and Coate (1995) point out, therefore, that group lending has both positive and negative effects on repayment rates. In each loan cycle, a group member will compare the discounted benefits of having access to future loans with the discounted costs of repaying the current loan, of bailing out delinquent members, and of reminding, annoying, or even sanctioning peers with loan defaults. The latter costs arise because of a potential reduction of the social capital owned by the member, which can occur when, as a result of the actions taken for enforcing loan repayment, the potential defaulter reduces the quality and extent of future human, social, and economic relationships with the member who attempts to compel repayment.

Bratton (1986) analyzes the repayment record of credit groups in Zimbabwe and shows that expectations about the peers' probability of repaying the loan influences the repayment of an individual member: group loans performed better than individual loans in years of good harvest, but worse in drought years. As argued by Varian (1990), such domino-like effects may be mitigated if group members are able to exclude potentially bad borrowers. Even if a group excludes willful defaulters, the occurrence of covariate shocks, such as drought, crickets, or flood, may make it impossible for members to repay the loan. The sustainability of group-lending programs in areas with high covariate risks will then depend on the ability of the financial intermediary to reschedule the loan of defaulting members or to raise emergency funds from members during normal years. Indeed, many group-based credit and savings schemes require a fraction of the loan amount to be deposited in an emergency fund, which is then used in a crisis to write-off or reschedule loans. Prominent examples are the Grameen Bank and the Bangladesh Rural Advancement Committee (BRAC). In 1993, the Grameen Bank rescheduled loans of members living in flood-affected areas. Credit guarantee funds that are solely financed by the government or donors introduce a moral hazard problem. When externally financed, they have failed in most cases, if not all.

Several authors argue that strong incentives exist for groups to form among individuals with similar risk characteristics (Stiglitz 1990; Devereux and Fische 1993). If one individual is more prone to default than others, he or she is being subsidized, since the peers share the risk of default under joint liability. Thus, an individual with low-risk exposure would like to group together with other low-risk individuals. However, Stiglitz's model assumes that the probability of success or failure is independent of the peers' projects. This assumption appears to induce the model's result that groups form among individuals with homogeneity in risks. It is argued in this paper that an individual can exploit economies of risk by grouping with others who choose projects or specialize in income-earning activities that are negatively correlated with the expected returns from his or her own asset portfolio. Udry (1990) shows in his analysis that state-contingent contracts are chosen in informal credit markets in Nigeria, which allow for direct risk pooling between the creditor and the debtor. There appears to be no reason to believe that such state-contingent contracts are implausible for members of groups with joint liability who want to maximize the utility from present and future loans.

Mathematical models of peer monitoring have focused on the risk attributes of the loan-financed project. However, members who wish to decrease the probability of peer default or want to coinsure themselves are likely to assess the riskiness of the overall asset portfolio chosen by the peer's household economy, not only the marginal effect on risk exposure due to an additional single project. Because family labor constitutes a major production factor, particularly in poor households, risk assessment of the peer's asset portfolio will not only take into consideration the consumption and production durables and financial assets possessed by the household, but also its human and social capital. The assessment of the riskiness of the household's asset portfolio may well encompass the household's available credit line in the informal credit market, alternative formal credit sources, and the household's claims to the informal social security network, all influenced by the social connectedness or social capital of the household members.

Insurance contracts between members can cover idiosyncratic risks, such as illness or individual crop failure. In fact, in cases of idiosyncratic shocks, most group-based credit programs insist that the loan is either repaid by the group, or by the informal insurance network of the individual member hit by bad luck. Hossein (1988) observes that Grameen Bank groups extend financial support to a member in times of genuine difficulty. Wenner (1995) shows that 75 percent of the sample groups in Costa Rica had members defaulting on their loan, but more than half of these groups managed to fully repay the loan to the financial institution by using group savings or by forcing the cosigner of the loan to repay for the defaulter. Thus, the threat of lost access to future loans may induce members to set up implicit insurance contracts. Some group-based credit and savings schemes offer explicit insurance contracts for covering idiosyncratic risks. In order to be sustainable, the insurance service has to be necessarily financed by the members themselves, either through obligatory contributions to an emergency fund, or through individual insurance contracts between the group member and the financial intermediary. For example, the Association for Social Advancement (ASA), a nongovernmental organization operating in many districts of Bangladesh, forgives debt in the case of the death of a member, if the member has repaid half of the loan. BRAC offers life insurance contracts to its members. However, such explicit insurance contracts between the financial institution and the member seem to work only for easily observable risks.

Even for covariate risks associated with natural shocks and bad weather, some scope for reducing the group's exposure to the risk factor exist, such as fragmentation of plots, use of wet lowlands and fields adjacent to rivers during the dry season, intercropping, use of seed mixes, cultivation of different soil types in land-abundant areas, temporary migration of family members, off-farm income diversification, and so forth. Although the options for diversification within a household economy are limited, they increase with the size of a group and the heterogeneity of physical, human, and social capital of the group's members. For example, farmers cultivating rice in irrigated lowlands may want to group with households

that are specialized in rainfed upland or off-farm income generation. Townsend (1995) gives other examples of the many possible risk responses of rural households living under diverse socioeconomic and agroecological conditions.

Another argument for homogeneity in capital and economic activities among group members in the literature reasons that the costs of monitoring a member decrease if he or she undertakes the same trade as his/her peers (Devereux and Fische 1993). While this argument appears justified under *ceteris paribus* conditions, it ignores how information about others is conveniently obtained in a village and which factors determine access to information. The ability to pick up the relevant gossip in the village has probably little to do with one's profession, except if the individual runs the local teahouse or pub. A rice farmer having a carpenter as a neighbor may be in a better position to monitor the labor efforts, character, and good and bad fortunes of the carpenter than the similar characteristics of rice farmers at the other end of the village. Social cohesion, as it is manifested in similarity in social class, ethnic group, neighborhood, friendship, and kinship, appears to be a more important determinant of being able to obtain information about peers than similarity in profession. Sensitive information is expected to be more readily shared and less costly to obtain among socially cohesive groups. Exceptions, of course, exist to this, as in the Hindu caste system, where profession is strongly related to social class.

The argument that the group's homogeneity with respect to social class, kinship, neighborhood, ethnic group, or religion is positively correlated with the group's performance is further supported by the reciprocal or unconditional help among socially cohesive individuals (Robison and Schmidt 1991). Among people who care for each other, an individual gains utility by helping somebody else, even if no claim to future assistance is created. Vice versa, defaulters in socially cohesive groups may incur substantive utility losses due to social sanctions by group members and loss of reputation. Social empathy, or what Bardhan (1993) also describes as "the ability to imagine oneself in the shoes of others," may explain the unconditional help for other people.

### 3. FORMATION, STRUCTURE, CONDUCT, AND LOAN REPAYMENT OF CREDIT GROUPS

In this section, the sampling design and data are presented, and information on the formation, structure, conduct, and loan repayment performance of the six group-lending schemes is given.

#### SAMPLING DESIGN AND DATA

The data is based on a survey in four regions of Madagascar during 1992. The survey comprised three units of observation: (1) households and their members, (2) informal and formal savings and credit groups, and (3) communities. The group-level questionnaire included questions on the process of formation and on the structure, conduct, and savings and loan repayment performance of the group. The respondents were the president of the group and five randomly selected members. The community-level questionnaire contained topics on village demographics: its infrastructure; the community's exposure to risks, such as natural disasters or crop pests; the community's access to agricultural input and output markets; the degree of commercialization of major crops; and the existence of informal and formal groups that provide financial or social insurance services. The mayor of the village responded to this questionnaire.

The survey at the community level was implemented in four agroecological regions. The first two regions comprise the eastern and western parts of the *Vakinankaratra*, a mountainous area with altitudes of 900 to 2,000 meters above sea level. It is highly diverse in rainfall, soil quality, and population density, and is one of Madagascar's high potential agricultural areas. The third region is the river basin of the *Betsiboka*, a major rice production area of the country. The fourth region comprises the central and eastern counties of the *fivondronona* (district) of Betioky, in the semi-arid and poorly developed southern area

of Madagascar. However, in this region, group-lending programs were not found in the small villages, probably because of the remoteness of the region, its low population density, and its low level of economic development.

Most of the rural financial institutions in Madagascar lend through groups. Because of low repayment rates, the agricultural bank largely withdrew from lending to individuals in recent years. Land as collateral proved to be meaningless for compelling repayment in the socioeconomic context of rural Madagascar. In the three survey regions having group-based programs, a total of 14 schemes are operating. However, 12 of the programs operate in the *Vakinankaratra*, whereas only two are in the *Betsiboka* basin. Three of the programs are specialized, in-kind credit programs of agribusiness firms for smallholder wheat, barley, and tobacco enterprises. Here, the loan amount allocated to a member is a function of the acreage planted for the specific crop. The remaining nine programs are administered by nongovernmental organizations. Three of these cooperate with dairy firms in the promotion of milk production. Two of the credit programs are administered by the governmental extension service in conjunction with the rural development bank. Only three of the 14 programs offer savings services, which is seen as a crucial component for rural financial institutions in attaining sustainability and in fully responding to the demand for financial services by the poor. None of the 14 programs is financially viable, since their loan interest rate is equal or not much higher than the formal market rate, so that even the recurrent costs of providing savings and credit services cannot be fully covered.

The sample for village- and group-level surveys was based on a sampling frame that stratified all of the existing 458 villages in the four survey regions, according to two main criteria: population size of the village greater than median in the region or not, and region-specific terciles of the distance from the village to the nearest national road. Sixty-three out of 458 villages were randomly selected from these strata, implying a sampling fraction of 13.8 percent. A proportionate stratification was applied.

The village-level questionnaire was administered in each of the 63 villages. From this village sample, a subsample of villages that had formal credit groups was randomly chosen for surveying at the level of credit groups, but focusing on a cross-section of groups from six of the programs. The selected programs were (1) ODR-GCV: paddy banks of an IFAD-financed project, “Opération Développement Rural,” as well as (2) their group-based short- and medium-term credit program, Associations de Crédit à Caution Solidaire (ACCS); the agricultural credit programs for the production of wheat and barley, administered—in conjunction with the government extension service by (3) the mill, KOBAMA, and by the (4) brewery, MALTO, respectively; the credit program (5) FIFATA of the French nongovernmental organization, FERT, in collaboration with the Malagasy nongovernmental organization, Tsimoka; and (6) a village bank scheme implemented by the French nongovernmental organization, the Centre International de Développement et de Recherche (CIDR) with funding by the Kreditanstalt für Wiederaufbau (German Development Bank). In total, 146 groups were randomly selected. The programs of GCV, ACCS, FIFATA, and KOBAMA were located in both the eastern (Region 1) and western (Region 2) parts of the *Vakinankaratra*, whereas MALTO and KOBAMA were only found in Region 1. The CIDR program operated only in the *Betsiboka* basin (Region 3).

## FORMATION AND STRUCTURE OF GROUPS

In about 75 percent of the groups, the formation was initiated by an extension officer. All programs employ specially trained officers who introduce the regulations and expected program costs and benefits to potential members. Later, these officers also assume the responsibility for training and monitoring the groups. Apart from the extension officer, the president or another member was the initiator of the group.

In all programs, groups are formed through a screening process controlled by the ultimate group members. The extension officer is requested to not interfere with the process of group formation or its ultimate outcome. The differences between applicants with respect to

education, wealth, interests, and bargaining power invariably affect the final composition of the group. Some applicants are rejected, others are persuaded to join. However, the ultimate structure of the group is not only influenced by the processes of self-selection, but also the socioeconomic and agroecological conditions of the group's community and region and by the regulations externally stipulated by the credit program. The latter include (1) regulations that govern the formation and composition of the groups, such as minimum or maximum number of members and criteria for member eligibility, and (2) regulations that influence the conduct of a group, such as the type and costs of financial services provided and the regulations concerning loan sizing and enforcement of repayment. These external regulations differ between the six programs, and result in divergent structural characteristics, conduct, and performance of groups. This will be shown next in the descriptive analysis.

The following tables describe several major characteristics of the structure of groups from the six programs. The relationship between members within the same group is shown in Table 1. Several types of relationships are differentiated, all meant as indicators of social cohesion and homogeneity between group members. On average, for all 146 groups, more than 75 percent of the members come from the same village, and about 40 percent belong to the same hamlet. The majority of members have the same ethnic group as a common bond. However, this does not hold for the CIDR group in the region of Marovoay, an area of immigration. About one-third of all groups are composed of members of the same extended family, again with the exception of the CIDR groups in Marovoay. The percentage of family involvement is especially high in the paddy bank scheme (GCV), a program that enables members to store rice for home consumption and later for sale. As the function of storing and distributing rice is traditionally assumed by the elders (*Ray-a-Mandreny*) of the extended family, it is not surprising that families, in particular, take part in the paddy bank scheme. The

**Table 1 Relationships between members of the same association, at time of creation of association and at time of survey**

	Type of Relationship: All Members Belong to the Same...					
	Village	Hamlet	Ethnic Group	Family	Religion	Sex(Male)
	(relative frequency in percent)					
GCV (n=32)						
Creation	75.0	50.0	90.6	43.8	40.6	28.1
Survey	81.3	46.9	87.5	43.8	40.6	25.0
ACCS (n=55)						
Creation	80.0	50.9	85.5	30.9	38.2	29.1
Survey	70.9	41.8	81.8	30.9	29.1	32.7
FIFATA (n=13)						
Creation	76.9	15.4	84.6	15.4	46.2	30.8
Survey	69.2	23.1	76.9	7.7	38.5	23.1
KOBAMA (n=33)						
Creation	78.8	27.3	93.9	39.4	24.2	30.3
Survey	81.3	31.3	93.8	46.9	28.1	31.3
MALTO (n=7)						
Creation	85.7	42.9	85.7	28.6	14.3	14.3
Survey	85.7	28.6	85.7	42.9	28.6	28.6
CIDR (n=6)						
Creation	83.3	16.7	16.7	0.0	0.0	0.0
Survey	83.3	16.7	16.7	0.0	0.0	0.0
All groups (n=146)						
Creation	78.8	40.4	85.6	32.9	33.6	27.4
Survey	76.0	37.0	82.2	34.2	30.8	28.1

Source: Deleted, in order to not disclose institutional affiliation of author.

pattern concerning religion of the members basically follows the one for the extended family. The percentage of groups solely formed by men is, on average, about 27 percent, but varies between the programs: all of the CIDR groups have female members, whereas about 30 percent of groups of the five programs in Region 1 and Region 2, with the exception of MALTO, have no women as members. All programs—except for CIDR—seemed to do little in actively encouraging the participation of women.

The information on relationship between members within the same group was obtained at two different points in time: at the creation of the group, and at the time of the survey. Except for women's participation, the fluctuations in membership resulted in a slightly higher degree of group heterogeneity. As groups mature and internal structure and internal rules of conduct stabilize, the members may be more willing to open up to new peers who are not directly from their same clan, hamlet, or village.

The group size, on average, is about 10 members. CIDR groups, which average 37 members, bear considerable overhead costs for maintaining a village bank and bookkeeping system, which require a larger group size. Criteria for member eligibility can be externally stipulated or internally set up by the members of the group. None of the six programs externally stipulates any wealth criteria for member eligibility. Table 2 presents the survey results on wealth criteria for being eligible as a member, as seen by the president of the group. On average for all groups, only 17 percent of them internally require that members possess riceland. If the possession of riceland is a criteria, the minimum area required is 36 ares, on average. This figure is considerably below the regional average of all sample households, so that the criteria, if applied, does still allow below-average farmers to join a group. Less than 20 percent of groups have set up minimum possessions of upland, and only about 4 to 6 percent of groups consider the

**Table 2 Criteria for member eligibility set by group, at time of creation of association and at time of survey**

Type of Association	Percent of Groups Stipulating a Minimum of Possession of...			Average Minimum Possessions by Member Household if Association Stipulates any		
	Riceland	Upland	Bullocks	Riceland	Upland	Bullocks
	(percent)			(are)	(are)	(number)
<b>GCV</b>						
Creation	10.3	10.3	0.0	25	105	...
Survey	10.3	10.3	0.0	25	105	...
<b>ACCS</b>						
Creation	28.3	20.8	5.8	34	84	1.7
Survey	26.4	17.0	5.8	37	91	1.5
<b>FIFATA</b>						
Creation	7.7	7.7	0.0	50	100	...
Survey	7.7	7.7	0.0	50	100	...
<b>KOBAMA</b>						
Creation	9.1	18.2	3.0	18	29	2.0
Survey	9.1	18.2	9.1	18	33	1.3
<b>MALTO</b>						
Creation	14.3	14.3	0.0	20	20	...
Survey	14.3	14.3	0.0	20	20	...
<b>CIDR</b>						
Creation	33.0	16.7	33.0	75	100	1.5
Survey	33.0	16.7	33.0	75	100	1.5
<b>All groups</b>						
Creation	17.7	16.3	4.3	34	71	1.7
Survey	17.0	14.9	6.4	36	74	1.4

Source: Deleted, in order to not disclose institutional affiliation of author.

Note: 100 ares = 1 hectare.

... = Not applicable.

ownership of a bullock as an eligibility criteria. In conclusion, the majority of groups does not appear to discriminate against poor applicants.

The group-level survey obtained information on socioeconomic characteristics of members. Two are discussed here: wealth and literacy of members. The members' average possessed area of riceland and upland considerably varies by region. For members, the average riceland area is 56 ares, 65 ares, and 269 ares in Regions 1, 2, and 3, respectively, (100 ares = 1 hectare). The corresponding regional averages of the random household sample are 38, 85, and 215 ares in Regions 1, 2, and 3, respectively. Members possess, on average, 88 ares of upland in Region 1, 168 ares in Region 2, and only 38 ares in Region 3. In comparison, the corresponding regional averages are 80, 262, and 117 ares in Regions 1, 2, and 3, respectively. Thus, if possession of land is used as a proxy for wealth, the members of the credit groups are, on average, somewhat better-off than nonmembers, with the exception of Region 2, in which members own less riceland and less upland. However, a t-test did not show any significant differences in land possession between the sample for group members and the sample or randomly selected households of the household-level survey. The member's ability to read and write ranges from 80 to 98 percent across regions and programs. These literacy levels are higher than the regional averages for the entire adult population found in the household-level survey.

## CONDUCT OF GROUPS

Table 3 compares the six group-lending schemes with regard to key characteristics of the group's conduct. Some of the regulations governing the group's conduct have been stipulated by the financial institution, but others have been internally decided by the members themselves.

**Table 3 Characteristics of conduct of groups**

	GCV	ACCS	FIFATA	KOBAMA	MALTO	CIDR
Membership fee						
•At admission	n.a.	n.a.	2,000-10,000 FMG <sup>b</sup>	n.a.	n.a.	2,000-10,000 FMG <sup>b</sup>
•Annually	n.a.	n.a.	1,000 FMG <sup>b</sup>	n.a.	n.a.	
Other admission criteria	Minimum of 200 kilograms of rice in stock; since 1993, 150 kilograms <sup>a</sup>	n.a.	n.a.	Wheat as farm enterprise <sup>a</sup>	Barley as farm enterprise <sup>a</sup>	n.a.
Allocation of group loan among individual members decided by ...	Group members <sup>c</sup>	Group members	Group members, but group must deposit 10 percent of its total loan amount	Extension agent (as a function of acreage of wheat)	Extension agent (as a function of acreage of barley)	Group members
Interest rate (percent per annum)						
•Savings	n.a.	n.a.	10 percent per annum <sup>a</sup>	n.a.	n.a.	24-36 percent per annum <sup>b</sup>
•Credit	13-14 <sup>a</sup>	13-14 (seasonal) <sup>a</sup> 15 (medium-term) <sup>a</sup>	14 percent before 1992 18 percent in late 1992 <sup>a</sup>	13-14 <sup>a</sup> plus crop insurance	13-14 <sup>a</sup> plus crop insurance	36-48 percent per annum <sup>b</sup>
Form of loan	Cash and in-kind	Cash and in-kind	Cash	In-kind	In-kind	Cash
Duration of loan	Dry season <sup>a</sup>	Wet season, and medium-term loans up to three years <sup>a</sup>	Several seasons during year <sup>a</sup>	Wheat season <sup>a</sup>	Barley season <sup>a</sup>	Loans less than 1 year (Most between 1 and 6 months) <sup>b</sup>
Average loan size to individual member (\$US)	53	93	64	68	107	34
Percent of loan demands rationed <sup>d</sup>	2	21	37	2	0	18

Source: Deleted for review.

<sup>a</sup> Decided by nongovernmental organization or project.

<sup>b</sup> Decided by members themselves.

<sup>c</sup> Loan amount is mostly a function of amount stocked and calculated value, FMG 150 per kilogram; since 1993, FMG 200 per kilogram. The exchange rate in 1992 was 2,000 Franc Malgache (FMG) per U.S. dollar.

<sup>d</sup> A loan was recorded as rationed if the group had asked for a loan size larger than it actually could obtain from the program. The programs of GCV, KOBAMA, and MALTO have clear guidelines concerning the amount to be lent to an individual member. Therefore, members of these groups usually demand loan amounts according to these guidelines, resulting in less rationing of group and individual loans.

n.a. = Not applicable.

Only two of the programs, FIFATA and CIDR, require that members set an admission fee for joining a group. These internally-set fees vary between one to five times the daily wage rate. The fees appear to be regressive, especially if they reach weekly wages. On the other hand, paying a few shows a clear commitment of the member to the group. Three of the programs apply other criteria for admission. These are the minimum amount of paddy to be stocked in the GCV scheme, or being a wheat farmer (for KOBAMA) or barley farmer (for MALTO). Wheat and barley are capital-intensive crops mainly grown by the wealthy farmers. The three admission criteria tend to act as barriers to entry for poorer households

With the exception of KOBAMA and MALTO, the members decide on how to allocate the group loan among themselves. However, in the FIFATA program, the maximum loan amount given to a group is 10 times the group's savings deposits with the FIFATA regional center. This externally stipulated linkage between group savings and loan amount translates into the informal practice chosen by the members in which each member's allocated loan size is also ten times more than his or her savings deposits. Group members of the FIFATA program often complained that the savings service is not attractive: it pays a low interest rate so that members save merely to obtain credit. The external stipulation of FIFATA appears to be counterproductive. It interlinks savings and credit services as a package but does not offer any attractive savings options, while indirectly increasing the implicit loan interest and unnecessarily raising transaction costs for the members and the financial institution alike. To improve services offered to members, the FIFATA program could charge higher interests on loans, and offer higher savings interest rates to mobilize resources for lending.

Such a strategy is used by the autonomously managed village banks of the CIDR program. For loans financed by member deposits, annual interest charges reach 48 percent, while savings rates range between 24 and 36 percent. These interest rates for internal deposits and loans have been fixed by the group members themselves. The household-level survey found average loan-amount-weighted annual interest rates of 35 percent and 70

percent for loans from friends and other informal lenders, respectively. Comparing these interest rates with the ones charged in the CIDR groups, it appears that groups have appropriately decided on their loan interest charge: an annual loan interest of 48 percent is not competitive with loans from friends and relatives, but significantly less than those charged from socially distant lenders. All other programs charged interest rates in line with the “formal” interest rate of about 14 percent, which was marginally above the inflation rate. Interest rates in the informal market are much higher, especially for the poorer households. All programs may therefore consider charging higher interest, and use receipts to cover their recurrent cost of lending and to cover at least some of the start-up costs for expanding their network of branches and groups.

FIFATA and CIDR provided cash loans, while KOBAMA and MALTO gave in-kind loans for agricultural inputs. In general, most sample households preferred cash over in-kind loans. For a financial institution, the provision of in-kind loans increases its transaction costs, and adds logistical risks for untimely delivery of the loans. If the in-kind credit is not desired by the borrower, the economic value of the loan to the borrower could be lower than that of a cash loan. On the other hand, in areas where input retailers do not operate, in-kind loans for agricultural inputs may result in a higher economic value for those borrowers who wish to finance inputs.

Most of the programs, except ACCS, only offer short-term loans (Table 3). The duration is, in general from four to seven months, reflecting the length of the dry and wet agricultural seasons. Loans that are very short-term, that is, from one to three months, are not offered by any of the programs, despite the high demand for small, short-term loans for petty trade, handicraft, poultry production, and consumption. These short-term loans are most frequently demanded by women and by poorer households. It is interesting to note that the group members of the CIDR program have decided to use internally mobilized savings for short-term lending, including consumption. For consumption and emergency loans, some of

the groups even charge less interest to their members, compared to production loans. If decision flexibility is given to members, such insurance services can emerge and then be monitored by the group. The average loan size to individual members ranges between US\$34 (CIDR) and US\$107 (MALTO). Given an annual household income between US\$100 and US\$250, loans account for a major component of the borrowers' cash flow.

Table 4 summarizes key characteristics of the organization, assets, and revenue of the groups. Record keeping is essential for monitoring loan repayment and savings deposits. A simple, but accurate, representation of the financial transactions is required for transparency of decisions and actions taken by the group or the program agent. On average, only 37 percent of groups had some sort of internal bookkeeping, but important differences between groups exist. All of the CIDR groups have a meticulous system of written record keeping. The implementation of this system required extensive training efforts with high start-up costs. Since the members have been trained to record their transactions themselves, this institutional design results in low recurrent costs of the program, but with high start-up costs. The storage and credit transactions of the GCV program do not require any sophisticated methods of bookkeeping, but about two-thirds of the groups keep internal documentation of the transactions. The other programs perform relatively poorly. In particular, the KOBAMA and MALTO groups have little documentation (and, therefore, information and, presumably, control) about the transactions of their group and their members. The extension

**Table 4 Organization and common assets of groups**

Means of Variables	GCV n = 32	ACCS n = 55	FIFATA n = 13	KOBAMA n = 32	MALTO n = 6	CIDR n = 6	All Groups n = 146
<b>Organization</b>							
Share of groups having ...							
Written internal rules of conduct (in percent)	66	64	46	56	83	100	62.3
Some sort of written bookkeeping (in percent)	72	33	31	9	17	100	37.7
<b>Assets owned by association</b>							
Share of groups owning ...							
Grain storage building (in percent)	22	0	0	0	0	0	4.8
Agricultural equipment (in percent)	3	2	0	13	0	0	4.1
Value of equipment, if any <sup>a</sup>	7	95	...	19	...	...	36.0
Bank account (in percent)	50	64	0	9	0	0	37.0
Value of deposits in August 1992, if any <sup>a</sup>	314	12	...	1	...	...	182.0
Safe (1 = yes, 0 = no) (in percent)	0	0	15	0	0	100	5.5
Common internal cash box (in percent)	16	9	23	22	17	100	18.5
Value of deposits in August 1992, if any <sup>a</sup>	5	4	30	9	1	171	49.0
<b>Sources of internal revenue of group<sup>b</sup></b>							
Share of groups having ...							
Annual internal membership fees	25.0	11.0	8.0	25.0	17.0	100.0	39.0
Earns interest from disbursing credit from group's funds	6.0	0.0	0.0	0.0	0.0	100.0	5.5
Communal farm enterprises	16.0	13.0	0.0	3.0	0.0	0.0	8.9
Rents agricultural equipment	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Buys, stores, and sells agricultural produce	16.0	0.0	23.0	3.0	0.0	0.0	5.5

Source: Deleted for review.

<sup>a</sup> In U.S. dollars (2,000 Francs Malgache = US\$1).

<sup>b</sup> All following numbers are relative frequencies in percent.

... = Not applicable.

agent of these programs appears to dominate all information flows, and credit transactions are often made directly between the borrower and the agent, rather than the group as a vehicle to cut transaction costs and to encourage autonomous management.

Some of the groups require common assets in order to function. Each GCV group maintains a granary, and the CIDR and FIFATA groups have a safe for keeping their savings deposits. Other assets are jointly owned by the group at their own deliberation, such as agricultural equipment in some of the GCV, ACCS, and KOBAMA groups. Still other groups deposit part of their cash in bank accounts, indicating the establishment of autonomous linkages between community-based groups and the banking sector. The use of common assets, membership fees, and, in the case of CIDR, interest charges from internal lending generate revenues for the group. Some of the groups run communal agricultural enterprises, or transact jointly in input and output markets. All these activities are, to a large extent, not being perceived or enforced by the program but decided by the members themselves. These diverse activities show that dynamic groups will seek to exploit the group's negotiating power and its economies of scale and scope, if they are not hindered by outside interference.

## LOAN REPAYMENT

Table 5 presents the repayment record for 168 group loans obtained by the 146 sample groups that were due before the date of survey. It should be noted that the actual repayment record is slightly lower than shown, because six of the groups in the 31 villages did refuse to participate in the survey. The enumerators obtained information on the performance of these groups indirectly from village elders. All six groups were said to be in dispute with the programs over the settlement of crop insurance claims or were defunct because of a previous loan default.

**Table 5 Repayment record of group loans, differentiated by association**

	GCV	ACCS	FIFATA	KOBAMA	MALTO	CIDR	All Groups
Total number of group loans obtained	40	99	15	46	14	12	226
of which due before date of survey	22	88	10	33	9	6	168
Percentage of group loans...							
(1) fully repaid at due date (percent)	100	67.0	70.0	42.4	100	100	68.9
(2) fully repaid, but late (percent)	0	13.6	20.0	24.2	0	0	13.3
- if repaid, but late, average days in arrears (mean)	n.a.	175	119	72	n.a.	n.a.	133
(3) partially repaid until date of survey (percent)	0	17.0	0	30.3	0	0	15.1
- mean share of debt paid until date of survey (percent)	n.a.	52.4	n.a.	65.5	n.a.	n.a.	57.6
(4) nothing repaid until date of survey (percent)	0	2.3	10.0	3.0	0	0	2.4

Source: Deleted for review.

Note: The sum of percentage from loan bracket (1) to (4) equals 100 percent. Differences are due to rounding.

n.a. = Not applicable.

On average over all programs, the percentage of loans fully repaid at the due date is 68.9 percent, and 82.2 percent of loans were fully repaid by the date of survey. Among groups having partially repaid loans, 57.6 percent of the debt was repaid. Loans that were fully outstanding account for 2.4 percent.

The survey also obtained information on who made the late payments and what the sanctions for late payers and defaulters were. About 61 percent of late payments were made by the members themselves, who had loans in arrears. In 9 percent of the cases, the other

members paid for the defaulting member. This action indicates solidarity among members in some of the groups who assist each other in repaying the loan. If a group member defaults on the loan, and has not experienced any severe income or consumption shocks that may make repayment impossible, the group members actually enforce repayment by liquidating assets of the defaulting member. In about 2 percent of the cases, the members sold assets of the defaulting member. Other forms of repayment, which account for 27 percent of the cases, include payments for failure of the wheat crop through the insurance scheme of KOBAMA. About 6 percent of the late payers were forced to leave the group, and one-third was excluded, by the peers, from obtaining a share of the group loan in the following year. Some groups also stipulated internally-set late payment fees.

#### **4. DETERMINANTS OF LOAN REPAYMENT: AN ECONOMETRIC ANALYSIS**

Based on the previous discussion, repayment performance in group-based credit schemes is initially determined by the process of formation of groups. This process influences the structure of the group, and therefore conditions its ultimate conduct and performance, along with exogenous characteristics of the program and the group's community. While the six credit programs in the sample do not directly interfere with the process of group formation, the member's decision to self-select herself and co-select her peers is influenced—apart from individual and household characteristics—by the types of services offered by the program and their contractual arrangements as well as by the socioeconomic and agroecological conditions of the community and region in which the member lives.

I do not attempt in this paper to model the different stages that led from the initial formation of the group to the stipulation of internal rules of conduct, and from there to the group's repayment rate as the final outcome variable of this process. The following regression model incorporates variables that reflect on the process of group formation and on

characteristics of the structure and conduct of the group, as well as the group's program and community. All these variables are hypothesized to directly or indirectly influence the repayment rate.

The repayment rate as a dependent variable is a continuous variable that is censored at a lower bound of zero and an upper bound of 100. In this case, an OLS model will lead to biased and inconsistent estimates (Greene 1993). On the other hand, using a probit or multinomial model would forego valuable information because the continuous dependent variable would need to be transformed into dummy variables. For these reasons, a TOBIT model appears most appropriate. The following model was estimated by using the TOBIT maximum likelihood technique (Maddala 1983).

#### VARIABLES OF THE MODEL

The repayment rate is expected to be influenced by a range of variables that reflect on program-specific, community-specific, and group-specific characteristics. The means, standard deviations, and hypothesized signs for the regressors are shown in Table 6 in the first three columns. The results are shown in the two right-hand-side columns, and will be subsequently discussed. Because of missing values for some of the variables, the number of cases used in the regression analysis is 141.

Several community-specific characteristics are used as regressors. First, the dummy variables, REGION1 and REGION3, control for agroecological and socioeconomic conditions that may influence the repayment rate of groups. Second, with increasing transport costs to rural service centers (MNFRAISR), transaction costs for training, monitoring, and supervision of groups increase. It is expected that higher transaction costs reduce the number of visits and contact hours of the extension agents in remote villages. Because a major reason for these visits is to ensure loan repayment, higher transport costs are expected to have a negative influence on loan repayment. Third, it is hypothesized that groups in communities with higher levels of monetarization will be able to better raise the

necessary cash to make timely loan repayments. The variable, MONETAR, measures the cumulative percentage of marketed production of the major three cash crops in the community. Fourth, the number of retailers for agricultural inputs per 1,000 inhabitants (PTHOCOMI) is expected to be positively related to repayment performance. As agricultural inputs are yield-enhancing, the repayment rate of groups that live in communities with good market access to agricultural inputs is expected to be higher. Fifth, risks in crop and animal production as well as storage of crops can undermine repayment capacity and therefore performance. In the community survey, the mayor was asked to report for 14 potential risk factors, whether any of them constituted little, modest, or serious risk to farmers in the village. The variable, TVSERISK, reflects the number of serious risk factors among the 14 potential ones.

Two program-specific characteristics are hypothesized to influence the repayment rate. First, it is expected that savings services (SAVINCR) offered by the program improve the repayment rate of the group. Savings may increase the financial discipline of group members. They can also serve as loan collateral. Second, programs that provide loans exclusively in the form of cash (CASHLOAN) are expected to obtain a higher repayment rate in the Malagasy context, since many group members valued cash loans more than in-kind loans.

**Table 6 Variables used in the analysis: Means, standard deviations, and expected signs (n = 141)**

Variables	Means	Standard Deviation	Sign	Coefficient	t-Value
Repayment rate (RATEPAI)	87.17	24.57			
Community characteristics					
Region 1 (1 = yes, otherwise 0) (REGION1)	0.69	0.46	?	0.067	0.138
Region 3 (1 = yes, otherwise 0) (REGION3)	0.02	0.14	?	9.821	0.000
Mean transport costs (Francs Malgache) (MNFRAISR)	175.14	190.05	-	-0.0004	-0.506
Degree of monetarization (MONETAR)	176.40	64.74	+	0.009	3.098***
Density of input retailers (PTHOCOMI)	0.0027	0.0022	+	232.24	2.215**
Number of serious risks (TVSERISK)	0.92	1.35	-	-0.454	-3.352***
Program characteristics					
Provides savings services (1 = yes, 0 = no) (SAVINCR)	0.19	0.39	+	1.397	2.174*
Gives only cash loans (1 = yes, 0 = no) (CASHLOAN)	0.28	0.45	+	0.280	0.797
Group characteristics					
Initiated by member (1 = yes, 0 = no) (ININTER)	0.17	0.38	?	-0.015	-0.040
Size of group (MEMCRE)	10.23	4.76	+	0.135	2.641**
Mean land area possessed in are (AEPOSALL)	49.38	48.51	?	-0.0007	-0.147
Mean share of lowland (AESHPRIC)	0.30	0.15	+	4.130	3.369***
Coefficient of variation for upland (VAEPOSTA)	80.53	41.86	+	0.041	3.264***
Squared term of VAEPOSTA (SQVPOSTA)	8,224.30	9,755.40	-	-0.0002	-2.386***
Number of common bonds (NORELCR)	3.13	1.34	+	0.216	2.024*
Member can read (1 = yes, 0 = no) (AVREAD)	0.94	0.11	+	0.350	0.182
Loan disbursed in time (1 = yes, 0 = no) (INTIME)	0.67	0.47	+	0.445	1.595
Group keeps books/records (1 = yes, 0 = no) (ACCOUNT)	0.36	0.48	+	0.032	0.080
Annual membership fees (1 = yes, 0 = no) (COTANN)	0.23	0.42	?	0.012	0.026
Internal rules of conduct (1 = yes, 0 = no) (RULES)	0.62	0.49	+	0.643	1.719*
Intercept				-5.173	-2.300**

Log likelihood = - 249.63

Note: The signs, \*, \*\*, and \*\*\* indicate that the estimated coefficient is significant at 10, 5, and 1 percent, respectively.

The remainder of the regressors are group-specific variables. The variable, *ININTER*, is a dummy that has a value of one if the formation of the group was not initiated by an external program agent. No sign for this variable is hypothesized. Second, an increasing group size, reflected by the number of group members (*MEMCRE*), is expected to augment the repayment rate. With increasing group size, economies in scope, scale, and risk management can be realized by the group. Some transactions costs that have fixed cost character for the group as a whole decrease with increasing group size. Examples heretofore are costs incurred by the management committee and for investment in common assets of the group. Given a limited time and budget and the need to achieve certain management targets, such as a high repayment rate, the extension officer may also tend to visit larger groups more frequently, as unit costs per member serviced tend to be lower. Furthermore, larger groups have more opportunities to exploit scale effects through joint procurement of inputs and marketing of outputs, thus increasing their negotiation power to obtain more favorable prices. Also, larger groups have a greater scope for diversification of risks. On the other hand, increasing the group size beyond a manageable level will disproportionately increase the internal management and monitoring costs, and jeopardize social cohesion of the group, which then creates a moral hazard and free-rider problems. However, the groups in the sample have an average size of only 10 members, so that excessive costs of intra-group coordination may not occur.

Third, while wealthier households have a higher repayment capacity, they may not necessarily better repay their debt, because repayment is a function both of capacity and willingness to repay. The variable, *AEPOSALL*, describes the average total area of rainfed upland and irrigated lowland, which is, on a per capita basis, possessed by the members of the same group. The expected sign is positive. While this variable indicates overall wealth in land of the group members, the variable, *AESHPRIC*, measures the share of irrigated lowland in total possession of land by all members of the same group. The gross margins per hectare of lowland are higher and less volatile than those of rainfed upland. Thus, the

expected sign for this regressor is positive. Fourth, the coefficient of variation of upland possessed by individual members of the same group, VAEPOSTA, measures the degree by which group members diversify the group's joint portfolio of assets. This variable is also viewed as an indirect measure of diversification in off-farm income activities among group members, since Malagasy households tend to engage in off-farm activities if upland is scarce. It is hypothesized that repayment rates increase with more diversification of the group's joint asset portfolio, since group members can exploit economies of scope and scale in risk. However, as it is the case with any risk portfolio and coinsurance strategy, too much of diversification increases the costs of monitoring and decreases the expected returns in exchange for decreasing gains in the reduction of variance of returns. Thus, the squared term of this variable, SQVPOSTA, has an expected negative sign. The degree by which group members enter insurance contracts with each other, however, is expected to be influenced by the social cohesion between them. Because reciprocity and unconditional help are more frequently found among socially close individuals, the number of common social bonds that each member shares with her peers is taken as an empirical variable to reflect on the degree of social cohesion. The variable, NORELCR, is hereby constructed by simply counting the number of common characteristics between group members, as shown in Table 1.

Fifth, apart from physical and social capital, as reflected in the possession of land and the number of common bonds, the repayment rate is expected to be positively influenced by the human capital of the group. The continuous variable, AVREAD, reflects here on the share of group members who can read. A value of one indicates that all group members can write, while a value of zero implies that none of the members can read. Sixth, groups may refuse to repay or only repay with considerable delay, if the credit service provided did not meet their expectations. This was the case in some of the programs, especially in those that delivered loans in-kind and therefore had to solve additional problems of sourcing and transport. Some group members complained that fertilizer and pesticides did not come in due time to be useful for proper crop management. The variable, INTIME, is a dummy whose

value is one, if the credit was disbursed in time, so that it could be used for the intended purpose. If the credit was obtained too late, it is understandable that farmers may refrain from timely repayment of their loans.

Seventh, groups that keep written records about their loan and savings transactions can be in a better position to monitor the performance of individual members, and therefore increase the repayment rate. The dummy variable, ACCOUNT, has the value of one if the group keep any written records on financial transactions. Eighth, the variable, COTANN, is again a dummy whose value is one if the group internally decided on paying any annual membership fees. This internal rule of conduct can both have positive or negative effects on repayment so that no specific sign is expected. The rule may exclude poor, but good borrowers. On the other hand, it can be a device to discourage free riders, who do not want to commit themselves to a lasting relationship with the group. The last regressor, RULES, is a dummy whose value is one if the group has any internal agreements and rules of conduct, either in oral or in written form. Because such rules can increase transparency and therefore reduce intra-group friction and costs of coordination, a positive sign is expected.

## MODEL RESULTS AND INTERPRETATION

The results in Table 6 show that the signs for all but one regression coefficient (AEPOSALL) are as expected. Regional characteristics do not have any influence on the repayment rate. The community's level of monetarization (MONETAR) and its access to input dealers (PTHOCOMI) significantly increase the repayment rate. The access to output and input markets is an important feature for a functioning credit market. Furthermore, groups that are located in communities with a high risk exposure (TVSERISK) have a significantly lower repayment rate. In order to cover the costs of an expected higher loan default in risk-prone communities, programs could charge higher interest rates or set up member-financed credit guarantee funds, which could be used to cover up for loan defaults. The latter would require that the member-financed guarantee funds must be spread over a

large cross-section of groups from communities between which the occurrence of risks is independent or even negatively correlated. Finally, the average transport costs from the village to rural service centers seems not to influence the repayment rate, although the variable, MNFRAISR, has the expected sign. This result could be explained by the fact that all of the programs receive subsidies that cover at least part of the variable costs for visiting and monitoring groups. Furthermore, most extension officers follow weekly travel schedules that are prescribed by the program managers. Thus, little incentive and flexibility exists for the extension officer to reduce transport and time costs per group member, because a high repayment rate as a performance criteria is presumably more valued by the program managers than cost efficiency.

Programs that provide savings services to their members have a significantly higher repayment rate (SAVINCR). This result emphasizes the role of savings services for improving the performance of group credit programs. Whether the loan was given in cash or not (CASHLOAN), however, does not significantly influence the repayment performance. Furthermore, it is of no significance whether the group was formed at the initiative of the extension officer or not (ININTER).

With larger group size (MEMCRE), the repayment performance improves. This result is in line with the hypothesized economies of scale, scope, and risk. However, it is to be noted that groups will have increasing costs of coordination, moral hazard, and free-rider problems when group size surpasses manageable levels. The optimal group size will vary with respect to socioeconomic and agroecological conditions of the participating communities and with program characteristics. The wealth of group members, as measured by total landholdings (AEPOSALL), does not influence the repayment rate. The sign is negative, but highly insignificant. Thus, the capacity to repay seems to matter little in actual repayment. With an increasing share of low-risk riceland in total landholdings of the group members (AESHPRIC), the repayment rate significantly increases, since the incomes of the group members are less volatile. Furthermore, a higher variation in possession of rainfed,

risky upland among group members (VAEPOSTA) significantly improves repayment. Households with low upland holdings diversify more in off-farm income activities that are independent or sometimes even negatively correlated with returns from upland. This result indicates that group members select each other so that the group's joint asset and activity portfolio is diversified and less vulnerable to covariate shocks. As expected, increasing variance of risky upland among members (SQVPOSTA) significantly leads, at the margin, to a decreasing repayment rate. As with group size, there is also an optimal degree of risk pooling among members within a group. Greater diversification beyond this point leads to decreases in the repayment rate, because of excessive costs of monitoring and enforcement of informal insurance contracts. Social cohesion, as measured in the model by the number of common bonds (NORELCR), significantly increases the repayment rate of groups. In socially cohesive groups, loan default by one member may incur significant utility losses that manifest themselves not only in a loss of reputation among friends and relatives, but also in reduced access to the informal social security network. One does not want to lose access to this network. The reading skills of group members (AVREAD), used as an indicator for human capital, prove to be insignificant. Furthermore, repayment improves if the program disbursed the loan in time (INTIME). Whether the groups keep financial records (ACCOUNT) or charge annual membership fees (COTANN) is of no significance for the repayment performance. Finally, groups that have clear internal rules of conduct (RULES) have a significantly higher repayment performance. This result may emphasize the role of empowering group members to set their own rules.

In summary, the results point out that the diversification of the joint asset and enterprise portfolio among members of the same group, and social cohesion among members, can augment the repayment performance in group-lending schemes. In order to exploit the benefits of social capital and intra-group diversification and risk-pooling of human and physical capital, group-based programs should therefore not interfere with the process of group formation through the enforcement of entry barriers, such as criteria for wealth or

professional occupation. These criteria will invariably limit the flexibility of the peers to self- and co-select each other in order to achieve the right mix of social, physical, and human capital within the groups that best fit their needs.

## **5. CONCLUSIONS FOR POLICY AND FUTURE RESEARCH**

In recent years, several theoretical models have been developed to explain the repayment performance of credit groups. Empirical analysis to test these models is extremely scant thus far. This paper briefly reviews the existing theoretical approaches, and expands the conceptual framework by allowing the utility gains due to social cohesion and intra-group risk pooling among members. The descriptive analysis of the formation, structure, and conduct of groups and the econometric analysis of the repayment performance from different programs leads to several conclusions regarding the role of public support for group-based credit programs for the poor, for program design and institutional innovation, and for the type of services provided by the financial institution.

The analysis shows that groups in Madagascar are primarily formed at the initiative of an agent of the financial institution, who then introduces the concept and regulations of the credit and savings program to the villagers. Only one-third of the groups has been founded at the initiative of the villagers. As successful programs become better known in the rural society, the community-based initiatives for founding groups could potentially increase. Such a development will eventually reduce the high cost for the financial institution for forming and training groups. These start-up costs can be seen as investments in human and social capital, similar to public investments in school education and adult training programs. Whether the potential benefits of such investments, in terms of economic growth and improving equity, are higher than the opportunity costs of public funds is an important question to be addressed in future policy research. Subsidies for the formation of community-based credit and savings groups could also be justified, if it is expected that the human and institutional capital generated by the investments can be easily appropriated by a

financial institution other than the one that promoted the formation of the group. However, public funds should not be used for covering any average long-run costs for savings and credit services to groups. The opportunity cost of the loan portfolio, the provision for defaulted loans, and the costs for transacting with the groups, once they have been established and trained, should be covered by appropriate charges on loan interest and an appropriate spread between savings and loan interests. Otherwise, the long-term sustainability of the institutions that are to be built is to be seriously questioned.

The analysis of determinants of loan repayment rates shows that groups with a higher level of social cohesion, as measured by the number of common bonds, have a better repayment rate. Moreover, the results show that it is not the level of physical and human assets of the group members, but the degree of variance of such assets among members, that leads to better loan repayment, by pooling risks among group members. Policymakers and program managers should be aware that the often-postulated homogeneity among group members has trade-offs by reducing the group's ability to repay loans in times of distress and to take advantage of more risky, but more profitable, enterprises by spreading risks among members of the same group. Most criteria for member eligibility tend to restrict the choices that are available to the community for the endogenous formation of groups. However, many credit programs apply such criteria, and often appear to merely copy well-known programs that are successful under different socioeconomic and agroecological conditions.

The analysis shows that groups with decision flexibility and autonomy will design internal institutional arrangements suited for them and perform additional functions that were not prescribed by the formal financial institution. Optimal institutional arrangements and the willingness to pay for different services will vary between groups in the same region or even in the same village. The wealth, education, interests, and character of members, and the member's and community's access to information, markets, and resources, as well as their risk exposure, shapes the "corporate identity," conduct, and performance of a group. Program design should allow for groups' flexibility in deciding on entry and exit barriers,

penalties and rewards, and on interest rates for internally mobilized funds. The groups' decision flexibility over entry and exit barriers, sanctions, and rewards can lead to the formation of groups that can better exploit economies of risk and scale. The provision of a variety of credit and loan services could also lead to the formation of groups that exhibit different levels of wealth and risk levels, and that could contribute to a more diversified loan portfolio of the rural financial institution.

It is therefore argued that—in general—the financial institution or nongovernmental organization involved in the formation of groups should not set any entry or exit barriers for potential members. Decision flexibility by members allows them to fully assume responsibility for their actions and their debt, and enables groups to customize internal regulations, membership composition, and the group's internal services and penalties to their needs. Of course, the financial institution must be aware of the risk that a group may collude to strategically default. This risk mainly exists if the program is perceived by the “beneficiaries” to be only of a transitory nature because of an apparent lack of sustainability characterized by easily observable program characteristics, such as highly subsidized interest rates, overpaid program staff, and lack of stringent enforcement of external program rules.

When equity objectives influence the policy of the financial institution or nongovernmental organization, effective outreach to the rural or urban poor can come about by offering those types of financial services that are mainly demanded by the poor, such as highly liquid savings options, short-term cash loans, and loans for agricultural inputs. Successful programs usually begin with very small loans, and gradually increase loan sizes contingent on repayment and savings performance. Indirect targeting through the type and terms of the financial service offered appears often to be more efficient than targeting through rigid wealth indicators, which may not always accurately indicate the poverty level of a household or individual. If it is believed that only rigid barriers, such as the maximum ownership of half an acre of land applied by many of the credit programs in Bangladesh, could avoid the control and exploitation of the groups by the wealthy landowner class, then

such barriers are certainly justified. However, socioeconomic conditions differ between countries and even between districts within a country. If no a priori knowledge exists for justifying rigid criteria for member eligibility, the default for setting up groups is to have no such criteria, even if the credit and savings program emphasizes equity along with sustainability objectives.

More empirical research is needed on the agroecological, cultural, socioeconomic, and program-design factors that determine the structure, conduct, and performance of credit and savings groups and other forms of member-based organizations, such as village banks and cooperative societies. Such research can assist in improving the design of institutional arrangements, and thus lead to institutional innovation that can better address the intrinsic informational problems of financial markets.

## REFERENCES

- Adams, D. W. 1988. The conundrum of successful credit projects in floundering rural financial markets. *Economic Development and Cultural Change* 36 (2): 355-367.
- Bardhan, P. 1993. Analytics of the institutions of informal cooperation in rural development. *World Development* 21 (4): 633-639.
- Besley, T., and S. Coate. 1995. Group lending, repayment incentives, and social collateral. *Journal of Development Economics* 46 (1): 1-18.
- Bhatt, V. V. 1988. On financial innovations and credit market evolution. *World Development* 16 (2): 281-293.
- Bratton, M. 1986. Financing smallholder production: A comparison of individual and group credit schemes in Zimbabwe. *Public Administration and Development* 6 (2): 115-132.
- Devereux, S., and M. Fishe. 1993. An economic analysis of group-lending programs in developing countries. *The Developing Economics* 31 (1): 102-121.
- Greene, W. H. 1993. *Economic analysis*. Englewood Cliffs, N.J., U.S.A.: Prentice Hall Inc.
- Hossein, M. 1988. *Credit for alleviation of rural poverty: The Grameen Bank in Bangladesh*. Research Report 65. Washington, D.C.: International Food Policy Research Institute.
- Huppi, M., and G. Feder. 1990. The role of groups and credit cooperatives in rural lending. *World Bank Research Observer* 5 (2): 187-204.
- Maddala, G. 1983. *Limited dependent and qualitative variables in econometrics*. Cambridge: Cambridge University Press.
- Robison, L., and A. Schmidt. 1991. Interpersonal relationships and preferences: Evidence and implications. In *Handbook of behavioral economics*, vol. 2b, ed. R. Frantz and H. Singh. Greenwich, Conn., U.S.A.: JAI Press Inc.
- Stiglitz, J. E. 1990. Peer monitoring and credit markets. *World Bank Economic Review* 4 (4): 351-366.

- Townsend, R. M. 1995. Financial systems in northern Thai villages. *Quarterly Journal of Economics* 110 (4): 1011-1046.
- Udry, C. 1990. Credit markets in northern Nigeria: Credit as insurance in a rural economy. *World Bank Economic Review* 4 (4): 251-269.
- Varian, H. R. 1990. Monitoring agents with other agents. *Zeitschrift für die gesamte Staatswissenschaft (Journal of Institutional and Theoretical Economics)* 146 (1): 153-174.
- Wenner, M. W. 1995. Group credit: A means to improve information transfer and loan repayment performance. *Journal of Development Studies* 32 (2): 263-281.
- Zeller, M. 1994. Determinants of credit rationing: A study of informal lenders and formal credit groups in Madagascar. *World Development* 22 (12): 1895-1909.