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Repayment Performance in Group-Based Credit Programs in Bangladesh: An Empirical Analysis

MANOHAR SHARMA and MANFRED ZELLER*

International Food Policy Research Institute, Washington, DC, U.S.A.

Summary. — This paper analyzes the repayment rates of 128 credit groups belonging to three group-based credit programs in Bangladesh: the Association for Social Advancement (ASA), the Bangladesh Rural Advancement Committee (BRAC), and the Rangpur Dinajpur Rural Service (RDRS).

Using TOBIT analysis, specific tests are performed on the following hypothesized determinants: group size, size of loans, degree of loan rationing, enterprise mix within groups, demographic characteristics, social ties and status, and occurrence of idiosyncratic shocks. The paper concludes that if basic principles of prudential banking are adhered to, repayment rates can be good even in poor and remote communities. The important thing for financial institutions is to tailor services such that it becomes worthwhile for the poor to establish a profitable long-term association. In addition, more freedom to members in the process of group formation is recommended. © 1997 Elsevier Science Ltd

Key words — credit groups, Bangladesh, repayment, finance, rural, Tobit

1. INTRODUCTION

Lending is a risky enterprise because repayment of loans can seldom be fully guaranteed. The failure of a large number of state-sponsored agricultural development banks in many developing countries was due, among other things, to their inability to ensure good repayment rates¹ among their borrowers (Adams *et al.*, 1984; Yaron, 1994). In the context of providing credit to the rural asset-poor, what are being increasingly called for are institutional innovations that combine prudent banking principles with effective screening and monitoring strategies that are not based on physical collateral (such as land). Indeed, throughout Asia, Africa, and Latin America, the last decade has witnessed substantial efforts that aim at opening the poor's access to credit and at the same time improve their incentives to meet repayment obligations. One distinguishing feature of these efforts has been the formation of borrower groups and the use of group responsibility and peer monitoring as the core principles guiding financial transactions.² Of course group-based lending has not been the only innovation. The success of Bangladesh's Grameen Bank in using small groups of borrowers in servicing the poor and achieving high rates of repayment is now well known (Hossein, 1989). So are the experiences of SANSA in Sri Lanka (Montgomery, 1996) and Credit Solidaire in

Burkina Faso (Gurgand *et al.*, 1994). In Thailand, the Bank for Agriculture and Agricultural Cooperatives achieved high repayment rates even though it sometimes used groups consisting of as many as 30 members (Huppi and Feder, 1990; Yaron, 1994). Repayment rates are not uniformly high, however, for all institutions or across groups within an institution. In Nepal, the repayment performance of groups formed under the Small Farmers Development Program (SFDP) exhibit a mixed result (Sharma, 1993; Desai and Mellor, 1993) and Bratton (1986) gives examples from Zimbabwe of how group repayment rates can fluctuate according to changing external circumstances.

What important factors affect group repayment rates within these new financial institutions? What are important factors that managers of microfinance should consider when initiating group formation? These are important issues for emerging micro-

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finance institutions since even a few loan losses can weaken a microfinance institution very quickly (Rock and Otero, 1997; Christen *et al.*, 1995). Yet very few previous studies have looked at group repayment rates and addressed this issue (see Zeller, forthcoming, for the case of Madagascar and Wenner, 1995 for the case of Costa Rica). Hence, this paper attempts to provide some answers to the questions above and to shed light on ways in which further innovation can enhance repayment rates and, hence, contribute to the ultimate sustainability of these new institutions. It does so by examining the repayment records of 128 borrower groups belonging to group-based credit programs of three relatively well-known institutions in Bangladesh: the Association for Social Advancement (ASA), the Bangladesh Rural Advancement Committee (BRAC), and the Rangpur Dinajpur Rural Service (RDRS). The rest of this paper is divided into four sections. Section 2 briefly highlights repayment performance of traditional state-owned banks and those of the newer group-based institutions in Bangladesh. Section 3 outlines the institutional structure of ASA, BRAC, and RDRS, while Section 4 presents the results of an econometric analysis of repayment behavior. Conclusions and recommendations are presented in Section 5.

2. FINANCIAL SERVICES FOR THE RURAL POOR: INSTITUTIONAL RESPONSES, SETBACKS, AND RE-ENGINEERING

A full appreciation of the recent innovations in Bangladesh's rural financial sector is not possible without an understanding of past efforts, actions, and failures. This section describes repayment rates of traditional commercial banks and the newer group-based lending organizations, and highlights factors that have enabled group-based systems to achieve high rates of repayment even when traditional commercial banks failed miserably.

(a) *Rural branches of commercial banks: lessons on how not to do it*

Until 1982, all financial institutions in the formal sector in Bangladesh were government owned. Some efforts aimed at liberalizing the financial sector were initiated during the mid-1980s. Two banks were denationalized in 1984 and, in 1986, a few private banks were allowed to start operations. The role of the private banking institutions in the formal sector remained minor, however, and the government continued to directly control and manage the financial system through a network of nationalized commercial banks (NCBs). Interest rates were

strictly regulated and funds were allocated to sectors and for uses that received government priority.

One of the favored sectors was the rural agricultural sector. During the 1970s as well as in the 1980s, a basic assumption driving government policy in the rural financial sector seemed to be that replicating the then existing urban-based banking structure in rural areas, and fortifying it with subsidized capital and a package of lending directives, would be sufficient to kick-start a viable financial sector in the rural areas.³ In 1977, for example, the replication effort took the form of the so-called two-for-one banking policy, requiring commercial banks, then all government-owned, to open two rural branches for every urban branch (Khalily and Meyer, 1993). This period also saw the establishment of two specialized agricultural development banks — the Rajshahi Krishi Unnayan Bank (RAKUB) and the Bangladesh Krishi Bank (BKB), which had specific mandates to deliver agricultural credit. In addition, networks of rural cooperatives were established by Bangladesh Sambaya Bank (BSBL) and the Bangladesh Rural Development Board (BRDB).

Implicit in these latter two actions was the realization that *some* change in the organizational structure of the traditional banking system was indeed necessary to make the carryover to the rural sector. In reality, however, pervasive bureaucratic and political control led to undermining of the basic principles of banking, and non-economic considerations in routine lending decisions and the lack of a credible enforcement mechanism eroded financial discipline among borrowers (Cookson and Alamgir, 1993). The rural financial sector therefore suffered the same fate as its urban counterpart: loans continued to be strictly collateral-based; incentive structures within banks provided little incentive for managers to screen borrowers for creditworthiness, or to evaluate loan projects objectively, or to enforce contract compliance. The standards of assessing loan quality was very weak. Because most loans were collateralized, financial statements of banks continued to project healthy image even as loan default continued to rise. This contributed to a false sense of complacency since, in reality, foreclosing collateral was, at the practical level, frequently not a feasible option. Hence as Cookson and Alamgir note, "the banks thought that the loans being made were satisfactory even though the loan recovery record was very unsatisfactory" (p. 7).

In addition, the banks' oligopolistic hold of the market, and the ready and continuous availability of subsidized funds from the central bank, encouraged inefficiency and impeded innovation at the institutional level. There were other factors exogenous to the banking system that contributed to this environment of lax credit discipline. First, as suggested above, legal recourse to foreclose and liquidate

collateral was, in practice, nearly impossible (World Bank, 1994), especially in the agricultural sector. This greatly lessened the cost of default to the borrower. Second, confusing signals created by frequent announcements of loan amnesty and interest remission programs — results of direct political interference (Khalily and Meyer, 1993) — increased incentives to default (in the hope of a future amnesty program), even among creditworthy borrowers. Third, despite eloquent directives to the contrary, there was, in reality, very little incentive for managers of rural branches to service the poor. First, transactions costs involved in servicing a large number of small borrowers were much higher than those involved in servicing a fewer number of large borrowers. Further, there were additional non-economic incentives — even direct pressures — on program managers to lend to or collude with big borrowers who received favorable political patronage. For the small borrowers, on the other hand, these extraneous considerations in routine lending decisions coupled with high transactions costs involved in dealing with the formal banks (high time and travel costs) made the banks less attractive long-term partners. This perceived short-term association further lessened incentives to repay loans.

The end of the 1980s thus found rural branches of the state-owned banks utterly failing in carrying out their mandates. Instead, the entire network of branches had metamorphosed into a structure that was no longer sustainable. A telling evidence of this was to be found in the pathetic state of loan repayment rates. Recovery on rural-sector loans (Table 1) were not only low, but were steadily declining through the 1980s: from about 51% during 1981–82 to under 19% during 1992–93 (Khalily and Meyer, 1993; World Bank, 1995).

In the late 1980s, a series of actions were taken by

the government to liberalize and reform the financial sector, especially under the Financial Sector Reform Project. Reforms were initiated in the following areas: interest rate liberalization, adequate provisioning of bad debt costs, capital adequacy and supervision, and legal means to enforce repayment of loans. Though the full impact of these reforms is not fully clear, some improvements are now starting to be discernable. For example, some check seems to have now been imposed on the unwieldy expansion of lending volume (World Bank, 1995), and provisional data for 1993–94 for nationalized commercial banks indicate that recovery from *current* year's realizable loan from the agricultural sector had increased to 56.7%. In spite of this, traditional commercial banks continue to be financially weak, largely due to their earlier imprudent expansion, their inefficient and unresponsive organizational structure, and their lack of expertise in making sound project loans.

(b) *Innovative group-based lending organizations: common threads and repayment rates*

In the late 1970s, even as the traditional commercial banks were mounting huge losses, a few group-based credit institutions like BRAC and the Grameen Bank were already beginning to challenge the basic paradigm of rural finance in Bangladesh. In fact, by the end of the 1980s, a number of such institutions had already gone a significant way toward demonstrating that the task of financing the poor could indeed be made feasible. The basic institutional structures of three group-based banking systems studied in this paper are described in detail in the next section. Below, five common threads that weave around the institutional structures of most nongovernment organization (NGO)-based credit organizations in Bangladesh are discussed.

First, services are strictly targeted to a well-defined set of clients, the most common criterion used being the amount of land owned. All three NGOs target landless or near-landless households. Second, credit is always provided to small groups of borrowers on the basis of joint liability and without the pledging of any physical collateral. Third, even though loans are made to individual members, the entire group is denied further credit when outstanding arrears exist for any one of the members. Fourth, lending activities are supplemented by training activities in areas ranging from entrepreneurial skill development, management of micro-enterprises such as shopkeeping, crafts production, etc., to education on social awareness and family planning activities. Fifth, groups are required to contribute to an emergency fund that may be used

Table 1. *Recovery rate on target rural loans of traditional commercial banks: 1980–81 to 1988–89*

Year	Recovery Rate ^a (percentage)
1980–81	51.6
1981–82	50.6
1982–83	42.1
1983–84	42.8
1984–85	42.3
1985–86	26.5
1986–87	42.3
1987–88	24.3
1988–89	18.8

Source: Khalily and Meyer (1993).

^aRecovery rate is defined as percent of target loans recovered relative to total target loans including principal and interest.

when members experience household and other emergencies.

Loan recovery rates of such group-based institutions are impressive when compared to those of the commercial banks. Jahangir and Zeller (1995) have noted the recovery rates for six of them during 1992–93: 100% for ASA; 98% for BRAC; 98% for the Grameen Bank; 93% for PROSHIKA; 77% for Swarnirvar Bangladesh; and 100% for UDDIPAN.

(c) *Why are repayment rates of group-based organizations so good? Insights from economic theory*

Fairly recent work in institutional economics has shed considerable light on why the new group-based institutions have been able to perform so well, while others failed.

In group-lending programs, the functions of screening, monitoring, and enforcement of repayment are to a large extent transferred from the bank's agent to the borrowers — the group members themselves. Stiglitz (1990) and Varian (1990) discuss these perceived advantages of collective action in the screening of loan applicants and monitoring of borrowers. The incentives for screening and monitoring the actions of peers arise from joint liability and the potential loss of access to future loans. The main argument is that, compared to socially and physically distant bank agents, group members can obtain, at low 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 (forthcoming), for example, shows that members of formal groups — such as informal lenders — consider peers' indebtedness in the informal market as a major determinant of credit rationing. Thus, group members are found to be able to access complex and sensitive information just like informal lenders. It is this informational advantage that drives the suggestion of Stiglitz (1990) and Devereux and Fische (1993) that there are more incentives for similar individuals to form groups as information asymmetry between members is expected to be lower in homogenous groups. In addition, groups may also have a comparative advantage in the enforcement of loan repayment. While the formal lender usually has limited options to compel repayment from delinquent borrowers, group members can potentially employ social sanctions or seize physical collateral of the defaulter (Besley and Coate, 1995). In many rural societies, including the ones in Bangladesh, nonresident bank agents have little leverage in actually going to a village and seizing collateral. Furthermore, group members appear to be in a better position to assess the reason for default, and to offer

insurance services to members experiencing shocks beyond their control, while sanctioning willful defaulters.

It is important to note, however, that group lending may not ensure higher repayment rates at all times. First, when loans are received on the basis of joint liability, the risk of loan default by particular member is shared by his or her peers. Hence, a member may choose to finance a riskier project than he/she would when liability is not shared with others. This is because the individual borrower may strategically decide to let other members who are keen on securing future loans repay his/her loan in their efforts to secure future loans for themselves. In other cases, it may be that the borrower's assessment of his/her peers' likelihood of defaulting triggers the borrower's own decision to default (Besley and Coate, 1995). Bratton (1986), for example, analyzes the repayment record of credit groups in Zimbabwe and shows that group loans performed better than individual loans in years of good harvest (when peers were expected to repay), but worse in drought years (when peers were expected to default). There is also the added problem of covariate shocks, especially after a drought or flood, when impaired repayment capability of some members coincides with the equally impaired capacity of other members to bail the former out. For this reason, as Zeller (forthcoming) emphasizes, individuals may attempt to exploit economies of risks by grouping with others whose income streams are negatively correlated with theirs. This is in contrast to Besley and Coate who postulate that homogeneity in risk among members is a desired characteristic of groups. Their model result is driven, however, by the assumption that project risks of different members are independent from each other so that there is no scope for exploiting economies of risk pooling among members (Zeller, forthcoming). Note also that sustainability of group-lending programs in areas with high covariate risks depends on the ability of the financial intermediary to reschedule the loans of defaulting members or to raise funds from borrowers during a normal year to cover such contingencies. Finally, there is also the question of optimal group size, since groups beyond a certain size may experience increased difficulty of communication and coordination so that both information and monitoring advantage of group formation are diluted. Further, disincentives attached to reneging on contracts diminish as each member expects that the effect of his/her action on other members will be diluted (Glance and Huberman, 1994).

To sum up, theory suggests advantages and disadvantages regarding loan repayment in groups compared to individual contracts. Empirical evidence is scant so far, and from a policy point of view, it would be important to know the conditions

under which groups perform well or badly so that changes in policy and institutional design can be made to improve performance.

3. STRUCTURE OF GROUP-BASED SYSTEMS: THE CASES OF ASA, BRAC, AND RDRS

This section provides some pertinent information on key institutional characteristics and repayment structures of ASA, BRAC, and RDRS.⁴

(a) *Association for social advancement (ASA)*

Credit services provided by ASA, an NGO with a large and diversified portfolio of activities, is administered through its Income Generation through Credit Program (IGDP) that was launched in 1989 (ASA, 1992, 1993). The objective of the program is to increase income levels, and thereby the purchasing power of poor households. ASA expects to achieve this by extending credit facilities to female members of households for investment in various income generating activities. Activities financed by the credit program include paddy husking, cow/goat rearing, poultry farming, small trading, and handi-craft production.

Membership in an ASA Village Group is mandatory in order to qualify for a loan. Membership of such groups, however, is restricted to the landless poor, defined as persons owning up to 0.50 acres of cultivable land and whose income does not exceed Tk 1,200 per month, and who also sells her labor for at least 200 days in a year. Other requirements imposed on the borrower, all females, are: (i) no more than one borrower per household is allowed, (ii) the borrower must be a permanent resident of the village; (iii) the borrower may not be a member of more than one NGO; (iv) the borrower is required to make a down-payment of 15% of the total cost of the proposed project, (v) the borrower must be a group member for at least six months, and (vi) the borrower must be able to sign her name. There is a one-time membership fee of Tk 10 at the time of entry into the group. Loans are granted to individuals but the group is jointly liable in case of default. Nearly 190,000 members received loans under the program in 1993. Services of ASA covers 75 Thanas in 22 districts in Bangladesh.

The loans are for a one-year term, repayable in 50 equal weekly installments. The size of an individual loan ranges between Tk 1,000–Tk 5,000, with the average being Tk 2,500. All loans are charged an interest of 15% per annum. Further, borrowers are required to contribute 1% of the loan amount to an Emergency Fund maintained with ASA. This fund is

used as a buffer against possible future delinquencies.

ASA places a strong emphasis on savings. Saving a minimum of Tk 4 per week is mandatory. An ASA Community Organizer (CO) collects these savings along with loan repayment installments once a week. These are then put into individual savings accounts of the group members and earn an interest of 5% per annum. Interest rates are adjustable from time to time in line with the market rate.

(b) *Bangladesh rural advancement committee (BRAC)*

BRAC, one of the largest NGOs in Bangladesh, initiated its credit program in 1976 (BRAC, 1991). The present form of the program, which was introduced in 1990, is known as the Rural Credit Project (RCP) and is an important component of the larger Rural Development Project. The credit program is group-based and its objectives are four-fold: (i) to generate employment opportunity for both males and females, (ii) to mobilize under- and unutilized resources, (iii) to assist in diffusing appropriate technology in the rural areas, and (iv) to promote better health care. As with ASA, credit is granted to individuals, but the group as whole is denied borrowing privileges in case of default.

The cumulative amount of loan disbursed through RCP over 1990–92 stood at Tk 1,745 million and during 1992, short-term loans accounted for 94% of total disbursement. Loans are generally extended for a specified line of projects. In 1992, for example, rural trading and food processing accounted for nearly 73% of the loans. Livestock, agriculture, rural industry, and irrigation account for another 23%. Consumption loans are also made, mainly to refrain households from selling assets during emergencies. An interest rate of 20% per annum is charged to all loans. As of June 1993, 70 branches of RCP were in operation with a coverage of 379,000 members.

Membership of a BRAC's Village Organization (VO) is mandatory in order to be eligible for a loan. Only the landless poor, defined as people owning less than 0.5 acres of land, are eligible for membership to such organizations. Though each VO has 45–55 members, they are split into a number of functional groups comprising five to seven members each. Other conditions have to be met too. Important among them are: (i) members should be committed to BRAC principles; (ii) must generate savings equivalent to 5% of the first loan amount, 10% for the second loan amount and 15% for the subsequent loans; and (iii) must complete the social awareness education course offered by BRAC.

Savings, which are collected along with weekly loan repayment installments, are deposited into

individual saving accounts. In addition, 4% of the loan amount is deducted at source and transferred to a Group Trust Fund. This fund, which is managed by the group as a whole, may be used, if the majority agrees, to extend grants to members in times of emergencies caused by idiosyncratic events such fire, tornado, or death in the family. All types of savings earn an interest of 9% per annum.

(c) *Rangpur Dinajpur rural service (RDRS)*

The credit program of RDRS/MSFSCIP is the product of a collaboration between the Government of Bangladesh, the International Fund for Agricultural Development (IFAD), and Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ). The program is driven by an objective to arrest the marginalization process of the marginal and small farmers in the district of Kurigram, situated in the northeastern corner of Bangladesh (Dupuis, 1994; MSFSCIP, 1995). Internal funds of the program are not used for lending; rather, the program serves as a 'link' between borrower groups and branches of four commercial banks. The current form of the program was initiated in 1989 and the first 300 groups were declared to have reached their 'bankability status' in 1991. Loan disbursement started in 1992. Total outstanding loans by the end of June 1994 was Tk 25 million.

Two categories of groups are formed: groups for marginal farmers (cultivating up to 1.5 acres) and groups for small farmers (cultivating between 1.5 to 2.5 acres of land). The formation and functioning of marginal farmers groups are supported RDRS; the small farmers, on the other hand, are grouped by the Department of Extension of the Ministry of Agriculture. Size of the group ranges from 10–20 persons. RDRS trains and advises both these groups and eventually certifies them as being bankable. The group, at this point, opens a bank account and makes a deposit of savings that are compulsorily mobilized from the members during the period of training. Certification of creditworthiness granted by RDRS is recognized by the participating banks and lending begins. Participating banks include three nationalized commercial banks and one agricultural development bank. The Agricultural Credit Project Department (ACPD) of Bangladesh Bank supervises the banking part of the special credit program.

Credit is provided to members without collateral. The first loan is given to only 50% of the households. Loans are extended to the other 50% only when the group has correctly paid the installments for the first set of loans. The interest rate is linked to the market rates and was 12.5% per annum during December 1994.

Considerable emphasis is placed on savings. A

minimum Tk 1,000 needs to be deposited in the bank before the first loan application made. An additional 4% up and above the interest rate is collected on loan until a special fund, the group-owned guarantee fund, reaches 10% of outstanding loans.

4. EMPIRICAL ANALYSIS

(a) *Data*

During 1994, the International Food Policy Research Institute (IFPRI) conducted a survey of 128 borrower groups participating in group-lending programs of BRAC, ASA, and RDRS (Zeller *et al.*, 1996). These groups were randomly selected from 41 villages in 11 *thanas* across Bangladesh and a formal questionnaire was administered to the chairperson of each group.⁵ For each group, all loans received by its members from the relevant NGO institution and their repayment status were recorded; however, the actual recipient was not disclosed to maintain anonymity that was found necessary for eliciting accurate but sensitive loan and repayment information. A total of 1,725 loan transactions were recorded. For this analysis, a subset of 868 transactions was chosen for which the contracted repayment date had passed at the time of the interview. Out of these, there were 116 cases where delinquency in repayment was observed. Delinquency for all groups was defined as the failure to meet repayment obligation at the date complete repayment was promised. The rate of delinquency was then computed as the proportion of the total loan amount in arrears at this promised date. The survey also obtained information on the process of group formation, socioeconomic characteristics of group members, internal rules set by the groups themselves, and loan transactions of the group.⁶

(b) *Econometric specification*

The dependent variable used in this study is the delinquency rate (*DELIQ*) defined as the proportion of the total loan amount in arrears at the date when complete repayment was promised. *DELIQ*=0 implies complete repayment on time, whereas *DELIQ*=1 would imply complete delinquency. There were no cases of the latter. The repayment function is defined as follows:

$$DELIQ = f(LNSIZE, \mathbf{X}, \mathbf{Z}, \mathbf{M}), \quad (1)$$

where *LNSIZE* is the loan size, *X* is a vector of group characteristics, *Z* is a vector of community characteristics, and *M* is a vector of lender characteristics. Note that this function is defined only for

$LNSIZE > 0$. We specify a function with the property that

$$\begin{aligned} DELIQ_i^* &= \beta_1(LNAMT) + (LNAMT)\mathbf{X}\beta_2 \\ &+ (LNAMT)\mathbf{Z}\beta_3 \\ &+ (LNAMT)\mathbf{M}\beta_4 + e_i, \end{aligned} \quad (2)$$

$$\lim_{Lnsiz \rightarrow 0} DEFAULT = 0$$

$$Lnsiz \rightarrow 0$$

This is a reasonable assumption, since defaults on small loans are indeed likely to be zero. When equation (1) is a linear function, this specification is achieved by interacting $\mathbf{X}$, $\mathbf{Z}$, $\mathbf{M}$ with $LNSIZE$, as in equation (2). A corollary of this assumption is that the effects of $\mathbf{X}$, $\mathbf{Z}$, $\mathbf{M}$ on the default rate are, quite reasonably, made conditional on the loan size, i.e.,

$$\frac{\partial(Deliq)}{\partial \mathbf{X}} = g_x(LNSIZE)$$

and similarly for $\mathbf{Z}$ and $\mathbf{M}$.

In addition, because the dependent variable is truncated at zero (group repays fully), the estimating equation is specified more generally as (for the i -th group):

where $DELIQ_i = 0$ if $DELIQ_i^* \leq 0$ and $DELIQ_i = DELIQ_i^*$ if $DELIQ_i^* > 0$.

In this framework, $DELIQ_i^*$ is a latent variable observable only when it takes a positive value. Equation 2 is estimated by using the TOBIT maximum likelihood technique (Maddala, 1983). Since heteroskedasticity results in a highly inconsistent maximum likelihood estimator, the model was tested, and subsequently corrected for heteroskedasticity, based on the method proposed by Greene (1993). The variance of the error term, σ_i , is specified multiplicatively as $\sigma_i = \sigma e^{\omega \mathbf{Z}}$ where $\mathbf{Z}$, in this study, is the loan size ($LNSIZE$). The likelihood ratio test (comparing the unrestricted heteroskedastic model with the restricted homoskedastic model) led to the rejection of the null hypothesis that $\omega=0$ at the 5% confidence interval ($\chi^2_1=467.85$).

(c) Regressors, hypotheses, and discussion of results

Table 2 provides the means of variables used and also presents results of the TOBIT estimation of the

Table 2. Determinants of default on group loans (TOBIT)^a

Variable ^b	Mean ^c	Units	Coefficient	T-Ratio
<i>LNAMNT</i>	12.031	Taka	0.11×10^{-4}	4.922*
<i>(LNAMNT)²</i>	25.5×10^7		-0.35×10^{-11}	-0.23
<i>GROUPSIZE</i>	12.5	number	0.18×10^{-7}	1.48
<i>M_LAND</i>	0.50	acres	-0.14×10^{-7}	-2.06*
<i>VARLAND</i>	1.62		-0.33×10^{-6}	-0.73
<i>RATION</i>	25.0	percentage	-0.54×10^{-7}	-3.85*
<i>(RATION)²</i>	5,140.0		0.46×10^{-10}	2.26*
<i>RELATIVES</i>	51.5	percentage	0.19×10^{-7}	1.82**
<i>SHOCKS</i>	22.0	number	-0.46×10^{-7}	-2.68*
<i>AG_PROP</i>	8.00	percentage	-0.56×10^{-5}	-2.88*
<i>M_DRT</i>	35.00	percentage	-0.19×10^{-4}	-4.43*
<i>PCFEMALE</i>	87.0	percentage	-0.57×10^{-7}	-6.73*
<i>DUMINTD</i>	0.30	dummy variable	0.15×10^{-5}	3.60*
<i>LN_AGE</i>	1.55	years	-0.35×10^{-7}	-0.15
<i>DISTANCE</i>	12.0	miles	-0.18×10^{-6}	-2.19*
<i>SAMITY</i>	0.23	number	0.97×10^{-6}	1.612**
<i>FFW</i>	0.23	dummy variable	-0.11×10^{-5}	-1.63**
<i>IRRI</i>	30.0	percentage	0.18×10^{-7}	1.88**
<i>PARTRATE</i>	200.0	per '000	-0.69×10^{-8}	-3.86**
<i>DUMGTZ</i>	0.013	dummy variable	-0.18×10^{-5}	-0.26
<i>DUMBRAC</i>	0.71	dummy variable	0.41×10^{-5}	2.71

^aNote: Log likelihood = -438.7.

^bEach variable is interacted with loan size.

^cMeans of regressors before interaction with loan size.

*Significant at the 10% interval.

**Significant at the 5% interval.

default equation. Below, we define regressors, present hypotheses, and interpret results. Each hypothesis is marked (+) or (−) according to whether the regressor is expected to have a positive or negative relationship with the delinquency rate. This expectation is then tested and discussed using the estimated regression equation.

GROUPSIZE represents the number of people in the group. The hypothesis is that the bigger the group, the more imperfect are flows of information likely to be between members. Hence, problems arising out of asymmetric information make monitoring and enforcing costly and less effective. Rates of default are therefore expected to increase with group size. The sign of the coefficient in the estimated equation is positive; however, it is marginally insignificant at the 10% level.

$LNAMNT$ and $(LNAMNT)^2$ are the value of a loan, in Taka, and its square, respectively. We postulate a two-pronged hypothesis. First, the greater the loan size, the greater the probability of unwilling default (+). This is because in the event of project failure, the borrower or group will find it more difficult to meet repayment obligations out of their personal funds. But, because the credit programs charge an incremental penalty rate of interest on delinquent loans after a certain date, the larger the loan, the higher is the penalty cost associated with any delinquency rate $[(1+r+p) \times LNAMNT]$, where p is the incremental penalty rate of interest. The second factor puts pressure on the borrower to reduce the delinquency rate (−). This consideration is important, since most arrears are eventually paid, even if late (as opposed to complete default). It is for this reason that a squared term is included. The coefficient on $LNAMNT$ is positive and significant and therefore supports the first part of the hypothesis. Though the sign of the coefficient on the squared term is as expected (−), it is not statistically significant.

M_LAND is the mean level of land owned by the group. Since it reflects ownership of an important asset, it was hypothesized that it would enhance the capacity of the group to repay loans on time (−). In the equation, the effect of land ownership on the delinquency rate, essentially an effect of wealth and risk-bearing capacity, is found to be negative and significant, as expected. This indicates the importance of even a marginal difference in land owned, since all three programs, especially BRAC and ASA, limit their lending to persons belonging to households that own less than 0.5 acres of land. This result may be partly due to the high marginal productivity of land at such low levels.

VARLAND is the variance of the land owned by members of a particular group. This variable was used as one indicator of the portfolio diversity among members of a group. It is hypothesized that

the greater the diversity, the less covariant the incomes within the group. Hence, a higher variance is expected to be associated with a higher rate of repayment, as it could enable a better pooling of risk among members (−). While the sign of the estimated coefficient is as expected, however, it is not significantly different from zero, indicating, probably, that it was not a good indicator of portfolio diversity. The insignificance of the result may also be due to the fact that both ASA and BRAC use a strict criterion for land ownership of 0.5 acres or less as one of their eligibility requirements; hence variability of *VARLAND* in the sample is low leading to high standard errors.

RATION is computed as the difference between the value of the loan applied for in that particular transaction and the actual value of the loan received, and expressed as a percentage of the loan received. A higher value of *RATION* implies a higher level of unfulfilled credit demand. If this generates a greater concern for protecting future borrowing privileges, groups can be expected to increase efforts to lower delinquency rates (−). If the degree of rationing is too high, however, it is likely to render the loan amount more and more trivial (in comparison to the needs of the groups), so that the lender may not be anymore considered as a preferred long-term partner. Hence too much of rationing may decrease incentives to adhere to the contracted repayment schedule (+). In the regression equation, coefficients of both *RATION* and $(RATION)^2$ are significant and carry the expected sign, supporting both hypotheses.

RELATIVES measures the proportion of members in the group that are related to each other. Since information flows are expected to be better among relatives, there would be less moral hazard associated with bailing out a relative who is unable to meet the repayment requirements (−). But, cultural factors are important as they may make it difficult to impose sanctions on relatives and in this way dilute the enforcement process (+). (Indeed, some credit programs have rules against groups containing close relatives because of possible collusion; however this was not the case with the programs included in this study.) The estimated coefficient in the regression is positive and significant, implying that the latter effect outweighs the former.

SHOCKS is the number of different types of shocks (family emergencies, crop/income loss, major social events) in the last 18 months, reported by members of the group. The coefficient is obviously expected to be positive (+). Our results show, however, that it is negative and statistically significant and, therefore, contrary to expectation. This result is most likely due to the fact that the *SHOCKS* variable contains only incomplete information on the shocks received by groups. What is as important as the number of shocks, it seems, is their severity;

SHOCKS does not contain any information on magnitudes.

AG_PROP is the proportion of members of a group reporting agricultural production as the principal occupation. In 68% of the observations this had a zero value. The sample mean was 8% with a median value of zero. The base scenario is therefore one in which most members derive a major part of their income as wages (as on- and off-farm laborers) or as profits from off-farm microenterprise. This is because an important eligibility criterion used by both ASA and BRAC is that members do not possess land in excess of 0.5 acres. Hence, increases in *AG_PROP* from this base scenario serves as an indicator of diversity in principal enterprises. That is, as *AG_PROP* rises, incomes within groups are, to some point, likely to be less covariant (a better mixture of agricultural production, off-farm enterprises and wage earning activities), making it easier to bail out errant members (—). Further, since most households generally own very little land to begin with, those that report agriculture as their main occupation are likely to be tenant farmers who rent in land. Given this, they are also likely to have other borrowing privileges (e.g., from a landlord) that may be used to meet the repayment schedule of group loans. Therefore, unwilling default, on the average, is likely to be greater for those groups that have a lower share of members reporting agriculture as their principal occupation. Our result supports these hypotheses, since the coefficient is strongly significant with a negative sign.

M_DRT is the group-wise mean dependency ratio (proportion of children in total household size). In general, it is expected that the higher the dependency ratio, the more risk averse the household, since the consequence of adverse shocks is likely to be more serious as it affects children who are more vulnerable. Hence, *ceteris paribus*, the higher the dependency ratio, the better the repayment rate, since such groups would want to avoid risking reduced future borrowing privileges, or reduced access to special emergency funds(—) and life insurance schemes, such as those offered by BRAC and ASA. The coefficient in the estimated model is significant with the expected sign, supporting the hypothesis.

PCFEMALE is the percentage of group members who are female. This variable generates considerable interest as many of the group credit schemes in Bangladesh especially target women who, because of their relatively low social and economic status, bear a greater burden of the hardship arising out of poverty than do men. At the one extreme, it may be argued that because females are merely agents of their principals — the males (who make all the decisions) — no significant difference in repayment rates can be expected. The argument changes somewhat if limited autonomy is allowed in loan

use and enterprise management. Under this scenario, repayment rates may be expected to be higher for women because they are likely to choose less risky projects. There are two possible reasons for this. First, given that women have very limited experience in the market economy to begin with, they are extremely cautious in their business ventures and are likely to choose projects that are relatively less risky. Women may also choose less risky projects for a second reason: the cost of project failure is likely to be higher for females than for males. This is because, given pervasive gender inequities, project failure may lead to reprimand and significant negative sanctions against the woman within the household, and she takes account of this eventuality in her decision-making. If these two factors indeed result in choice of safer projects, then the delinquency rate can be expected to decline with *PCFEMALE*. The coefficient of *PCFEMALE* in the estimated regression equation is negative and significant, suggesting that the default rate decreases as *PCFEMALE* increases.

DUMINTD is a dummy variable that equals one when the group is initiated by an NGO agent and zero if the group formed on its own. It may be hypothesized that screening is more effective within groups that form on their own than within those groups that depend on the intervention from an outside agent. But, it is difficult to place an *a priori* expectation on the sign and the interest here is to examine whether the manner in which the group was formed makes a difference at all. The coefficient is significant and positive, indicating that delinquency rates are lower for groups that form on their own.

LN_AGE is the number of years from the date of the interview that the loan was procured. If each subsequent transaction reinforces the value of the credit service to the borrower, then one may expect the delinquency rate to decrease at each successive transaction. If this is indeed so, the delinquency rate on more recent loans would be lower than ones in the past (+). But, if borrowers perceive the relationship to be only transitory, then one can expect delinquency rates on later-date loans to increase. Hence, prediction on the sign of coefficient is ambiguous. In the estimated equation, the coefficient is negative, but not significantly different from zero.

DISTANCE is a community-level variable computed as the mean distance from the village to nine types of service centers, ranging from a post office to a health post to the nearest agricultural input dealer. The closer the village is to the service centers, the less remote and more buoyant the local economy is likely to be. Hence, delinquency rates are likely to be low (+). But, the estimated coefficient of *DISTANCE* is negative and significant and therefore does not support the hypothesis. A possible explanation may be the following: the more remote the village, the

greater the value placed on the credit services of the group programs, since other alternatives are less available (e.g., such as loans from traders, employers); delinquency rates therefore are low to avoid a loss of future borrowing privileges from this important and sometimes only source.

SAMITY is the number of informal mutual self-help and insurance groups in the village. The less the number of such groups, the more the value of an outside agency that provides insurance services. Therefore, lower delinquency rates can be expected (+). The coefficient is positive and just significant at the 10% level.

FFW is a dummy variable that equals one if the village has a food-for-work (FFW) program in place. Since *FFWs* are more likely to be placed in relatively depressed areas, poverty-related unwillful arrears in repayment are likely to be relatively large. The more impoverished the village, however, the greater the likelihood that its residents are rationed by other informal and formal lenders. Hence, the greater the likelihood that a greater value is placed on preserving continued access to these credit programs. Thus, the net effect on the delinquency rate is not clear. The coefficient is negative and significant at the 10% confidence interval, implying that the second effect is dominating and carries the important implication that areas with above average poverty rates can have better repayment records.

IRRI is the proportion of the cultivated area in the village that is irrigated. Higher levels of irrigation reduce the riskiness of agricultural incomes not only within the community, but may also benefit the income level of the group. Hence, unwilling default is likely to be lower(−). But, the estimated coefficient of *IRRI* is positive and significant. Though this is a result that cannot be satisfactorily explained, it should be noted that poorer households may actually own little irrigated land, even in villages that have high irrigation rates. This result, again, could be explained by the fact that group members in poorer villages place a higher value on access to formal credit.

PARTRATE is another community-level variable indicating the number of persons participating in group-based institutions per 1,000 inhabitants of the village. The greater the participation rate, the greater the demonstrated benefits of group-based lending in the community. This contributes importantly to the viability and the perceived permanence of participating institutions. Hence, delinquency rates are likely to be low as groups act to preserve transactions well into the future (−). The coefficient is negative and significant and support our hypothesis.

Finally, *DUMGTZ* and *DUMBRAC* are dummies for RDRS and BRAC, respectively, indicating whether delinquency rates vary across the institutions, even when all the other variables are

controlled for. Our results show that while there is no significant difference between ASA and RDRS, BRAC has a significantly higher delinquency rate than the other two. This, we note, is a result of the particular sample we use since BRAC, at the national level had a repayment rate of 95% in 1993 which is only slightly lower than that of ASA or RDRS.

5. CONCLUSIONS

This study examined repayment rates in traditional commercial banks operating in the rural sector in Bangladesh. It also analyzed delinquency rates among 128 groups belonging to three group-based NGO institutions that have made major advancements in delivering financial services to the rural poor. A number of conclusions are in order.

First, the repayment rates of group-based institutions are infinitely superior to those of NCBs, reiterating the fact that once the right institutional structures are in place, there need not be a major conflict between prudent financial management and lending to the asset poor. We observed that repayment rates of group-based systems are especially good in relatively remote communities, and even in communities that are likely to have higher than average rates of poverty. The secret seems to lie not just in innovations that reduce the cost of screening, monitoring, and enforcing loan contracts, but also in the successful demonstration to transactors in small rural communities that these innovations and institutions were not transitory phenomena, that they addressed their financial concerns, and that it was worthwhile for them to invest in a profitable long-term association. In fact, it is precisely this type of realization among borrowers that has contributed to the building up of a critical mass of social capital that supports these institutions. Without this critical mass, the joint liability would quickly flounder. Understanding the financial concerns of the poor is therefore indispensable; after all, there is little incentive for borrowers to build a lasting relationship with institutions that do not address their economic demand. It was noted that in all the three institutions, it was common practice to combine lending services with a range of vocational, social, nutritional, and entrepreneurial education is a good example. This is an important feature because when new activities or new technologies are introduced, it steps needs to be taken to ensure that they are properly understood by borrowers who are often inexperienced and illiterate.

Having said this, however, it is suggested that the process of group formation be made more endogenous to members themselves and less subject to external rules, once the minimum eligibility conditions have been met. Our analysis indicates that factors such as asset and enterprise diversity within

groups significantly affect repayment rates. A good mix of income activities, including agricultural production activities, is thus a desirable group characteristic. In general, potential members are in a better position to screen and select the best partners for group formation, giving due consideration to factors such as potential risk-pooling benefits by co-selecting members whose anticipated income and consumption shocks are negatively correlated.

Finally, the experience of group lending shows that the basic principles of prudential banking have to be adhered to at all times. Delivering finance to the poor should not be taken to mean that loan evaluation or rationing should be entirely dispensed with. On the contrary, loan size has to take into

consideration limited investment capacities and the limited risk-bearing abilities of the rural poor. In fact, our analysis indicates that delinquency rates do appear to increase with loan size. Hence, objective and realistic project evaluation is necessary prior to loan approval. In case graduated lending is considered, increases in credit lines should be granted only after a careful scrutiny of project risks and also be made conditional upon satisfactory previous repayment performance. It is important, however, to ensure that this evaluation of loan applications not be based on traditional forms of bias against gender, age or families with many children. As the results of our analysis indicate, these biases, however deep-rooted, are totally misplaced.

NOTES

1. We focus on loan repayment behavior of borrower groups. The term 'repayment rate' therefore refers to the extent to which groups abide by their contractual obligations to repay on time. It should be noted that good repayment rate is a necessary but not sufficient condition for good investment performance.

2. Of course group-based lending has not been the only innovation. BRI, a bank in Indonesia, successfully uses local agents to assess borrowers' creditworthiness.

3. More detailed reviews are contained in World Bank (1994, 1995), and Cookson and Alamgir (1993).

4. Those interested in a greater level of detail are referred to Jahangir and Zeller (1995).

5. The sampling technique used is fully described in Zeller *et al.* (1996).

6. These group characteristics are described in details in Zeller *et al.* (1996).

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